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The Underwriter Effect: How Underwriters Influence the Amount of Money Left on the Table for Initial Public Offerings

Matthew Ahearn
University of Maine

THE UNDERWRITER EFFECT: HOW UNDERWRITERS INFLUENCE THE AMOUNT OF MONEY LEFT ON THE TABLE FOR INITIAL PUBLIC OFFERINGS

by

Matthew Austin Ahearn

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Advisory Committee:

Stephen Jurich, Assistant Professor of Finance, Advisor
Henri Akono, Assistant Professor of Accounting
Muralee Das, Assistant Professor of Management
Melissa Ladenheim, Associate Dean of the Honors College
Matthew Skaves, Lecturer in Finance and Accounting

ABSTRACT

During 2015, approximately 201 U.S. companies decided to go public in order to gain capital in return for stock shares. Out of these 201 companies, 127 companies left an average of $46.5 million dollar on the table as a result of underpricing. There is a plethora of literature that shows underpricing is a result of many different variables, yet few analyze how underwriters relate to IPO underpricing. Through the use of correlation matrices, means difference tests, simple regressions, and multivariate regressions, this study finds that there is no statistically significant trend between underwriters and money left on the table. However, one point of interest for future studies would be to analyze the effectiveness of Singular Lead Underwriters versus Multiple Lead Underwriters while controlling for prestigious investment banks.

DEDICATION

I would like to dedicate this paper to my loving family,

To Andrew: Thank you for being a constant role model for me. You are a true example of the saying: The way you do anything is the way you do everything.

To Jen: Thank you for always being the ray of sunshine that cuts through a dark day. You were the one I leaned on during my weakest moments, and for that I am forever grateful.

To my Mom: Thank you for teaching me how to love. Whether it be love for another person or for myself, your charisma shows me the way. You are the kindest person I have ever met and not a day goes by where I do not think about your infectious smile.

To my Dad: Thank you for teaching me how to learn. You have never shown me a dull moment, whether it be expanding my vocabulary or teaching me how to build a patio. Dad, you are a true renaissance man.

To the Ahearns: This one is for you. There is a little piece of you in every part of my Honors Thesis, because in me there is a little piece of you. Words cannot express how fortunate I am to have four amazing individuals in my life who love me unconditionally. Cheers!

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TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER I

INTRODUCTION

In 1602, the Dutch East India Trading company produced a groundbreaking idea that would forever change the landscape of business. Their primary source of revenue came from sailing around the world to gather highly sought-after goods. With ships being pirated for their loot or lost to an unforgiving sea, the Dutch East India Trading company realized they were in grave financial risk if they wanted to keep funding these expeditions. In order to stay afloat, literally and figuratively, they sought out investors in exchange for a percentage of their company. This event is considered to be the first publicly traded company, therefore making it the first Initial Public Offering (IPO). Much has changed over the past 400 years, although conceptually the ideas pushing these types of financial events remain the same.

In 2015, there were over 200 U.S. IPOs, which allowed companies to gain capital from investors in return for partial ownership. 2015 companies such as Fitbit saw an opportunity to sell shares to public markets and increase their capital. When a company chooses to go public, they are most often underwritten by a large investment bank. With the assistance of large investment firms such as Goldman Sachs, Deutsche Bank, or Morgan Stanley, companies going public can reduce their legal workload while mitigating their risk through an underwriter. However, a company going public may have multiple underwriters forming a syndicate in order to diffuse the risk amongst multiple investment banking firms.

As a company tries to find the right underwriter(s) to bring their shares to the public, many factors are considered, such as the issuing company's price, size, age, number of shares, and industry. Companies that are recently incorporated or ones that already have a large net worth pose a higher risk due to respective margins of error. Although there are numerous factors that influence how an underwriter would price an IPO, these underwriters spend enormous amounts of money and hours trying to perfect this process. These underwriters or syndicates use many different techniques from analyzing cash flows, growth, or earnings per share, comparing the current company to others in the past, and checking dividend payments, if applicable, using a discounted dividend model. When the issuing company decides how many shares and at what price they would like to offer, the underwriter agrees to purchase the shares being allocated to the public market. Once the company's issuing date arrives and the company goes public, then the underwriter resells them at a slightly higher price known as the underwriter spread.

