


MASTER THESIS

BUSINESS ADMINISTRATION, FINANCIAL MANAGEMENT TRACK



THE EFFECT OF UNDERWRITERS' REPUTATION ON AFTERMARKET IPO PERFORMANCE

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This thesis is written as the result of my graduation assignment in the finalization of the masters' programme Business Administration at the University of Twente. In the past year, I focused myself on the highly interesting topic of IPOs.

In the process of writing my thesis, I found that a lot of factors place an influence on the outcomes of IPOs and inherently, on the perceived success of the IPO. Most research is carried out trying to explain phenomena which can be influenced by external stakeholders, such as regulators, banks and institutional investors. I challenged myself with the assignment to explain IPO performance by using factors which the management of the issuing company can place an influence on. Whilst scoping my thesis, I focused upon the choices management has to make in successfully guiding their company towards a publicly traded status. I am happy with the results of my thesis, showing effects on multiple levels of analysis. I expect that this thesis will provide insights which can be used by management to support their choice in finding an appropriate underwriter.

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- Leo Snippert, December 2015

CONTENTS

Acknowledgements	2
Contents	3
List of Figures	5
Management summary	6
1 Introduction	7
1.1 IPO	8
1.2 IPO process	8
1.3 Problem identification and relevance of the study	9
1.4 Thesis outline	11
2 Literature Review	12
2.1 IPO underpricing - definition	12
2.2 Causes of underpricing	13
2.3 Change in underpricing	16
2.4 Consequences of underpricing an IPO	17
2.5 Explaining IPO performance	17
3 Research Question	20
3.1 Problem statement and composition of hypotheses	20
4 Methodology	22
4.1 Measuring long-term stock performance	22
4.2 Underpricing	22
4.2.1 Continual price adjustment approach	22
4.3 Underwriters' reputation	23
4.4 Data collection	24
4.5 Analysis Scheme	26
5 IPO performance: Descriptive statistics	27
5.1 IPO performance "as is"	27

5.2	Underwriter's reputation	28
5.3	Industry codes	30
5.4	IPO year	31
6	The influence of Underwriter Reputation on IPO performance	32
6.1	Main effects	32
6.2	Interaction effects	32
6.3	Results based on hypotheses	33
7	Conclusion & Limitations	34
7.1	Conclusion	34
7.2	Limitations	35
7.3	Future research	35
8	References	36
Appendix A	Summary of Standard industry classification codes	39
Appendix B	Descriptive statistics (Underpricing per sic-group)	40
Appendix C	Descriptive statistics (IPO Performance after IPO (per Sector))	41
Appendix D	Underwriters based on reput scores (percentiles)	42
Appendix E	Anova test (Repeated Measures) – between-subjects effects table	43
Appendix F	Syntax used in statistical analysis	44

LIST OF FIGURES

Table 1 - Costs incurred by ipo (Pwc, 2012)	10
Table 2 - IPO underpricing ranging from 2001-2013 (Ritter, 2011)	16
Table 3 - Summarizing Figure of Determinants of Short- and Long-run IPO Performance	19
Table 4 - Analysis Design	26
Table 5 - Summary of IPOs-per-Underwriter (REPUT Scores).....	29

MANAGEMENT SUMMARY

This thesis aims to provide suggestions for IPO issuing companies in their search for an underwriting bank. In order to enable a statistical analysis, this thesis assumes that issuers are willing to maximize the performance of their IPO. Data was retrieved using different data sources such as WRDS and COMPUSTAT North America, complemented with a dedicated IPO database. Based on this data, it is concluded that the sector in which an organization conducts business sets a particular growth path, varying between different sectors.

The General Linear Model of Repeated Measures was used for analyzing the effect of the reputation of the underwriter on IPO Aftermarket performance. The results outlined in Section 6 are provided by the ANOVA test for a sample 324 of NYSE IPOs in the period 2000-2015 and comparing cases on industry sector and IPO year. Results of this study show that management can use the choice of underwriter to increase IPO performance. The main results of this thesis show that choosing “the right” underwriter provides significant positive effects on the performance of an IPO. Looking at the sample, an underwriting bank which has guided a lot of IPOs is considered to be influencing the IPO performance in a positive significant way, where the highest quartile performs best in general (main effect). Quite remarkably, the results show that a high underwriter reputation is not a guarantee for high IPO performance, when controlling for sectors. We find that certain underwriters (for example Goldman Sachs) perform differently over certain industries. Based on the interaction effects found in the GLMRM analysis, it is concluded that an organization should choose an underwriter based on their primary industry of business and secondly on reputation score. The impression of a higher reputation resulting in a higher IPO performance holds for the financial sector, but for the retail sector a reputation score of 3 is most likely to induce the best IPO aftermarket performance. For companies willing to issue their IPO, it is best to first check the industry-specific performance of the underwriting, before selecting the overall top-rated underwriting bank.

1 INTRODUCTION

Nowadays, fast emerging markets and companies account for a significant part of the economy. New industries have defined a new set of rules for businesses trying to become successful. Initial Public Offerings (IPOs), the decision to issue stocks to the general public, are a part of this growth. The stock market is a game of supply and demand. A price is set when supply and demand meet, like in any other market. The main benefit of the stock market is that the fair value of the stocks should increase over time, due to the increased business and profit numbers, increasing the worth of the companies.

In the short term, the stock prices fluctuate day-by-day; the sentiment on the stock market is relatively neutral. But the IPO market is growing noticeably. IPO stands for Initial Public Offering, but some stock analysts argue that it stands for "It's probably overpriced". A lot of newly public companies perform worse than the benchmark. Research by Loughran and Ritter found an underperformance averaging 5.1%. Still, a lot of investors are more than happy to invest in IPOs, encouraged by a small number of highly profitable examples such as Google and the acquisition of WhatsApp by Facebook. These examples cause a high profit expectation, resulting in a high number of investors signing in on the next IPO. A lot of IPOs are guided by private equity investors who want to cash out on their initial investments. Bearing in mind that these investors often have a great knowledge of the business and that during the IPO they are willing to sell (a large amount of) their shares, one could argue that they would not be willing to sell their shares if the future prospects were not good.

After "going public", public investors trade shares among themselves. The company selling shares is never required to repay the capital to its public investors. A lot of research has been conducted in order to obtain further insight into the dynamics of IPOs, generally concluding underpricing/undervaluation in the short term, and underperformance in the long term. This thesis aims to add further insights into the dynamics of these important events in business development. An IPO proves to be a unique way to stimulate further business growth and enables the attraction of new capital. However, management should be aware of the drawbacks of an IPO, the understanding of which this thesis contributes to.

1.1 IPO

Historically, an IPO, referred to the first time a company offered its shares of capital stock to the general public.¹ The objectives for “going public” are found in a demand to raise funds from the market to invest in a project, in promotional purposes, or in order to diffuse ownership structure.

The results of an IPO noticeably improve the financial situation of a company. From an accounting point of view, the debt-to-equity ratio is improved, resulting in an easier attraction of debt capital. Viewed from an internal perspective, the capital attracted through an IPO may be used to stimulate innovation and expansion financing. For investors, an IPO helps the current shareholders to “cash out” on their early investments in the firm. The desire to have a publicly traded stock, hence having a market-based valuation, also makes it easier to facilitate stock-financed acquisitions. By conducting interviews with CFOs, Brau & Fawcett (2006) found this acquisition motive to be the primary motivation for going public. A number of researchers have more closely examined companies’ desire to make acquisitions after going public. Celikyurt, Sevilir, & Shivdasani (2010), Brau & Fawcett (2006) Hovakimian & Hutton (2010), Hsieh, Lyandres, & Zhdanov (2009) all reported similar findings about a high frequency of acquisitions made by companies that had recently gone public. Shareholders benefit from an IPO by the increase in their shareholder value, and by gaining an opportunity to diversify their portfolio. However, the main reason for “going public” is found in a demand for building a stronger equity base as a starting point for financing further company growth. A stronger equity position often counts as a prerequisite for higher future leverage (Hamer, 2007).

1.2 IPO process

A typical IPO in the U.S. starts with the company choosing an investment bank to manage its IPO (Ritter, 2011). In order to lawfully offer and sell shares, a company has to register its offerings with the Securities and Exchange Commission (SEC). By filling out a registration statement, “form S-1”, a description of the company’s history, performance, business model and accounting statements is given. In this first statement a first price is offered, often within a range of \$2 (i.e. \$14-\$16 per share).

The SEC checks whether the S-1 is fully compliant with the applicable disclosure rules. Once given the status of “Offer effective”, the investment bank brings the company in contact with institutional investors. Based on management-based pitches, the institutional investors provide feedback. Investors provide indications of interest during this “road show”. In a process called “book building”, all of these indications are combined in a “book”, after which the investment bank prices the company.

Based on this road show and the interest of potential investors, both the issuer and book-runners decide to alter the first price range. Research has shown a downward revision resulting in less underpricing,

¹ <http://www.sec.gov/investor/alerts/ipo-investorbulletin.pdf>

and vice versa for upward revision. Hanley (1993) showed the altered prices compared to first-day returns, and found a first-day return of 3%, 11% and 50% for adjustments below, within and above original price range, respectively.

The final step in the preparation of an IPO is a validation of the interest of the institutional investors, followed by an allocation of shares. Shortly after allocating the shares, the trading begins (Sec, 2013).

The IPO process (along with IPO underpricing) is influenced by specific details of institutional frameworks.