Despite all of these valuation methods from well-renowned underwriters, even seasoned investment firms continue to misprice the value of shares when underwriting IPOs. An underwriter could overestimate the offer price resulting in a decrease in share price once a company's shares hit the market. If an underwriter underprices the offer amount for an IPO, then the market would increase the share price to the fair value. In the latter scenario, the price increase multiplied by the number of shares offered is considered Money Left on the Table (MLOT). Even though this is an increase in share price, it is often an unrecognized loss for these companies because they were not valued accurately initially and therefore never received the capital. The term "Money Left on the Table" is referred to by Loughran and Ritter (2004) as the difference between the first closing ask price minus

the original offer price multiplied by the number of shares sold. The prevalence of companies leaving enormous amounts of money on the table is all too common across the market.

Highly reputable investment banks, such as Morgan Stanley, are responsible for some of the most infamous examples of MLOT. Loughran and Ritter (2002) describe the process of Morgan Stanley underwriting the IPO for Netscape in August of 1995. With an approximate 108% increase in price on the first day, Netscape left $151 million on the table as a result of Morgan Stanley's egregious underpricing. Netscape went on to retain them as their underwriter for a follow up offer that took place in November of 1996.

Many investors do not realize how much more capital the company could gain because most investors are happy with the superficial gain in personal wealth due to a stock price increase according to Loughran and Ritter (2004). It is because of this universal mindset that most people make a tradeoff between the gain of their personal stock and MLOT. Rosenboom (2012) suggests that an underwriter's decision on how much to resell the shares for on the primary market affects money left on the table. Others, such as Loughran and Ritter (2004), believe it is a result of a revision to the offer price after the preliminary prospectus. This study serves the purpose to fill a gap in analyzing the MLOT phenomenon by analyzing 2015 U.S. IPOs number of *Underwriters, All-Star Underwriters*, *Lead Underwriters*, *Lead All-Star Underwriters, and Singular Lead All-Stars versus Multiple Leads with an All-Star*.

CHAPTER II

LITERATURE REVIEW

Many academic journals have proven that IPOs, in general, are underpriced. There have been a multitude of studies that are dedicating to assessing how and why IPOs are underpriced.

Numerous scholars believe that underpricing is a deliberate strategic plan executed by managers of the firm going public and their underwriters. Hakenes and Nevries (2000) initially developed a model studying how underpriced IPOs may generate more media coverage. This additional coverage for a company going public would attract new customers looking to expose an arbitrage situation, and in return, increase the intrinsic value of the stock due to an increase in demand. Boehemer and Fishe (2004) continued off of this analysis to develop an alternative theory. They created a model to analyze if strategic underpricing, by the underwriter, creates a higher trade volume for a company going public. Higher trade volume would be highly beneficial to the underwriters for they hold the majority of shares being released to the public. With the underwriter being a basic market-maker, underwriters would be able to benefit from the increase in trade volume due to higher demand. Yet, their model showed no benefit of systematic underpricing for the underwriter. Aggrawal, Krigman, and Womack (2002) studied how managerial shareholding correlate with the IPO underpricing. Their model disproves the model presented by Hakenes and Nevries (2000) and shows that IPO underpricing is harmful to a firm's intrinsic value. They found a positive correlation between managers that have a high

amount of shareholding and first-day underpricing. Their theory for this is that managers of a firm going public strategically underprice the value of the firm in order to get a higher personal gain in wealth.

Carpenter and Strauser (1971) studied firms going public and the advice that they receive from their auditors. They report that auditors of IPOs were suggesting that firms going public should change from local or regional underwriters to nationally recognized underwriters. Through the change to more prestigious underwriters that have national attention, they believe it instills a public perception of a higher quality IPO. If the public were then to believe that this IPO is of higher quality, then they would be willing to pay a higher price in order to gain access to its shares. Logue (1973) attributes underpricing to be a result of information asymmetry. With a firm going public for the first time, there is a high amount of uncertainty within the market about that firm. He continues to explain that firms going public may seek out a prestigious investment banking firm. By having a prestigious bank bringing a company to the market, he believes that it may instill confidence into that IPO. Investors would then assume that IPOs with prestigious underwriters have information of which the public is unaware, therefore inducing people to believe it is a good investment and to enter at a higher share price. Both Carpenter and Strauser (1971) and Logue (1973) explain that IPOs that are partnered with prestigious and well-known investment banking firms are viewed as more favorable to the public, which could increase their intrinsic value.

Titman and Trueman (1986) examine how more prestigious underwriters influence information about the firm they are bringing public. Their analysis shows that the information in regards to valuation is important, yet having a prestigious underwriter shows

a greater influence. An IPO with a higher-level underwriter indicates to the market that there is a more careful valuation. They conclude that this may account for some underpricing, yet it does not completely cover the scope of the issue. Carter and Manaster (1990) develop a more accurate way to assess a prestigious underwriter's influence on an IPO. They create a system that ranks some of the more well-known underwriters with their associated reputation. Their conclusion is that prestigious underwriters are associated with lower risk IPOs, therefore creating a market of investors that do not seek information about the IPO. By marketing a less risky IPO through a prestigious underwriter, underwriters are able to maintain their reputation. Since these IPOs are viewed as having less risk associated, investors feel that they are well-informed about the IPO and its price. With less perceived risk and more 'accurate' pricing, there is less price run-up once the firm goes public, thus reducing MLOT.

Loughran and Ritter (2002) examine how IPO underpricing has grown since the turn of the century. They theorize that part of the underpricing issue could be because prestigious national investment banking firms are phasing out regional banks in the lead underwriting positions. During the internet bubble of 1999-2000, first-day returns were around 65% showing huge amounts of underpricing. They argue that these high amounts of money left on the table are due to firms going public being complacent with this loss. Continuing with their theory, firms going public may incur MLOT as an indirect cost for having more reputable investment banking firms as their underwriters in order to boost public perception of the IPO.

Corwin and Schultz (2005) studied how having more members in an underwriter syndicate effects an IPO offer price. Their study found that an IPO with a greater number

of underwriters has a tendency to revise the offer price from the amount filed originally. Hu and Ritter (2007) analyze how price revisions affect the amount of money left on the table. Their empirical findings show that each additional underwriter increases the offer price for an IPO by 1%. They continue on to explain that IPOs that revise their offer price, prior to going public, left $23 million on the table whereas the average IPO from their study left approximately $9 million on the table. Other academic papers like those of Bradley and Jordan (2019) study different variables of shares allocated to the public, price revisions, and Venture capital-back firms. Their empirical finding shows that IPO underpricing can be predicted using price amendments as indicators. An amendment of filing price accounts for approximately 13% of the variation in underpricing in their model.

The purpose of this study is to test how underwriters and all-star underwriters, within different underwriter positions, affects the amount of money left on the table. All-star underwriters are investment banking firms that received a reputation ranking of seven or higher in Ritter (2004). Logically, more underwriters would provide a higher level of assessment for a firm's intrinsic value therefore reducing underpricing. Having the presence of prestigious investment banking firms (all-stars) should also reduce the amount of money left on the table, because they are more reputable firms with a higher level of expertise.

CHAPTER III

HYPOTHESIS DEVELOPMENT

3.1 Number of Total Underwriters

Hypothesis 1) IPOs that have a higher number of Total Underwriters will result in lower amounts of Money Left on the Table.

Underwriters are in charge of facilitating a company's transition to becoming a public enterprise. Once a company and underwriter agree to bring shares to the public; the underwriter is in charge of the entire process, from start to finish. Legal consultation, valuation of the shares, promotion, and assumption of risk are all duties of the investment banking firm. While this is a wide array of responsibilities to fulfill, these underwriters are massive financial conglomerates that rely on highly skilled individuals to make these decisions on their behalf. Through this diffusion of risk and having other investment banking firms present, one would assume that more diligent and accurate valuation methods would be present with more underwriters.

Corwin and Schultz (2005) studied how having more members in an underwriter syndicate affects an IPO offer price. Their study found that an IPO with a greater number of underwriters has a tendency to revise the offer price from the amount filed originally. According to Hu and Ritter (2007), having an IPO underwritten by multiple book runners is a recent upward trend since 2001. This syndication allows for lower coordination costs and helps reduce risk through its dispersal amongst the multiple investment banking firms. However, Hu and Ritter (2007) also shows that each additional underwriter raises the

middle point of the filling price by 2.8% and 1% for the offer price. The upward revision of a price has an influence with the amount of money left on the table as IPOs with upward revision of share price resulted in an average of $23 million lost to underpricing. More MLOT as a result of upward price revision is due to the underwriters lack of confidence in the valuation of the company's share price. Therefore, an IPO that has more underwriters, which contributes to an upward price revision, should leave more money on the table. Yet, this is not logical, for having more underwriters should contribute to more accurate information, thus reducing underpricing through creating a fair valuation.

Even with specialization, access to incredibly powerful tools, and seasoned experience, these underwriters still struggle to make a fair offer price. There can be a general analysis for trends of underpricing against the total *number of underwriters* used for an IPO because of this initial hypothesis. A wide scope of how underwriters influence MLOT will create an effective starting point where more elaborate hypotheses can be revealed for different variables.

3.2. Number of Total All-Star Underwriters

Hypothesis 2) IPOs that have a greater number of Total All-Star Underwriters will result in lower amounts of Money Left on the Table.