1.3 Problem identification and relevance of the study

IPO underpricing (the difference between offer price and first-day trading results) is an interesting phenomenon to study in the area of finance. The motivation behind this study is broad attention for the reasons for underpricing IPOs. Chapter 2 contains a literature review in which various theoretical approaches to IPO underpricing are discussed in more detail. A distinction can be made between various empirical findings on IPO underpricing in different geographical areas, IPO underpricing reviewed along a time-axis, and several theoretical approaches to explaining the motivations for underpricing an IPO from different perspectives. However, Birkenbeul (2010) argues that management often puts great emphasis on the net proceeds of the IPO and IPO-related valuation results. This induces the danger that the IPO is seen as an end rather than a mean to an end (attracting new capital and facilitating growth). As stated before, in Section 0, an IPO should function as a starting point for strengthening the equity position of a company and thus creating a more positive debt/equity ratio, which in turn results in more space for attracting new financing. Despite various research studies on the topic of IPOs, only a few articles dive deeper into understanding the influence of pre-IPO factors on long-term performance. Jain & Kini (1994) compare operating performance before and after IPO, and conclude that operating performance tends to decline after an IPO. However, the investment landscape has changed since 1994, and thus this thesis will add new insights based on more recent IPOs.

Underpricing can be seen as the opportunity cost of a firm going public. Chen and Ritter (2000) found an average gross spread (the investment banking fee) of 7% of the proceeds of the IPO. For larger IPOs and IPOs outside the U.S., the gross spread is lower.

Hence, an offering price of \$10 yields a net \$9.30 for the issuing company. At an 18% underpricing rate, the end-of-day trading price will be \$11.80. The issuing company thus leaves 21.20% "money on the table", since a higher offer price would have yielded more capital for the issuing firm (excluding other costs such as auditing and legal costs).

The total costs of an IPO vary with the magnitude and scope of the IPO itself, based on variables such as the size of the offering, the complexity of the IPO structure, and the organization's readiness to go public (PwC, 2012). Some important variables include **direct costs**, such as underwriter costs, external auditing costs, legal fees, and financial reporting fees; **longer-term costs** such as the costs incurred by developing an external reporting fee, investor relations programme, and HRM functions; and **institutional costs** for devising incentive plans for executives and employees. To summarize the costs incurred during the "going public" process, a table is provided below.

TABLE 1 - COSTS INCURRED BY IPO (PWC, 2012)

Directly attributable to the offering (netted against proceeds)	Non-directly attributable (AANPASSEN) incremental organizational costs (expensed as incurred)
Underwriter discount (based on public registration statements (equals 5-7% of gross proceeds)	Tax and legal entity restructuring costs in anticipation of the IPO
Legal, accounting and printing fees associated with drafting the registration statement and comfort letter	Additional audit, interim/quarterly review costs, advisory accounting and other costs to make the financial statements S-X compliant
Road show expenses	Valuation reports
	Costs to draft new articles of incorporation, audit committee charter, by-laws, and other agreements

On average, the amount of directly attributable costs is \$3.7 million, and more than \$1 million of one-time costs as the result of going public (PwC, 2012). Unfortunately, the impact of those costs varies significantly, based on management decisions. For example, the underwriter is sometimes entitled to sell more than the amount of shares initially set. This option is called the Green Shoe option. The issuer decides whether or not the over-allotment is integrated in the underwriting agreements. However, management does not influence all costs of external parties, such as the underwriter. The average IPO leaves \$9.1 million on the table, an amount equal to years of operating profits for many of the companies going public, and an amount equal to approximately twice the direct fees paid to underwriters (Loughran & Ritter, 2002). Taking a closer look at the work of Loughran and Ritter, it is evident that most IPOs leave relatively little money on the table. Extreme outliers influence the average amount cited. Those IPOs are characterized by a higher offer and market price than anticipated by management. Thus the amount of money left on the table is integrated into the gained wealth. Loughran and Ritter argue that the management is distracted by the net proceeds of the IPO, thereby placing less importance on the pricing strategy.

By approaching the reputation of the underwriter of an IPO as an explanatory variable for IPO performance, this thesis will focus on the relation between the underwriters' reputation and post-IPO performance of the company that went public. Examining this perceived relationship will contribute new insights to existing literature. Management can use this knowledge to prevent an unnecessary underpricing and thus leave less "money on the table".

1.4 Thesis outline

The first section of this thesis contains an introduction about IPOs, the IPO process in the U.S., and the relevance of this thesis. Section 2 presents the literature review. Section 3 provides the construction of the research question, the problem statement, and the composition of the hypothesis. In Section 4 the methodology is described, followed by Section 5, which contains the descriptive statistics of the variables used in this thesis. In Section 6, the empirical research and results are presented. Finally, Section 7 provides the conclusion and limitations of this thesis.

2 LITERATURE REVIEW

Within this thesis, IPO performance is reviewed by examining related literature in more detail. IPO performance is often viewed from two different points in time. Hence this review first looks at the IPO performance in the short term, conceptualized in *Underpricing*. Literature explaining short-term IPO performance by examining the performance from an underpricing/ undervaluation point of view is reviewed in section 2.1 and 2.2. Section 2.3 reviews literature about the amount of underpricing present during the years present in the sample, followed by section 2.4 which explains the consequences of underpricing. Section 2.5 presents a literature review focusing on the long-run performance of IPOs. Within both fields of research multiple stakeholders are accounted for, such as the issuing company, future private investors, the underwriting bank, and institutional investors. Reviewing the literature from both fields of research provides a balanced overview.

2.1 IPO underpricing - definition

Multiple studies have closely examined IPO underpricing. Most studies view IPO underpricing as the difference between fair value of the company and the offer price, where price movements in the first day are part of the adaption process to fair valuation (Birkenbeul, 2010). IPO underpricing is thus defined as the difference in first-day closing price and the closing offering price at IPO. Many IPOs are traded at a higher price (listing price) than the initial price (offering price). This induces a belief that the company itself (or the investment bank) undervalued the potential of the company. Since the value of the stock increased in the first day of trading, the company could have set a higher offering price.

The causes for IPO underpricing are broadly discussed among academics. The various differences and significance of IPO underpricing have led to a strong belief that IPO underpricing causes a short-term investment opportunity.

Purnanandam & Swaminathan (2004) approach “underpriced” IPOs differently. Instead of comparing the offering price with first-day returns, hence calculating underpricing, they argue the presence of overpricing by comparing offering price to the fair value. The authors value IPOs by using price multiples before comparing those measures of fair value to the offer price. The authors obtained a surprising result by finding a systematic overvaluation of IPOs when compared to fundamentals. “Taking a sample of 2000 large-cap IPOs between 1980-1997, the median IPO firm is overvalued by about 50% relative to industry peers” (Purnanandam & Swaminathan, 2004).

Clearly, the phenomenon of underpricing is explained using various terms such as underpricing, overpricing, initial return, raw return, excess return, etc. All of these terms imply a slightly different explanation. For example, underpricing implies an informationally inefficient market (information asymmetry). Overpricing, on the other hand, implies an assumption of an informationally inefficient secondary market. Hence, by comparing different studies, a clear distinction must be made between the different approaches in explaining underpricing, including the phrasing of this phenomenon.

2.2 Causes of underpricing

Several theories are proposed for explaining the causes for the differences in underpricing IPOs. In order to assess these theories systematically, this thesis uses the headings/categories of Ljungqvist (2004), along the work of other authors as well. Related work in the field of causes for IPO underpricing is found to be specific in terms of sampling area, sampling period and stakeholders involved. By using the headings of Ljungqvist, a structure is provided in reviewing the diversified works about the causes of IPO underpricing.

Asymmetric information

Central stakeholders in an IPO process are the issuing firm, the underwriting bank, and the investors. Asymmetric information models make the assumption that one of these parties is better informed than the others. The underwriting bank is better informed about demand conditions compared to the issuing firm. This induces a principal-agent problem, in which the bank uses underpricing to stimulate selling efforts (Baron, 1982). Kleeburg (2005) argues that despite banks being better informed, the company itself should create a recognizable corporate image and build a foundation for a strong investor relations program. Kleeburg compares selling corporate shares with selling goods or services; hence the company itself has a responsibility for sales and related costs/efforts.

Allen & Faulhaber (1989) state that underpricing is part of a signal towards investors. Their “signaling” theory suggests that underpricing is a good predictor of future success, and that the costs of underpricing are handled in the future. If a firm has poor future prospects, the costs of underpricing cannot be covered, and so the firm will not underprice its stocks. However, Daniel (1994) found that underpricing is only used for signaling purposes in severely restricted strategy spaces. Moreover, underpricing is a very costly way of signaling future prospects to investors.

Rock, 1986) hypothesizes the “winner’s curse”, a tendency for wanting to have the winning bid in an auction. Rock defines two types of investors: the informed and the uninformed. The uninformed investors subscribe to all IPOs. The informed investors only invest in an IPO that is priced under intrinsic value. Incomplete information, emotions, media attention, and other factors can result in a higher (subjective) intrinsic value. This results in a “winner’s curse”, with the uninformed investors bidding a higher price than the offering price. Both informed and uninformed investors are needed to yield enough funds for all IPOs, so IPOs are priced under intrinsic value. Many studies have found evidence supporting this approach, but all tests lack causality checks. One could argue that underpricing is caused by adverse selection, or that rent-seeking behavior causing adverse selection is a result of underpricing.

Benveniste & Spindt (1989), assume that underpricing is a compensation for better informed investors for truthfully revealing information before the issue price is finalized.

Risk perspective

Ritter (1984) hypothesizes that IPOs with a higher level of risk are more underpriced than less risky IPOs, in order to compensate for the amount of risk involved. Ritter proxies risk based upon “ex ante observable accounting information” and “ex post stock market returns”. Ritter distills his hypothesis from models that account for underpricing as an equilibrium condition for investors to participate in the IPO market. Loughran & Ritter (2002) argue that, given an increasing amount of high risk IPOs, underpricing should be increasing too. However, Loughran and Ritter found the risk-return relation too stationary to explain the large differences in underpricing over time.

Rock (1986) concludes that underpricing compensates for the costs of being uninformed, by hypothesizing that a higher insecurity of the future leads to a higher required compensation for the investors. Both Rock and Ritter view underpricing from an investor’s demand-side perspective (Loughran & Ritter, 2002).

Institutional theories

“Institutional theories focus on three features of the marketplace: litigation, banks’ price stabilizing activities once trading starts, and taxes. (Ljungqvist, 2004)”

These insights based on institutional motives are important for broadening the knowledge of the IPO process and the influence of present dynamics in the legal environment. They make it possible to compare different economic and political areas by addressing various issues related to the IPO process and performance.

An increasing amount of research argues that the effectiveness of corporate governance mechanisms differs from country to country, moderated by institutional characteristics of an economic system. Earlier work that combines institutional theories with agency research shows that differences in national institutions impact the effectiveness of corporate governance at the firm level (Aguilera & Jackson, 2003). This results in riskier investor behavior in common law environments, since investors are able to sue management if they do not act in their best interest. According to (Hoskisson, et al. 2004), in civil law countries investors rely more heavily on “relationship” governance (network based). Thus, institutional frameworks can influence the behavior of investors, resulting in a different impact of various investors in an IPO.

Control considerations

IPO underpricing can be viewed from a management control-related point of view. Ljungqvist & Wilhelm (2003) argue that the cause for underpricing in 1999 and 2000 was found in a change of incentives. The pre-IPO ownership structure was changed during the process of “going public” with an IPO, including insider selling and an overall increased ownership fragmentation. During the internet bubble years, insider selling before the IPO caused a sharp decline in pre-IPO shares held by management. In the same period, both underpricing and business valuation skyrocketed. According to Ljungqvist and Wilhelm, this caused a declined interest in controlling the offer price of the IPO. Management is willing to take a loss by enabling underpricing, since its wealth increases significantly after the IPO.

Despite evidence from the internet bubble years, the incentive perspective does not explain the large differences in underpricing throughout the years. By taking a broader sample, Loughran and Ritter found a higher market value of CEOs' holdings, which should result in a higher incentive to prevent a significant underpricing.

Underwriter reputation

The literature suggest that the effect of the reputation of the underwriter plays a role in the amount of short- and long-term stock performance. The organization responsible for pricing the IPO is the underwriter. Next to pricing, the underwriter also organizes and executes the IPO. Depending on individual agreements per IPO, the underwriter may provide further services. Former studies emphasized the importance of an underwriter in the IPO process. Since this thesis focuses on the outcomes of an IPO instead of on the IPO process itself, it conducts a review of the influence of an underwriter on the gross proceeds of an IPO. Benveniste and Wilhelm (1997) found that issuers benefited from underwriters by yielding more gross proceeds from an IPO. Baron (1982) suggests that issuers have limited information about the market, and therefore the price-setting process is typically conducted by the underwriter alone.

Based on this process, the underwriter may underprice the IPO in order to increase the chance of its success (hence, a "cheap" IPO likely shows positive price developments in its first months). Moreover, since the underwriter organizes a road show, multiple profitable IPOs can contribute to its business (as seen from the buying side). Hence a potential conflict of interest between the underwriter and the issuer occurs. Issuers wish to maximize the amount of capital raised from their IPO (hence pricing higher), while underwriters want to price their IPO lower (creating more business in their own interest).

Booth and Smith (1986) assume that the investors in the markets judge the quality of firms issuing an IPO. The investors proxy the quality of the IPO by assessing the quality of the underwriter, by hypothesizing that normally an underwriter with a high reputation only underwrites high-quality IPOs. By doing so, the underwriter limits the possibility of issue failure. Therefore, hiring a highly prestigious underwriter enables the issuing company to impress investors with the quality of their issue. Krishan et al. (2011) found that IPOs backed by a high reputation VC (venture capital) firm had a better stock performance than firms backed by other VC firms.

Behavioral approaches

Rock's analysis, by hypothesizing that uninformed investors bid "too much", can also be seen from a behavioral perspective. The "irrational" investors bid up the price of the IPO beyond true and fair values. Another approach is found in issuers suffering from behavioral biases causing insufficient pressure to reduce underpricing. This approach shows an overlap with the findings of Ljungqvist & Wilhelm (2003). Overpricing the stock can cause possible lawsuits for the issuing company (Tiniç, 1988)

A “common sense” argument against underpricing being a motive to avoid lawsuits focuses on the impact of a lawsuit. Tiniç hypothesizes that underpricing is a motive to prevent future lawsuits (in case of overpricing), but in fact underpricing is very costly and carries no more weight than the costs of a possible lawsuit (Ritter, 2011). Therefore, Tiniç accepted his hypothesis, but defined the risk of possible lawsuits for the U.S., a typical litigation environment. Hao (2011) on the other hand, reports no significant relation in underpricing and subsequent litigation risks.

In summary, empirical evidence supports information asymmetry as causing principal-agent problems. Evidence based on institutional theories is more mixed. Adjusting for litigation, price stabilization and taxes, no significant differences are found in the literature. In other words, underpricing is also found in IPO markets with no clear influence of litigation, price stabilization and taxes. Underpricing viewed from a risk perspective only yields stationary evidence, and does not explain the change in underpricing over time. Section 2.3 dives deeper into the changes in underpricing at different sampling times.

2.3 Change in underpricing

Throughout the years, multiple authors have studied underpricing, finding different results over different sampling times. In order to assess IPO performance consistently, changes in measured underpricing are reviewed using related work. Below, an overview of related work is shown.

Loughran & Ritter, 2004) found a difference in underpricing by comparing different sampling times. Ibbotson (1975) was one of the first authors who concluded significant positive first-day results on stocks that went public. He found a significant average return of 11.4% during the period 1960-1969. The 1980s were characterized by an average underpricing of 20%. For 1990-1998 underpricing averaged 15%, followed by an excessive underpricing of 65% during the bubble years 1999-2000 (Loughran & Ritter, 2002).

Jay Ritter continued to analyze the phenomenon of underpricing by keeping track of IPOs and their underpricing. Table 2 is constructed based on his data.² After the excessive bubble years of 1999 and 2000, underpricing levels returned to an average of 12.4%. Correcting for the low values during the “crisis” years 2008-2009, underpricing averages 13.6%. *A note must be made here since*

Year	IPOs Priced	Underpricing
2001	79	14.2%
2002	66	9.1%
2003	63	11.7%
2004	173	12.3%
2005	160	10.2%
2006	157	12.1%
2007	159	14.0%
2008	21	6.4%
2009	41	9.8%
2010	93	9.1%
2011	81	13.3%
2012	93	17.9%
2013	157	21.1%

TABLE 2 - IPO UNDERPRICING RANGING FROM 2001-2013 (RITTER, 2011)

² <http://bear.warrington.ufl.edu/ritter/IPOs2013Underpricing.pdf>

Ritter's sample excludes American Depositary Receipts (ADRs), unit offers, closed-end funds, Real Estate Investment Trusts (REITs), partnerships, small best efforts offers, banks and S&Ls (Savings and Loan associations), and stocks not listed on CRSP (Center for Research in Security Prices).

2.4 Consequences of underpricing an IPO

As previously described, IPO underpricing implies money being left on the table. It seems that companies are willing to accept these losses. Along the way, others pick up this money. In order to obtain further insights about who benefits from IPO underpricing, it is necessary to more closely examine which group of investors receives the highest amount of allocated shares (Birkenbeul, 2010).

A small number of studies have been conducted with regard to the allocation of shares after an IPO. Hanley and Wilhelm (1995) conducted an analysis on a sample of 38 IPOs managed by a single underwriter. They found that 70% of the shares were allocated to institutional investors. Aggrawal et al. (2002) found similar results by analyzing 164 companies that went public shortly before the internet bubble (1997/1998), finding a median of 75% allocation of shares to institutional investors.

The results mentioned above were gathered in the U.S. IPO market. In a sample of 1031 IPOs in 37 countries between 1990 and 2000, Ljungqvist & Wilhelm (2003) found that share allocations to institutional investors were double those received by retail investors.

Generalizing the results of Ljungqvist and Wilhelm while taking into account earlier results from the U.S. IPO market, institutional investors seem to profit the most from the underpricing phenomenon.

2.5 Explaining IPO performance

A wide consensus is found among authors who claim that the phenomenon of "underpricing" causes excessive returns in the short term. If first-day returns are seen as the intrinsic value of an IPO, significant underpricing is found. The review paper by Khan, Anuar, & Malik (2014) provides a benchmark that shows that underpricing occurs in almost every country with a stock market. Depending on the period of time examined, the average IPO has a first-day return between 10 and 20%. As previously discussed, the causes for this underpricing are hypothesized from several perspectives. Ranging from initial undervaluation to overreaction of investors, multiple causes are discussed in the literature (Friesen & Swift, 2009).

Aggrawal et al. (2002) argue that managers create a momentum after the IPO by enabling underpricing. An increase in research coverage then leads to a higher demand for the stock, driving the price up. Brav and Gompers (2003) find a 60% insider selling behavior rate just before the expiration date.

Ritter and Welch found that positive first-day returns are followed by a long-term underperformance. An explanation for this is found in the overreaction to new information on the first day of trading. Overreaction drives the price above the fundamental value of the stock, but in time the prices convert back to fundamental values. However, underperformance can only be attributed to overreaction if the IPO was not initially overvalued. As discussed in Section 2.1, Purnanandam & Swaminathan (2004)

note an IPO overvaluation of as much as 50%, on which one can suggest that negative long-term performance is the result of an initial overpricing/overvaluation.

Early work by Ibbotson (1975) shows a negative relation between underpricing and long-term IPO performance by reporting positive results in the first year and negative results in the following three years. Ritter (1991) found, in a sample of U.S. IPOs between 1975-1984, an underperformance of about 29% in the three years after IPO. Carter et al. (1998) found a 19.92% underperformance of U.S. IPO firms.

In other countries, this underperformance is also noticeable, except for Sweden (Loughran & Ritter, 2004) and Korea (Anthes & Nash, 2000). Most research uses a time window of about three years after IPO.