As an IPO makes its selection of underwriters, they may be tempted to include a highly reputable investment banking firm. Carter and Manaster (1990) created a ranking for investment banking firms in order to analyze why IPOs choose more prestigious bankers to bring their firm public. Their theory continues to say that IPOs seek out reputable investment banking firms in order to reduce the IPOs public perception as a risky

investment. The model created for their study shows that there is a positive correlation between prestigious investment banking firms and low risk IPOs. If these *All-Star Underwriters* are associated with less risky IPOs, than there will be less price run-up which would reduce underpricing. Loughran and Ritter (2004) create a more recent underwriter reputation ranking that acknowledges adjustment from the original data of Carter and Manaster (1990). Through the use of these ranking systems, this study analyzes the effect of having underwriters that are all-stars (rank 7.0 and greater) on how much money is left on the table.

Cliff and Denis (2004) explain how IPOs indirectly pay for *All-Star Underwriters* through money left on the table. They continue to explain how after a firm goes public, the underwriters provide analyst coverage on the performance of the IPO. Analyst coverage contributes to the success of a firm's stock price when it comes from prestigious investment banking firms. Therefore, a company going public ignores the money left on the table in order to receive analyst coverage about their upward trending stock from these all-stars, which boosts the public perception of both parties involved.

Due to this gap of knowledge, the second, and more focused hypothesis, of this study is based on how the *Number of All-Star Underwriters* influences an IPOs underpricing. There will be an analysis of how the *Number of All-Star Underwriters* involved in the syndicate of an IPO will affect how much money a firm leaves on the table. Logically, more highly reputable investment banking firms would result in a higher level of expertise and therefore, a more accurate offer amount reducing MLOT.

3.3 All-Stars in a Lead Underwriter Position

Hypothesis 3) IPOs with a greater number of Lead All-Star Underwriters will reduce MLOT in the highest amount.

Sharma and Seraphim (2010) studied IPOs in the Indian market to see if having an all-star in the syndicate would help narrow the gap of underpricing. They found that there was an inverse relationship between IPOs with reputable investment banking firms and underpricing. Additionally, they found that an offer price was more rationally valuated when performed by all-star underwriters. Furthermore, they suggested that IPOs without an all-star should form a syndicate of multiple underwriters in order to try and replicate the results. Yet, they did not analyze how having a *Lead All-Star Underwriter* would influence the accuracy of an IPO's offer price.

Mola and Loughran (2004) found that in a seasoned equity offering, bringing more shares public for a company that is already publicly traded, it is more likely to have underpricing if the lead underwriters are considered all-stars. Yet, this study did not analyze how *Lead All-Star Underwriters* impact underpricing for an IPO. Neither Carter and Manaster (1990) or Loughran and Ritter (2004) analyze if having more all-stars in a lead underwriting position is beneficial to an IPO. For this hypothesis, IPOs with a greater number of *Lead All-Stars Underwriters* are considered to have a higher amount of expertise than the rest of the field. Yet, Liu and Ritter (2011) provide empirical evidence that IPOs are more underpriced when they receive coverage from an all-star analyst that has expertise in an industry. However, this defies the simple logic for an IPO to seek out a *Lead All-Star Underwriter,* for having a prestigious underwriter in the lead position should drastically reduce the amount of MLOT. If an IPO has a greater number of *Lead All-Stars*

Underwriters, than additional expertise should lower MLOT, in the highest amount, if there are more prestigious investment banking firms in a lead position.

3.4 Multiple Lead Underwriters with All-Star(s) and Singular Lead All-Star Underwriter

Hypothesis 4) IPOs having Multiple Lead Underwriters with an All-Star or a Singular Lead All-Star Underwriter will leave less money on the table than the rest of IPOs.

Between 2001 and 2010, nearly half of all IPOs in the United States were managed by a syndicate of underwriters that had more than one lead underwriter according to Jeon, Lee, Nasser, and Via (2013). With Hu and Ritter (2007) describing that more and more IPOs have been using syndicates as their preference, this study saw an opportunity to research these two specific groups. Adding the variables of a *Singular Lead All-Star* versus *Multiple Leads with an All-Star* could provide more insight into what underwriter construct produces the most accurately priced IPO.

When bringing these private companies public to the primary market, there is usually a *Lead Underwriter* that assumes most of the risk for this company. In some situations, the *Lead Underwriter* is a singular investment banking firm that assumes all of the risk for the company that it is bringing public. On the other hand, *Multiple Lead Underwriter*s evaluating the company and issuing the shares is very common. From the two scenarios, another element is added so that there may be a more in-depth analysis. For the IPOs that have *Multiple Lead Underwriters* (any amount greater than one), sub-groups were created for *Multiple Lead Underwriters* that contained an *All-Star* and those that did not. With the *Singular Lead Underwriters*, they are separated into sub-groups where the *Singular Lead Underwriter* was either an *All-Star* or not.