Explanations for underperformance in the long run are found in different perspectives. Explaining long-term performance using underpricing models is an extensively tested method. For example, Weiss tested the price range of IPOs, but did not find any significant evidence of higher IPO performance for companies priced close to the upper range of the initial price range. In line with Tiniç, Hughes and Thakor (1992) propose that underperformance is caused by exclusion of legal costs that occur after IPO. Hao (2011) did not find support for this motive, since most developed countries do not have significant litigation risks.

There is a hypothesis that underwriters keep the price high: then, once the underwriter decides to withdraw the price support, prices drop to their intrinsic value. Ljungqvist (1996) and Rudd (1993) both tested this hypothesis, but their results were inconclusive.

Ritter argues that companies go public during a period of over-optimism. Investors are willing to pay extra based on high expectations of growth after IPO. As more information becomes available, long-term performance declines due to a decreased investor sentiment. Since investor sentiment is hard to measure, it is difficult to test this hypothesis.

Jain & Kini (1994) investigated the relation between long-term performance of an IPO and ownership. They found a significant positive effect between the amount of equity retained by original shareholders and long-term IPO performance. Mikkelsen et al. (1997) found no evidence of a relation between long-term performance and ownership structure.

Ritter (2011) found that the IPO volume declined in the period 2001-2010, compared to 1990-2000. He also found a similar effect in the period between incorporation date and listing date. The median age of firms going public in the U.S. increased from seven years (1990-2000) to 10 years (2001-2010). This effect has been attributed to new regulations, but could also be a proxy for ensuring the quality of a firm before going public. In explaining the increased age at the moment of IPO, Gao et al. (2011) found a decreased profitability among young firms and argue that underwriters are more willing to take a profitable company public. In Chapter 4, these findings are translated into hypotheses.

Research on long-term IPO performance is highly differentiated, and often focuses on very specific constraints. In Section 4, these key factors are translated into hypotheses, after which a methodology is presented. The figure provided below illustrates the different factors influencing IPO stock performance.

Determinants	Previous studies	Sign (S-T PERF)	Sign (L-T PERF)
Pricing of IPOs (upward revision of initial price)	Ritter (2011)	+	
Underwriters' reputation	Loughran and Ritter (2004) Cliff and Denis (2004) Krishan et al. (2011)	+	+
Change in ownership structure	Mikkelsen et al. (1997)		N.S.
Signaling	Allen and Faulhaber (1989)	+	
Age of firm	Ritter (2011)	+	+
Profitability	Gao (2011)		+
Ownership equity retention	Jain and Kini (1994) Mikkelsen (1997)	+	

TABLE 3 - SUMMARIZING FIGURE OF DETERMINANTS OF SHORT- AND LONG-RUN IPO PERFORMANCE

N.S. = Not Significant

Empty Cells = Not studied

S-T Perf = Short-term performance

L-T Perf = Long-term performance

Underpricing has been subject to change in the last decades. Despite the various efforts made by academics to obtain further insights into the causes of underpricing, a clear explanation is not yet known. Changed regulations, new industries and different behaviors of lead investment banks all seem to play a significant role.

Recent work of Loughran and Ritter, Cliff and Denis, and Krishan et al. found positive significant effects of the reputation of the underwriter on IPO performance. This thesis takes a closer look at this effect by analyzing a sample of US IPOs listed on the New York Stock Exchange (NYSE). In section three, the research question is formulated and hypotheses are constructed.

3 RESEARCH QUESTION

In order to systematically assess performance in this thesis, variables are constructed. Many³ articles have provided evidence for the existence of IPO underpricing (outperformance in the short run) and underperformance in the long run. However, most articles lack an explanation for this underperformance. As stated in Section 1.3, this thesis examines underpricing from the perspective of the involved organizations. In chapter 2, a review of the literature on both motivations for underpricing and factors influencing long-term performance was presented. In this chapter, an analysis will be made in order to shed new light on a proposed effect by explaining IPO performance using the reputation of the underwriting bank, and by conceptualizing that the choice of underwriter influences the IPO performance.

This conceptualization is translated into the following research question:

“What is the influence of the underwriter’s reputation on the aftermarket IPO performance?”

3.1 Problem statement and composition of hypotheses

This thesis focuses on the influence of the underwriter on IPO performance. In this thesis, five hypotheses are formulated. The operationalization of all variables involved in testing the hypotheses is done in Chapter 5.

According to the works of Loughran and Ritter (2011), Cliff and Denis (2004), and Krishan et al. (2011), the underwriter has an influence on the performance of IPOs. The thesis at hand focuses on this particular association. In fact, one could argue that a firm goes public to strengthen its own financial position instead of to help an investment bank make its profits. In earlier work by Loughran et al., most performance measures were taken in the first two years after an IPO. In order to map the hypothesized effect of underwriters’ reputation on IPO performance, the decision is made in this thesis to capture a longer time period, by sampling the first five years after the IPO of the issuing company. It is to be expected that IPO performance after 5 years is no longer influenced by the choice of underwriter.

Underwriters are employed during the IPO process to help issuers with the offering. Firms issuing an IPO mostly understand the demand dynamics in the market based on the information provided by the underwriter. By going through the IPO process and taking part in road shows and other marketing activities, investors obtain information about the issue. In line with the work of Booth and Smith (1986), the quality of service of the underwriter is conceptualized in a reputation score. The effect of the reputation of an underwriter is based on his or her quality of service. Having a high reputation indicates

³ Ritter (2011); Loughran & Ritter (2004); Jain & Kini (1994); Khan, Anuar and Malik (2014)

that the underwriter is more skilled in guiding issuers during their IPO process and thus is more likely to better inform investors. The underwriter's reputation may also be a proxy for the amount of risk incurred with the IPO, since a highly reputed underwriter does not want to expose him or herself to a high amount of risk (caused by a low quality issuer) (Krishan et al, 2011). Therefore, the following hypothesis is formulated:

Hypothesis 1: The reputation of the underwriter has a positive significant effect on the long-term performance of an IPO.

It is expected that a high underwriter reputation can be associated with a higher IPO performance, depending on the specific circumstances of the issuing company, such as the year in which the IPO is carried out, and the industry in which the company conducts its business. Therefore, the following hypotheses are formulated:

Hypothesis 2a: The effect of the reputation of the underwriter on IPO performance differs per industry sector, yielding a specific strategy for choosing an underwriter.

Hypothesis 2b: The effect of the reputation of the underwriter on IPO performance is influenced by macro-economic constraints.

4 METHODOLOGY

In this section, the methodology used in this thesis is explained. In order to answer the research question fully, the following approach is used. First the IPO performance is assessed, using a market-adjusted approach. This enables a descriptive analysis, in which macro-economic constraints are accounted for. After carrying out the descriptive analysis, an analysis is made in order to check whether the choice of underwriter has an effect on the individual IPO stock performance. The operationalization of the variable underwriter reputation is carried out in 4.3.

4.1 Measuring long-term stock performance

According to Ritter and Welch (2002), long-term stock performance can either be measured by raw stock returns or abnormal stock returns compared to the benchmark. This thesis focuses on the abnormal stock returns.

In order to measure long-term performance of IPO stocks, the Market-Adjusted Performance Measure can be used. Based on the work by Carter et al. (1998), this measure can be determined by calculating the difference between the daily individual stock performance R_{it} and the corresponding value-weighted market index return R_{mt} , taking a one-year window of time starting on the offer date + 252 trading days⁴(= d). This calculation is performed five times, corresponding to the five years after the IPO.

$$MAPM1_i(+d) = [\prod_{t=1}^d (1 + R_{it}) - \prod_{t=1}^d (1 + R_{mt})]$$

4.2 Underpricing

As defined in Section 2.1, underpricing is defined as the difference between the price at issue of a new share, and the price at the end of the first trading day. In the literature underpricing is divided into two categories: *ex ante* underpricing and *ex post* underpricing. *Ex ante* underpricing is measured by the discrete difference between the expected price on market and the offering price, while *ex post* underpricing is calculated using the realized first trading price and the offering price. This thesis uses *ex post* underpricing calculations.

4.2.1 Continual price adjustment approach

Ljungqvist (1997) used an alternative approach to calculating underpricing. Instead of measuring the discrete difference between the closing price and the offering price, Ljungqvist tries to measure a

⁴ Assumption: A year has 252 “trading days”days’. ([Wikipedia, 2015](#))

continual price adjustment between markets. In this thesis underpricing was calculated using the logarithm below:

$$UP_i = \ln\left(\frac{P_{i,t}}{E_i}\right) - \ln\left(\frac{M_t}{M_0}\right)$$

This study uses a mainly used approach in determining the amount of underpricing. Underpricing is calculated by subtracting the first days' results of the initial offering price. Studies show that taking a broader time span (i.e. a week) shows no difference (Ljungqvist, 2004).

Despite various efforts to adjust the perceived underpricing against market or risk profiles, different adjustment influences should be considered when analyzing IPO underpricing. Until now, no consensus has been reached for using a particular method. This thesis follows Ljungqvist's method by using the logarithmic approach.

4.3 Underwriters' reputation

After calculating the short- and long-term IPO performance in this study, variables are added based on the hypotheses formulated above. Whereas Carter et al. (1998) found a relation between long-term IPO performance and the choice of underwriter, only little work was found documenting the effect of pre-IPO factors/decisions on long-term IPO performance. Such factors include, for example, the time before management decides to make the firm public, how much equity is issued in the IPO, and which underwriter is chosen. All of these factors could have an influence on the IPO performance.

This thesis makes the assumption that the long-term IPO performance is a function of pre-IPO factors and the industry of the issuing firm. In order to analyze the perceived association of an underwriter's reputation on IPO performance, a General Linear Model of Repeated Measures (GLMRM) was conducted (ANOVA with Repeated Measures) using the following variables:

Industry: By creating sub-samples based on the industry of an issue, a more valid comparison is possible. Levis (1993) found differences in long-term performance when comparing different industries. For each company in the sample, the primary industry was retrieved using the SIC code. Secondly, the companies were divided into their corresponding SIC groups. Therefore, the industry is approached as an explaining variable in the GLMRM. A comprehensive table explaining SIC codes per industry is provided in Appendix A.

Year: Each year has its own number, representing the first five years after IPO. Data had to be recoded into new variables to ensure a valid comparison. In the GLMRM, an IPO is carried out in year 0. Therefore, the measurements have been carried out 6 times (0-5). This variable is used for the repeated measures.

REPUT: Within the available databases, the underwriter reputation was not available. Therefore, multiple datasets were combined and recoded to proxy the reputation of the underwriter. In line with Megginson and Weiss (1991), the lead underwriter is given full credit for the total amount underwritten. In order to calculate the reputation of an underwriter, the number of IPOs in the sample led by this underwriter is divided by the total number of IPOs in the sample. Based on this ratio, the underwriting banks were classified into four groups by taking the percentiles of the number of issues guided by that underwriter. A value of 1, 2, 3 and 4 is given to the first, second, third and fourth quartile respectively.

4.4 Data collection

Usage of databases

The data used in this thesis were collected from different data sources; a total of $n=324$ valid data entries were identified. Using the Wharton Research Database Services (WRDS), fundamental, market and stock information on active and inactive publicly held companies was obtained. The COMPUSTAT North America Fundamental Annual Dataset was used to complement missing data from the WRDS. It consists of quarterly and annual reports and information on industry segments, market prices and earnings. Companies with incomplete data were omitted from the analysis.

The initial sample of IPO data was retrieved from an IPO reviewing site⁵. This database contained the IPOs and their lead underwriters, which was used in calculating the reputation for each underwriter. The sample was adjusted to ensure external validity of this research, hence excluding specific financial constructions such as ADRs, unit offers, closed-end funds, REITs, partnerships, small best-effort offers, banks and S&Ls. Starting with a population of $n=2325$, the sample was narrowed down to $n=1747$.

Companies that went public and were acquired by or merged into new companies were also omitted from the sample. This thesis aims to take a close look at the “pure” operating performance of a company, hence excluding business growth caused by acquisitions. In line with this strategy, only IPOs are accounted for in this thesis. Therefore, secondary offerings, exit strategies, and reversed Leveraged Buy Outs (LBOs) were omitted from the analysis. The sample selected based on the number of priced IPOs includes IPOs on several stock exchanges. In this thesis, the sample was narrowed down by omitting IPOs from companies already listed on exchanges other than the New York Stock Exchange (NYSE). By doing so, the sample was reduced to $n=987$.

⁵ www.IPOScoop.com

The data is controlled for industry specific dynamics by dividing the data based on Standard Industrial Classification (SIC) codes. For some companies, the current primary SIC code could not be retrieved. Therefore, these companies were omitted from the analysis, yielding a sample of $n=935$. To identify the companies that were selected for this thesis, International Securities Identification Number (ISIN) codes were used. Motivation choosing ISIN codes instead of ticket symbols was that a ticker symbol (or small variations in a ticker symbol) can be used multiple times, and therefore could cause confusion.

Data Coding

The sample of $n=935$ was transposed into new columns by assigning the variables defined in Sections 4.1 and 4.2. Then the entries were recoded by SIC industry, by assigning the numbers 1-9 to the sectors of Agriculture, Construction, Finance, Manufacturing, Mining, Retail Trade, Services, Transportation and Wholesale Trade, respectively. Within the sample, industries with less than 12 valid cases or containing insufficient market price data were excluded from the sample. Furthermore, the underwriting banks were divided into four quartiles (percentiles) based on their number of IPOs. Certain IPOs in the sample were less than five years old, resulting in incomplete data about the market prices. Therefore these IPOs were excluded from the sample, making a selection of cases based on the IPO years 2000-2010 ($n=611$). Some of these organizations contained missing values and were therefore omitted, yielding a sample of $n=324$ for analysis.

4.5 Analysis Scheme

For all analyses the statistical software SPSS version 23 was used. To determine whether the reputation of the underwriter plays a role in how IPO performance develops over the run of six years, an ANOVA with repeated measures was conducted. The market price of the first year and the five following years were the repeated measure; the underwriter's reputation, industry sector, and the year of the IPO were taken as the predicting factors. For all analyses a standard alpha was used ($\alpha = .05$). Within the analysis, the following design was used, based on the hypotheses. First of all, descriptive statistics are calculated in order to produce an initial overview of the dynamics of the sample. Based on these descriptives, illustrative figures are derived. Secondly, a GLMRM analysis is carried out to verify hypothesis 1; *"The reputation of the underwriter has a positive significant effect on the long-term performance of an IPO."*

After interpreting the main effects found in the analysis, further analysis is carried out by analyzing the influence of the industry in which an issuer conducts its business in. Furthermore, the year in which a company conducts its initial public offering is accounted for in the analysis, hereby including macro-economic constraints, such as the financial crisis of 2008. A summarizing figure explaining the design of the analysis is provided below:

Analysis	Design
1 Descriptives	<ul style="list-style-type: none"> - REP_Quartiles - SICIndustry - IPOYEAR
2 GLMRM (Main Effects) (Hypothesis 1)	<ul style="list-style-type: none"> - REP_Quartiles - SICIndustry - IPOYEAR
3 GLMRM (Interaction Effects) (Hypothesis 2a and 2b)	<ul style="list-style-type: none"> - REP2*SICIndustry; - IPOYEAR*REP2; - IPOYEAR*SICINDUSTRY - REP2*SICINDUSTRY*IPOYEAR

TABLE 4 - ANALYSIS DESIGN

5 IPO PERFORMANCE: DESCRIPTIVE STATISTICS

Based on the research question, “What is the effect of Underwriters’ reputation on aftermarket IPO performance?” the following section contains the first step in analyzing this effect. By examining IPO performance from different points of view, some effects are visible. This section therefore provides a first overview of the IPO performance. This tackles the risk of “third variable effect”, a risk which occurs when an effect can be explained using other variables. The effect of the underwriters’ reputation will be tested in section 6, on which section 7 concludes.

5.1 IPO performance “as is”

In order to shed a light on the recent developments in the IPO performance, an initial analysis was performed. This analysis looked at the most recent IPOs (2000-2010). The sample used in this thesis yields an average rate of underpricing of 15.36% (Appendix B). In the figure provided below, a general overview is given illustrating the sample. Within the general picture shown below, it is clear that the short-term performance/underpricing of IPOs is quite high (starting point of graph). After the first year, the mean market price drops, reaching a low in the third year. After the third year, performance starts to rise again (Figure 1). All measures (mean market price in dollars) were taken on year-end.

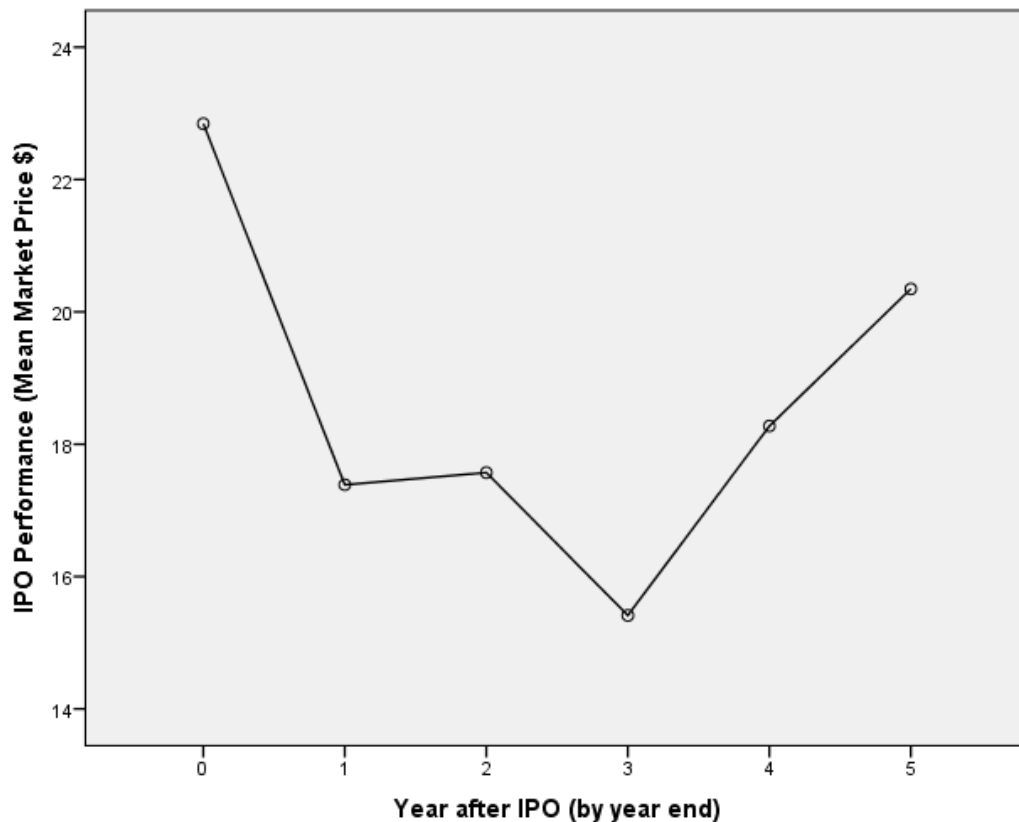


FIGURE 1 - IPO PERFORMANCE PER YEAR (AFTER IPO)

The descriptive statistics about IPO performance are displayed in the table in Appendix C. The figure provided below illustrates the descriptive table from Appendix C, showing the influence of the “dot-com” bubble and the crisis years of 2008/2009. This figure shows a similar pattern for all IPOs, which indicates that despite different flotation years, a similar pattern is recognized, in line with figure 1. However, this excludes the influence of factors such as underwriter’s reputation, and industry sector (SIC). As described before, the figures of section 5.1 are used for checking whether macro-economic constraints have an effect on the progress of IPO performance. The combination of calculating the IPO performance using a market-adjusted approach (section 4.1) and checking for year of flotation, the effects found in section 6 are controlled for macro-economic constraints.