The original intuition of this hypothesis is that any IPO that has an all-star in the lead position, multiple or singular, would leave less money on the table than its counterpart. *Singular Lead All-Star Underwriter* should be the most effective representative from the group of IPOs that have one lead underwriter due to the prestigious sole underwriter. Additionally, the study chose to use a *Multiple Lead Underwriter with an All-Star,* because it allows the inclusion of IPOs that have multiple lead underwriters and only one All-Star. These *Multiple Lead Underwriters with an All-Star* may have more than one prestigious bank, however they should still be the best representatives from the IPOs with multiple investment banks in the lead role. *Multiple Lead Underwriters with an All-Star* should also leave less money on the table than singular leads due to an increase of resources and capabilities that are at the helm of bringing a stock public.

CHAPTER IV

SAMPLE SELECTION AND METHODOLOGY

The sample selection used in the analysis begins on January 1, 2015 and continues until December 31, 2015. The sample period focuses on all of the Initial Public Offerings in the United States during this time, which was over 200 companies. This was almost immediately narrowed down to 177 companies due to some issues with data. All of these companies were traded on the NASDAQ and the NYSE with the exception of a few. Through the NASDAQ's online database, this study was able to access information about these IPOs and the characteristics surrounding them. The companies were manually entered into an Excel sheet in the order they went public. After acquiring the names of the companies, the data set expanded to their respective tickers, date of publicity, offer price, and shares offered. All of the variables were available through the NASDAQ database, with the exception of a few companies, which required manual entry to their respective company in Excel.

NASDAQ's database also allowed the data set to include the total *Number of Underwriters* to have a base reference as to how many total investment firms were involved in any of the IPOs. The names of all *Underwriters* were included, along with a column that was to represent the numerical amount of the IPO's syndicate. The total *Number of Lead Underwriters* was made into a different data entry as they were distinguished in NASDAQ's database. There was also a numerical column created for the total *Number of Lead Underwriters* in order to have a continuous variable for later analysis. All the

information gathered through the NASDAQ database was hard data that had to be collected, transferred, and organized manually into Excel.

Using the Center for Research in Security Prices (CRSP), the data set grew to include the Permanent Number (a unique identification number) and the Standard Industry Classification (SIC) code to allow for some more distinct characteristics about the existing data. The Center for Research in Security Prices also gave the final closing ask price for the day that a company administered its IPO. Receiving the first day closing ask price was a vital step for the study because it allowed for the *Money Left on the Table* column to be calculated for meaningful data. CRSP provided a more seamless transition into the working data set as these values were selected in the database then exported into an Excel sheet.

When running initial descriptive statistics and simple regressions, the numbers returned seemed to be heavily skewed by some of the values. Upon revisiting the original data set, this study saw that there were negative data values in the *Money Left on the Table* column that are a result of overpricing. While overpricing is still a pertinent issue for IPOs and the underwriters pricing them, this study's scope is more focused on MLOT which is due to underpricing. This paper addresses the different effects of overpricing and underpricing on companies going public in Sections 4.3.1 and 4.3.2. It is because of this discrepancy that a separate data set was created including only the positive values for MLOT (an underpriced offer amount). This data set still has all of the same characteristics of the original data set but includes only 127 companies with positive amounts of money left on the table. It is for this reason that all tables and regressions, except for the Descriptive Statistics and Correlation Matrices, are from the 'Positive' data set. The

Positive data set will be the most pertinent to this study, however it is important that all IPO data from 2015 be acknowledged.

4.1 2015 Initial Public Offerings

The initial number of 201 companies was a very substantial original data set to analyze. However, some of these companies were removed from the data set for a number of reasons. After these discrepancies, the number of companies from 2015 remaining in the positive data set had dropped down to a total sample of 127. Out of the 127 companies, 89 companies were traded on the NASDAQ and the remaining 38 companies were traded on the NYSE.

The major components of an Initial Public Offering are offer (share) price, shares offered, and the offer amount. The offer amount is dependent on its two inputs being offer price and shares offered.