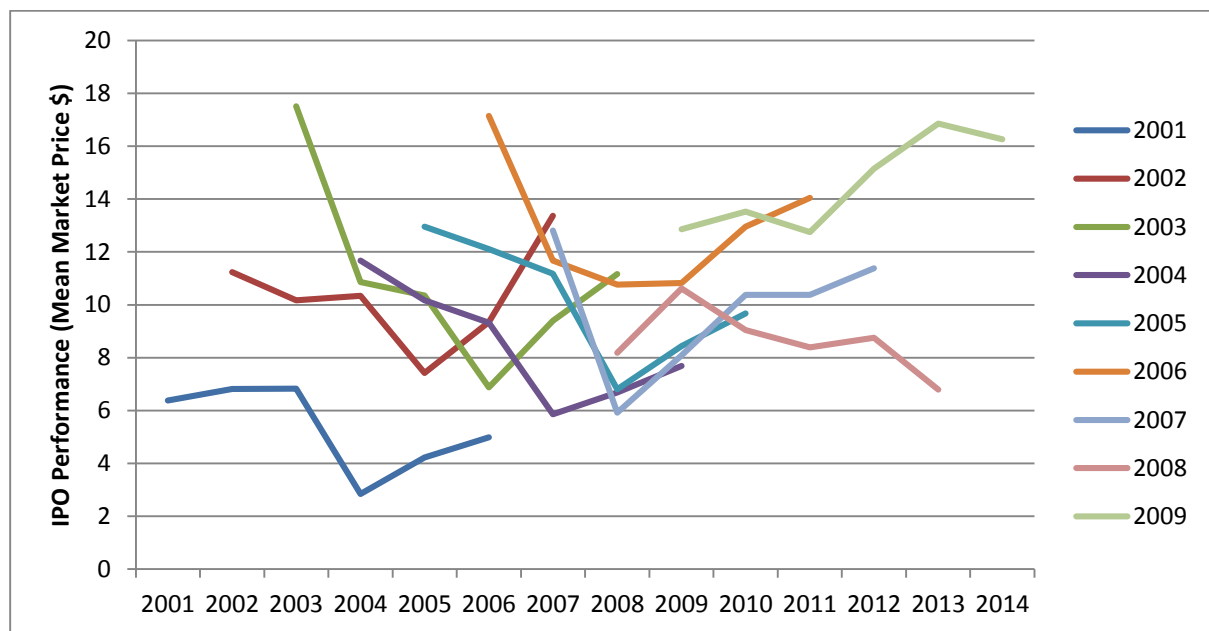


FIGURE 2 - CHRONOLOGICAL IPO PERFORMANCE PER YEAR

5.2 Underwriter’s reputation

The underwriter’s reputation was calculated by using the variable REPUT. First a frequency analysis was conducted to identify the most common underwriting banks. Using a sample of $n=324$, Goldman Sachs was found to underwrite the most IPOs (80), followed closely by *Morgan Stanley* (74). The underwriters are classified into four groups (REPUT). These groups, which are defined using percentiles, are in line with the model by Megginson and Weiss (1991).

The lowest REPUT score contains the most underwriters (71), all underwriting a small amount of IPOs. REPUT scores 2, 3 and 4 contain eight, four and one underwriter(s) respectively.

Appendix D provides a comprehensive table in which the dynamics of the variable Underwriter Reputation (REPUT) is given, yielding the following IPO-per-underwriter ratio:

TABLE 5 - SUMMARY OF IPOs-PER-UNDERWRITER (REPUT SCORES)

REPUT SCORE= 1	3.46 IPOs per underwriter
REPUT SCORE= 2	18.63 IPOs per underwriter
REPUT SCORE= 3	52.25 IPOs per underwriter
REPUT SCORE= 4	80 IPOs per underwriter

By calculating descriptive statistics, an initial overview is constructed. Quite remarkably, this figure indicates an underperformance of the IPOs issued with the most highly reputed underwriters in the first year of the companies' public status. Furthermore, when compared to the general figure 1, a similar pattern is recognized, showing the third year as the lowest market price. However, the influence of SIC_Industry is not accounted for in this figure.

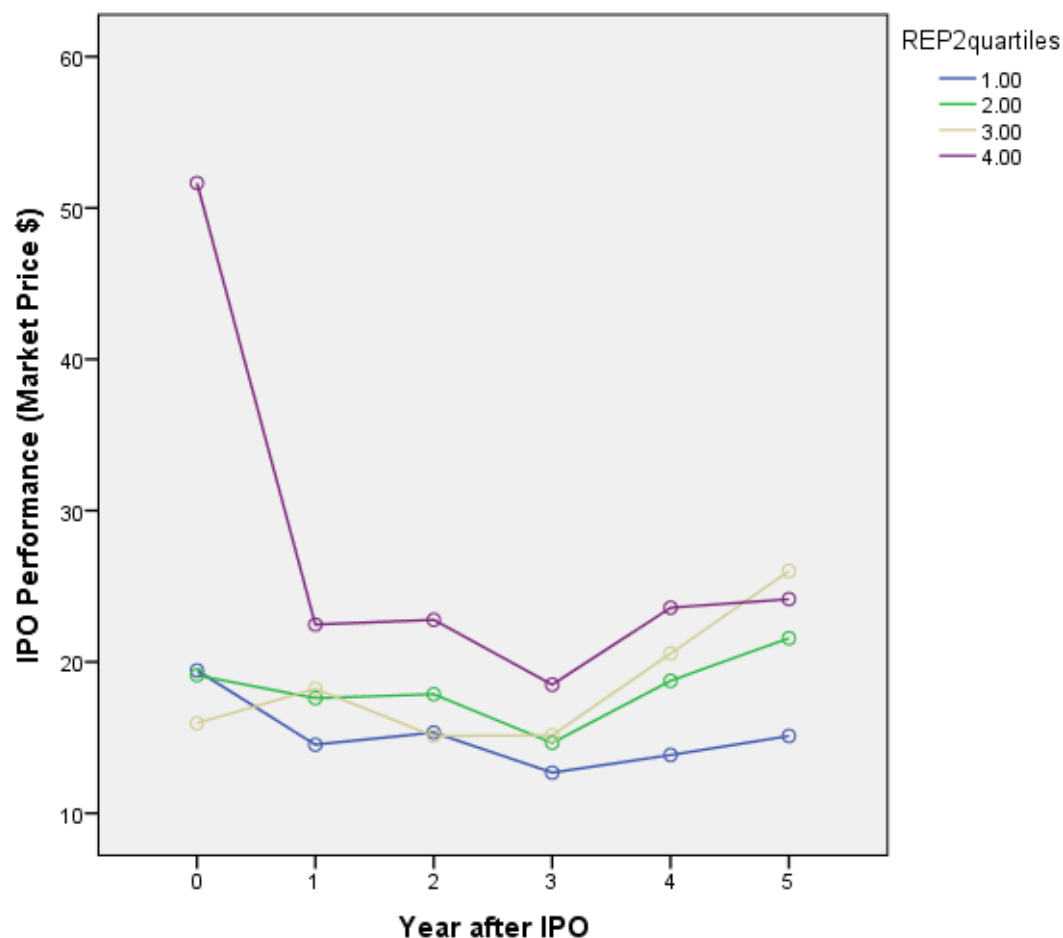


FIGURE 3 - IPO PERFORMANCE PER YEAR (AFTER IPO – PER REPUTATION QUARTILE)

5.3 Industry codes

The figure provided below gives an indication of the IPO performance per year-after-IPO, compared by industry. This figure indicates that the financial sector has a high short-term performance, with the market price dropping severely after the first year. This figure also indicates that retail trade needs a couple of years before returning an increased market price. The other sectors mining, manufacturing and services show no remarkable performance growth.

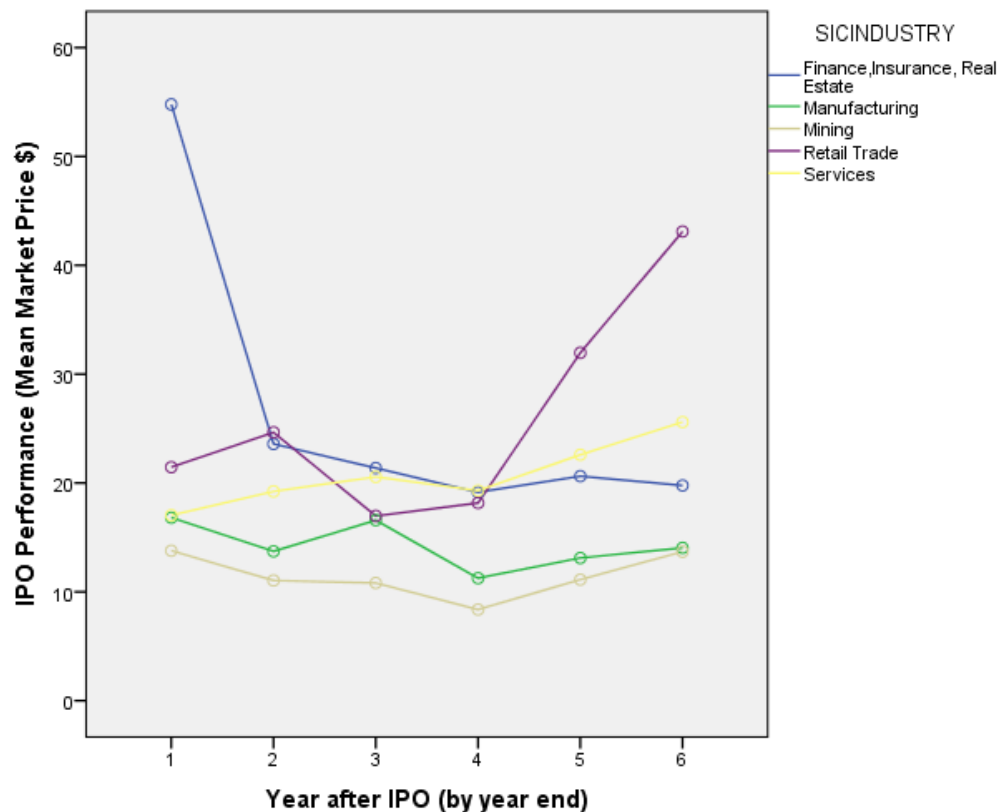


FIGURE 4 - IPO PERFORMANCE PER IPO YEAR

5.4 IPO year

Below a figure is provided indicating the performance of IPOs classified per the year of IPO. This figure shows similarities with the general figure 1.