*Offer Amount = Offer (Share) Price * Shares Offered*

Table 1A of the Appendix A (see Appendices for all future tables) reports descriptive statistics for the IPOs of 2015 from the Positive data set. For share price, the mean was $15.26 with a maximum value of $52.00 and a minimum value of $4.00 per share. The mean number of shares offered to public had a mean of 10,185,263 shares, with a maximum of 48,000,000 shares and a minimum of 683,250 shares. In regard to offer amount, the mean was $171,409,830 with a maximum of $1,203,500,000 and a minimum of $4,099,500. The offer amount had a high standard deviation of $210,783,386, showing that there is a skew in the data as a result of a very high offer amount.

4.2 Underwriters and Lead Underwriters

After the total *Number of Underwriters* was assigned to each company, the *Number of Lead Underwriters* was extracted and entered as a separate data column. In reference to Panel A of Table 1 for descriptive statistics on Positive Data Underwriters, the median number of total underwriters was four with a maximum of 17 and a minimum of one. For *lead underwriters*, the median was two with a maximum of five and a minimum of one. The median value is used in future calculations because the mean is not an integer and using fractions of underwriters is not a realistic value. It is through the creation of these inputs that this study aims to use the continuous variables as points of immediate comparison for money left on the table. Take Facebook, for example, which went public in May of 2012. When going public, Facebook had three lead underwriters and 34 total underwriters bringing them public. To date, Facebook is known as one of the most disastrous IPOs due to the underwriters not being able to create an accurate price, and constantly revising it prior to going public.

4.2.1 All-Star Underwriters

The All-Star variable was then added to the data for a more accurate representation of how a more reputable investment banking firm may be able to influence a fair share price. In reference to the Carter and Manaster (1990) reputation ranking, along with the edits made by Ritter (2004), this study was able to determine *Number of All-Star Underwriters* for 2015 U.S IPOs. Both Carter and Manaster and Ritter describe an All-Star underwriter to have a reputation ranking of eight and above (on a scale of zero to nine). Yet, our study decided to change the cut-off to any underwriter with a ranking of seven to nine in order to widen the scope of all-stars. It was through referencing this document and

the data described in the former paragraph that the *Number of All-Star Underwriters* came to fruition. Table 1B shows that the median *Number of All-Star Underwriters* is three with a maximum of 12 and a minimum of zero.

4.2.2 Lead All-Star Underwriters

In order to distinguish an IPO's underwriter even further, the *Lead All-Star Underwriter* variable was created. A *Lead All-Star Underwriter* is an investment banking firm that is distinguished as the lead underwriter, singular or multiple leads, and has a reputation ranking based on Ritter (2004) greater than or equal to seven. Just as an IPO may have multiple *All-Star Underwriters*, they may also have multiple *Lead All-Star Underwriters* as some larger IPOs usually have a syndicate bringing them public. Panel A of Table 1 shows that of the mean of *Lead All-Star Underwriter* is 1.56 with a median of two. Any IPO with more than two *Lead All-Star Underwriter* is going beyond the benchmark of *Lead All-Star Underwriter* and should have less underpricing.

4.2.3 Singular and Multiple Underwriters

In addition to this data about *All-Star Underwriters* and *Lead All-Star Underwriter*, this study saw an opportunity to give further differentiation to these existing values. In order to have a more efficient way to distinguish *Singular Lead Underwriters* from *Multiple Lead Underwriters,* the study turned to binary codes. For an IPO that has one investment banking underwriter, like Presbia LLC, the column for *singular lead (SL)* would be assigned a '1' and the *multiple leads (ML)* column would have a '0' value. If there was an IPO that had five lead underwriters, like Patriot National Corp., then the *SL* column would receive a '0' and the *multiple leads (ML)* would get a '1.'

The data set also included binary options to show whether the IPO had a *lead all-star underwriter* within the *SL* and *ML* columns. Respectively, if the singular lead underwriter is an all-star (seven or greater on the Ritter Rank) then that data entry would be assigned a '1' to the *Singular Lead All-Star (SL All-Star)* and the *Multiple Lead All-Star* column would receive a '0'. If ***any*** of the *Multiple Lead Underwriters* are an all-star, then the *SL All-Star* column would receive a '0' and the *multiple lead all-star* (*ML All-Star)* would get a '1'. If there are singular lead underwriters or multiple lead underwriters that did not have a *lead all-star* present, then they would receive a '0'. See the example 1 below of how the data entries were made. Also note that the table above has removed some elements of the data set in order to convey a clearer depiction of the underwriter formatting.