Quite remarkably, the IPOs issued in 2006 recovered well from the financial crisis in 2008. The IPOs issued in 2003 are characterized by a fairly high initial performance, but lack the recovery seen with the IPOs of 2006.

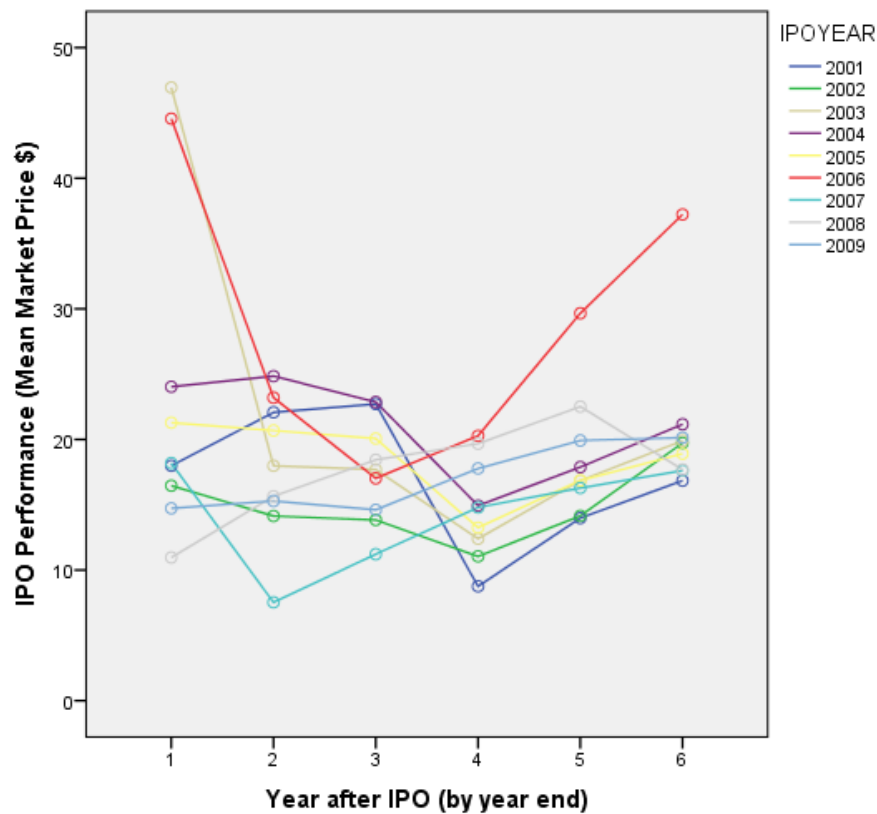


FIGURE 5 - IPO PERFORMANCE PER IPO YEAR

6 THE INFLUENCE OF UNDERWRITER REPUTATION ON IPO PERFORMANCE

Like discussed in section 4, the influence of underwriter reputation is measured using the General Linear Model of Repeated Measures. The between-subjects test found a number of main effects, as described in section 6.1 (provided below). The main effects are found using the whole sample, without taking the industry sector and IPO year into account. Therefore, additional analysis is carried out, providing further insights in the dynamics of the effect of underwriters' reputation on IPO performance.

6.1 Main effects

The General Linear Model of Repeated Measures found the following effects via between-subjects test. The main effect of the underwriter's reputation on the annual closing price of an IPO is found to be statistically significant ($F_{(3;204)}=3.29; P<0.05$). The effect is situated between the first and fourth reputation; the mean difference of the fourth minus the first reputation rank is 12.031 ($SD=4.20$). In other words, an underwriter with a reputation of 4 will generally perform better than an underwriter with a reputation of 1.

The main effect of the industry/sector on the annual closing price of an IPO is found to be statistically significant ($F_{(4;204)}=4.24; P<0.05$). Differences were found between finance and manufacturing 12.29($SD=3.90$), finance and mining 15.08($SD=4.17$), and retail trade and mining 14.58 ($SD=5.03$). The better performances are found in the financial sector, compared to the mining and manufacturing sectors. In addition, the retail trade sector performs better than the mining sector. More differences were found between sectors, but not all differences are statistically significant.

The main effect of the IPO year on the annual closing price of the IPOs is found to be statistically significant ($F_{(8;204)}=2.10; P<0.05$). The difference is found between the years 2006 and 2007, yielding a trend is found here ($0.05 < p < 0.10$), with 2006 being a better year than 2007. More differences were found between the years, but not all differences are statistically significant.

6.2 Interaction effects

The interaction effect between underwriter reputation and SIC industry was found to be statistically significant ($F_{(12;204)}=2.03; P<0.05$). The differences are found for the financial sector between reputation 4 and the other reputations 35.82 ($SD=8.63$); 34.42($SD=8.60$); 37.99($SD=9.16$), yielding a higher market price for reputation 4. Appendix E provides a comprehensive table, showing the between-subjects effects. For manufacturing, mining, and services no differences are found between the reputations. The differences are found for the retail sector between reputation 3 and the other reputations 41.55 ($SD=10.61$); 37.83($SD=12.18$); 40.43($SD=12.13$), yielding a higher market price for reputation 3.

In other words, reputation 4 performs best in the financial sector. Reputation 3 performs best in the retail sector. The other interaction effects between reputation and IPO year, industry and IPO year, and the three-way interaction effect between reputation, industry and IPO year were not statistically significant.

6.3 Results based on hypotheses

Depending on the selection process of companies intending to go public, the choice of underwriter can be built based on the results of this research.

Hypothesis 1: The reputation of the underwriter has a positive significant effect on the long-term performance of IPOs.

The effect of the reputation of the underwriter on the long-term performance of IPOs is found to be statistically significant using an ANOVA with Repeated Measures analysis ($P < 0.05$). Therefore, hypothesis 1 is accepted.

Hypothesis 2a: The effect of the reputation of the underwriter on IPO performance differs per sector, yielding a specific strategy for choosing an underwriter.

The effect of the reputation of the underwriter differs per sector, yielding a different performance for the highest underwriter reputation. This effect is found to be statistically significant ($P < 0.05$), and therefore this hypothesis is accepted.

Hypothesis 2b: The effect of the reputation of the underwriter on IPO performance is influenced by macro-economic constraints.

A statistical significance is found in analyzing IPO performance using IPOYEAR as the explaining variable ($P < 0.05$); for this reason this hypothesis is accepted. A note must be made here, since a trend is discovered between the IPO years 2006 and 2007 ($0.05 < P < 0.10$). Other differences between years are found, but those results are inconclusive.

7 CONCLUSION & LIMITATIONS

In this section, the implications of the results are displayed. The research question will be answered and limitations of this thesis are discussed. The conclusion is divided in main effects and interaction effects, following the structure of chapter 6.

7.1 Conclusion

This thesis aims to provide suggestions for issuing companies in their search for an underwriting bank. In order to enable a statistical analysis, this thesis assumes that issuers are willing to maximize the performance of their IPO. A sample of $n=324$ NYSE IPOs between 2000 and 2010 was used in the analysis. Data was retrieved using different data sources such as WRDS and COMPUSTAT North America, complemented with a dedicated IPO database. Based on these statistics, it can be concluded that the sector in which an organization conducts business sets a particular growth path, varying between different sectors. The General Linear Model of Repeated Measures was used for the analysis. The results outlined in Section 6 are provided by the ANOVA test for the sample of NYSE IPOs in the period 2000-2015 and comparing cases on sector and IPO year. Results of this study show that management can use the choice of underwriter to increase IPO performance. The main results of this thesis show that choosing “the right” underwriter provides significant positive effects on the performance of an IPO. Looking at the sample, an underwriter which has guided a lot of IPOs is considered to be influencing the IPO performance in a positive significant way, where the highest quartile performs best in general (main effect).

Quite remarkably, the results show that a high underwriter reputation is not a guarantee for high IPO performance, when controlling for sectors. We find that certain underwriters (for example Goldman Sachs) perform differently over certain industries. Based on the interaction effects found in the GLMRM analysis, it is concluded that an organization should choose an underwriter based on their primary industry of business and secondly on reputation score. The impression of a higher reputation resulting in a higher IPO performance holds for the financial sector, but for the retail sector a reputation score of 3 is most likely to induce the best IPO aftermarket performance.

7.2 Limitations

Despite careful analysis and significant results, this thesis is subject to several limitations. These limitations are found over several categories; scoping, data and conclusion.

Scoping - First, due to the use of combined databases, a lot of cases had to be excluded from the analysis. The databases used in this study did not provide comprehensive data for the initial sample. This may have an effect on the results.

Data - Second, IPOs attract a lot of attention from several stakeholders surrounding the issuing company, including media attention, dividend-sharing programmes for employees, and exit strategies from the management. In this thesis, careful analysis was conducted in order to provide insights into the effect of the reputation of the underwriter on IPO performance. This analysis was supported by an interaction effect analysis on year of IPO (IPOYEAR) and industry in which the involved organization conducts its business (SIC_INDUSTY). Despite this additional analysis, the board structure of the issuing company could have an effect on the results of this study.

Conclusion - The sample of this study is constructed based on NYSE-listed companies. Using another stock market may yield different results based on constraints such as macro-economic conditions and legislation of the country in which the stock market is located.

7.3 Future research

Based on the conclusions and limitations stated above, future research could be focused around the following topics.