Data Example 1: ***Other Columns and Variables Removed to Show Underwriter Formatting***

Firm Name	Number of Underwriters	Total Number of AllStars	Is SL an All-Star	Are any of ML an All-Star	Total Number of Lead Underwriters	Total Number of Lead AllStars
COUNTY BANCORP, INC.	2	1	0	1	2	1
PATRIOT NATIONAL, INC.	5	3	0	1	3	1

It is from the various data entries that this study aims to create a supplemental comparison of how underwriters may influence the amount of money left on the table. Since the aim of this study is rather large in its scope, breaking down the underwriters into subgroups was a logical step for evaluating data. Also, in efforts to make data more digestible, the subgroups were made so that there is a clear point of comparison between the two; *i.e.,* having a *lead all-star underwriter* or not. Different subgroups are a vital factor for this study because it allows for the separation of data and results for clear interpretations.

4.3 Money Left on the Table

The MLOT variable is the most crucial to this study. The origination of this variable came from multiple academic journals that address how underpricing results in higher amounts of MLOT. It starts with the underwriters accepting to take a company, and its shares, to the public market. From there, the investment banking firm assesses the company's financial statements and performs valuation methods (those mentioned earlier in the paper) to reach a "fair" market price. Once the investment banking firm has determined the market value of an IPO's shares, the underwriter then purchases those shares from the company going public at that price. In assuming this risk, the underwriter must be compensated, therefore a small premium is added to each share price. The new share price, including the premium, then hits the market with the underwriter pocketing each premium for all of the shares they are technically reselling. However, this premium is not accounted for in MLOT, because the determinants of MLOT are once the shares go public. An IPO leaves money on the table when they enter the market at the offer price, determined by the underwriter, and there is a large increase in share price during the first day of trading.

Example: MLOT comes into action once the stock actually hits the market. Take Company XYZ that has an underwriter determining that its offer price should be $10 per share for 1,000 shares. Company XYZ then goes public at $10 per share and within seconds the market has shot the price of Company XYZ's stock up to $20 per share. At this point in time, the market has self-corrected the share price of Company XYZ through the process of arbitrage. Arbitrage is when any buyer/seller seeks an opportunity to exploit a good that is mispriced. In the case of Company XYZ, a buyer would purchase the share at $10 only

to immediately sell it back into the market at $20, because they believe there is someone willing to pay that price. Through arbitrage, the market has revealed Company XYZ's shares to have an intrinsic value of $20 per share. In this scenario, Company XYZ saw a 100% increase in their share price, but as a result left approximately $10,000 on the table. While Company XYZ did not have a realized loss, they lost the opportunity for their shares to be sold at the intrinsic value of $20 which would have given them $20,000 of initial capital, as opposed to the realized $10,000 they received.

Once the participants in the market have used arbitrage strategies to expose an underpriced asset, the share price is now at what the market considers to be the intrinsic value. At the end of the first day when a company goes public there is a final closing ask price from the seller of the security. The closing ask price is the lowest price at which a seller of the stock is willing to execute the trade. The first day closing ask price minus the original offer price creates the difference for the IPO. Taking the spread multiplied by the number of shares brought to the public gives the amount of money left on the table:

*Money Left on the Table = (Final Ask Price - Offer Price) * Number of Shares Offered*

While this example is very controlled and may not address some other factors such as hot markets or industries, it still creates a picture about how much money a firm could miss out on as a result of underpricing. If most IPOs were to be fairly evaluated and have an accurate offer price, then these companies with millions of shares would see a much larger capital production. Scenarios, such as Company XYZ, are the reason that this study is focusing on the effects of underwriters with money left on the table.

4.3.1 Mispricing IPOs – Overpricing

The calculation featured above could result in a negative value depending on the IPOs pricing and performance. If an underwriter were to vastly overprice the offer amount, and there was a low final ask price, then the result of the above equation would be a negative number. However, this negative number is not money left on the table, but rather a loss to the company. This is important to acknowledge because Purnanandam, Amiyatosh, and Swaminathan (2004) find that the median US IPO firm is overvalued by about 50% relative to the industry that the company participates in. Therefore, if an entire industry, like pharmaceuticals, is overvalued than IPO overpricing may occur. The reason that these negative values remain in a different data set is because they still harm the company that is going public. Even though the number is negative, that does not mean underwriters were more accurate in their pricing than those that left money on the table. Underwriters are still responsible for the drop in stock price because of their overpricing.

In reference to Table 1B for the descriptive statistics (including the original 177 IPOs for 2015), the minimum amount for the money left on the table variable is a bit misleading. It is technically not money left on the table; it is actually an opportunity cost that the company going public incurs. Furthermore, the term 'minimum' is a bit confusing because this is actually the maximum amount that a 2015 company loss due to overpricing. Yet, the least amount of money lost as a result of overpricing was $80,000 which is the most accurate pricing in 2015 and was for Ritter Pharmaceuticals.