Measuring the reputation of the underwriter: The reputation of the underwriter can be measured in several ways. Since the management of the underwriting bank has a large influence on the selection of companies willing to issue shares in an IPO, this influence should be analyzed. Another topic of interest is that of the distinction between institutional and individual investors. A topic of future research could be to dive deeper into the differences in underwriter reputation viewed from the investors' perspective. Moreover, the theories of underpricing are complete is arguable. Viewed from the market-equilibrium theory, if every underwriter is willing to drive underpricing to higher levels, an equilibrium cannot be set. The IPO performance is influenced by the amount of underpricing, and therefore research on theories of underpricing can complement the knowledge presented in this thesis.

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APPENDIX A SUMMARY OF STANDARD INDUSTRY CLASSIFICATION CODES

The Standard Industrial Classification (SIC) Codes are four-digit codes assigned by the U.S. government to identify the primary business of the establishment.⁶ SIC-codes are used by the SEC to sort out company filings. Professionals use SIC codes to identify market segments.

SIC CODES	Description
01-09	Agriculture, Forestry, Fishing
10-14	Mining
15-17	Construction
20-39	Manufacturing
40-49	Transportation & Public Utilities
50-51	Wholesale trade
52-59	Retail Trade
60-67	Finance, Insurance and Real Estate
70-89	Services
91-99	Public Administration

⁶ <http://siccode.com/en/pages/what-is-a-sic-code>

APPENDIX B DESCRIPTIVE STATISTICS (UNDERPRICING PER SIC-GROUP)

	<i>Sample size</i> <i>Underpricing</i>	<i>Average Underpricing</i>	<i>Low Underpricing</i>	<i>High_Underpricing</i>	<i>Stdev of</i> <i>Underpricing</i>	<i>Var of</i> <i>Underpricing</i>
Agriculture, Forestry, Fishing	21	11,27%	-0,071428571	1,011904762	0,241588888	0,058365191
Construction	14	7,68%	-0,076086957	0,47375	0,14543695	0,021151907
Finance,Insurance, Real Estate	264	7,12%	-0,165364583	1,8375	0,171991	0,029580904
Manufacturing	496	17,43%	-0,21875	2,3025	0,315143394	0,099315359
Mining	189	7,50%	-0,199411765	1,228333333	0,162303915	0,026342561
Retail Trade	87	22,31%	-0,133333333	1,228333333	0,272459422	0,074234136
Services	377	23,16%	-0,260769231	2,191666667	0,310366434	0,096327323
Transportation & Public Utilities	114	11,43%	-0,352222222	2,102941176	0,280527442	0,078695646
Wholesale Trade	27	5,42%	-0,085714286	0,302564103	0,112648609	0,012689709
Total	1589	15,36%	-0,352222222	2,3025	0,2767332	0,076581264

APPENDIX C DESCRIPTIVE STATISTICS (IPO PERFORMANCE AFTER IPO (PER SECTOR))

Year	Descriptive	Finance, Insurance, Real Estate	Manufacturing	Mining	Retail Trade	Services	Total
0	Mean	31.34	21.54	13.86	20.78	19.61	21.82
	SD	61.089	40.381	11.668	13.168	16.069	37.727
	N	77	119	62	29	80	367
1	Mean	12.79	8.36	8.61	14.72	9.72	10.05
	SD	16.203	15.151	11.264	25.119	15.602	15.993
	N	122	214	85	43	147	611
2	Mean	17.52	16.76	10.84	17.00	19.61	16.56
	SD	16.090	34.292	11.286	14.214	21.426	24.079
	N	76	119	61	28	79	363
3	Mean	15.64	12.95	8.97	16.19	19.26	14.46
	SD	12.775	18.823	10.093	19.950	18.689	16.805
	N	73	115	61	28	78	355
4	Mean	17.97	15.10	11.38	27.73	21.27	17.47
	SD	15.921	30.246	12.906	41.902	20.151	24.842
	N	69	109	57	27	77	339
5	Mean	19.87	16.50	13.76	35.64	25.33	20.35
	SD	17.191	28.086	17.545	64.520	24.365	29.465
	N	64	104	54	27	75	324

APPENDIX D UNDERWRITERS BASED ON REPUT SCORES (PERCENTILES)

REPUT SCORE	Number of IPOs 'Underwritten' (NOIPO)	Percentage (%NOIPO)	Number of Underwriters (NOU)	Percentage (%NOU)	Average percentage Marketshare within percentile
1	173	53.39%	50	59.52%	3.46 IPOs per Underwriter
2	149	45.98%	8	9.52%	18.63 IPOs per Underwriter
3	209	64.50%	4	4.76%	52.25 IPOs per Underwriter
4	80	24.69%	1	1.19%	80 IPOs per Underwriter
Total	324	100	84		

APPENDIX E ANOVA TEST (REPEATED MEASURES) – BETWEEN-SUBJECTS EFFECTS TABLE

Source	Mean Square	F	df	Sig.
Intercept	325220.752	149.597	1	.000
REP2quartiles	7151.701	3.290	3	.022
SICINDUSTRY	9211.428	4.237	4	.003
IPOYEAR	4563.661	2.099	8	.037
REP2quartiles * SICINDUSTRY	4420.975	2.034	12	.023
REP2quartiles * IPOYEAR	2629.612	1.210	23	.240
SICINDUSTRY * IPOYEAR	2254.559	1.037	29	.421
REP2quartiles * SICINDUSTRY * IPOYEAR	2878.726	1.324	40	.108
Error	2173.981		204	

APPENDIX F SYNTAX USED IN STATISTICAL ANALYSIS

*****.

* Derivate Variables.

*****.

* Calculate Number of IPOs per Underwriter.

AGGREGATE

/OUTFILE=* MODE=ADDVARIABLES OVERWRITEVARS=YES

/BREAK=Underwriter

/Numberofunderwritersofbank=N.

* Calculate Percentiles for divison into REP2.

FREQUENCIES VARIABLES=Numberofunderwritersofbank

/PERCENTILES=25.0 50.0 75.0 100.0

/ORDER=ANALYSIS.

* Recode Number of Underwriters into REP2 by percentiles.

RECODE Numberofunderwritersofbank (0 thru 23=1) (24 thru 67=2) (68 thru 198=3)
(199 thru 217=4)

INTO REP2quartiles.

EXECUTE.

* Frequencies of Underwriters within the 4 categories of REP2 .

SORT CASES BY REP2quartiles.

SPLIT FILE SEPARATE BY REP2quartiles.

FREQUENCIES VARIABLES=Underwriter

/PERCENTILES=25.0 50.0 75.0

/ORDER=ANALYSIS.

SPLIT FILE OFF.

*****.

* FILTERING.

*****.

* Recode Industry for filter.

RECODE SICINDUSTRY (

'Agriculture, Forestry, Fishing'=1)(

```
'Construction'=2)(
'Finance,Insurance, Real Estate'=3)(
'Manufacturing'=4)(
'Mining'=5)(
'Retail Trade'=6)(
'Services'=7)(
'Transportation & Public Utilities'=8)(
'Wholesale Trade'=9) INTO SIC_numeric.
EXECUTE.
```

* Filter out Year of IPO under 200 and above 2010,
also filter out Industry Agriculture, Forestry, Fishing and Construction (codes 1 and 2) and Wholesale Trade (code 9).

USE ALL.

```
COMPUTE filter_$=(IPOYEAR > 2000 & IPOYEAR < 2010 & SIC_numeric >=3 &
SIC_numeric < 8).
```

```
VARIABLE LABELS filter_$ 'IPOYEAR > 2000 & IPOYEAR < 2010 & SIC_numeric
>=3 & SIC_numeric < 8 '+
'(FILTER)'.
```

```
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
```

```
FORMATS filter_$ (f1.0).
```

```
FILTER BY filter_$.
```

```
EXECUTE.
```

* Frequencies of underwriters per REP2 categories (after filtering).

```
FREQUENCIES VARIABLES=Numberofunderwritersofbank
```

```
/PERCENTILES=25.0 50.0 75.0 100.0
```

```
/ORDER=ANALYSIS.
```

```
*****.
```

* Figure section 5.1, IPO performance As-Is.

```
*****.
```

```
GLM MP_year0 MP_year1 MP_year2 MP_year3 MP_year4 MP_year5
```

```
/WSFACTOR=factor1 6 Polynomial
```

```
/METHOD=SSTYPE(3)
```

```
/PLOT=PROFILE(factor1)
```

```
/CRITERIA=ALPHA(.05)
```

/WSDESIGN=factor1.

*****.

* Main Analysis.

*****.

* Repeated Measures ANOVA, REP2, Industry Code and Year of IPO as factors, full interaction model.

GLM MP_year0 MP_year1 MP_year2 MP_year3 MP_year4 MP_year5 BY
REP2quartiles SICINDUSTRY IPOYEAR

/WSFACTOR=year 6 Polynomial

/METHOD=SSTYPE(3)

/PLOT=PROFILE(year*REP2quartiles*SICINDUSTRY
year*SICINDUSTRY*REP2quartiles)

/EMMEANS=TABLES(REP2quartiles) COMPARE ADJ(BONFERRONI)

/EMMEANS=TABLES(SICINDUSTRY) COMPARE ADJ(BONFERRONI)

/EMMEANS=TABLES(IPOYEAR) COMPARE ADJ(BONFERRONI)

/EMMEANS=TABLES(REP2quartiles*SICINDUSTRY) compare (SICINDUSTRY)

/EMMEANS=TABLES(REP2quartiles*SICINDUSTRY) compare (REP2quartiles)

/PRINT=DESCRIPTIVE

/CRITERIA=ALPHA(.05)

/WSDESIGN= year

/DESIGN= REP2quartiles SICINDUSTRY IPOYEAR

REP2quartiles*SICINDUSTRY IPOYEAR*REP2quartiles

IPOYEAR*SICINDUSTRY IPOYEAR*REP2quartiles*SICINDUSTRY.