4.3.2 Mispricing IPOs – Underpricing

On the other end of the spectrum are the positive values which is the orthodox MLOT. Entered into their own data set, the Positive Data allows for an analysis that only deals with IPOs that had MLOT as a result of their underwriters underpricing the IPO offer amount. With the underwriting valuing the offer price below the fair value, a situation of money being left on the table is created. Ritter and Loughran (2002) claim that IPOs on average are underpriced which means that there is a higher chance of most IPOs leaving money on the table. Even though these values are positive, and that the company saw a gain in their stock price, it can still be considered a loss. To paint a more accurate picture, return to the Netscape example presented in the introduction.

Referenced in Loughran and Ritter (2002):

> ...cofounder James Clark held 9.34 million shares (of Netscape). Based on the midpoint of the file price range of $12-$14, the expected value of his Netscape holdings was $121 Million at the time that the preliminary prospectus was filed. At the closing market price on the first day of trading, his shares were worth $544 million, a 350% increase in his pretax wealth in the course of a few weeks. So, at the same time that he discovered that he had been diluted more than necessary due to the large amount of the money left on the table, he discovered that his wealth had increased by hundreds of millions of dollars. Since he owned 28.2% of the company before going public, $43 million of the $151 million wealth transfer from pre issue shareholders to the new investors came out of his pocket. After the offering, he owned 24.5% of Netscape, but if the same proceeds had been raised by selling 2.4

million shares at $58.25 instead of 5.0 million shares at $28.00, he would have owned 26.3%. (420)

This is a real example of how underpricing an IPO can affect much more than just the share price. Mr. Clark ended up having an enormous personal gain in wealth but his actual influence in Netscape diminished as a result of systematic underpricing by Morgan Stanley. This incremental change in his percentage owned may not appear to be too detrimental, but when dealing with a company worth approximately $3 billion, the pennies tend to stack rather quickly. Having the Positive data set dedicated to analyzing MLOT allows for this study to use these numbers in a plethora of ways.

Referencing Table 1A for descriptive statistics on MLOT, it can be seen that the mean amount in 2015 was a whopping $46,583,540. Looking at the same table, the median for MLOT is approximately $16 million. This is a very appropriate distribution for this variable because Loughran and Ritter (2002) show empirically that the average amount of money left is much higher than the median due to a few IPOs with large amounts of MLOT. To further this point, the standard deviation of this variable is $70,490,226. The maximum amount of MLOT is $359,532,250 with the Fitbit IPO. Within the 'Positive' data set, there was IPO that was priced perfectly (Franklin Financial Network) resulting in the minimum being zero.

CHAPTER V

QUANTITATIVE RESULTS

5.1 Correlation Matrices

Simple correlation matrices were used to see the relationship of certain inputs against others. The inputs were as follows: Number of Shares, Offer Amount, *Number of Underwriters*, *Number of All-Stars*, and *Money Left on the Table*. Number of Shares and Offer Amount were chosen because it is assumed these factors contribute to the amount of Money Left on the Table. In reference to Panel A of Table 2, Number of shares had a correlation of 0.59 against MLOT, which is reasonable considering IPOs with more shares have a higher proportional risk. This situation is similar with offer amount, which has a correlation of 0.55 to MLOT. Again, this was not a surprise as companies that have a higher offer amount will be inherently tougher to value and have more risk associated with valuation. It is also important to note that with these two situations (Number of Shares & Offer Amount) there is a margin of error with pricing an IPO. As these two variables increase, so does the margin of error because of their size and complexity, which could contribute to MLOT.

Number of Underwriters and *All-Stars* were chosen to be the additional variables to align with the focus of this study. Table 2A shows that the number of underwriters has a correlation of 0.3 with MLOT. While this correlation does not seem to be too strong, it is still correlated with a medium strength. Many other factors contribute to MLOT, but as Panel A of Table 2 shows, there is a relationship between *Number of Underwriters* and

MLOT, *ceteris paribus.* This is higher than the same correlation in Panel B of Table 2, because the negative values of MLOT were pulling the mean down, therefore showing a weaker correlation. Even with the negative values present there is still a small correlation between *Number of Underwriters*, *ceteris paribus.*

Having the *Number of All-Stars* variable addresses the correlation between MLOT and how many all-stars were present for an IPO. Panel A of Table 2 shows that there is actually a higher correlation with MLOT and Number of All-stars than the relationship described in the former paragraph. Number of All-Stars has a 0.328 correlation at a medium level, *ceteris paribus.* This is a very interesting correlation assuming that highly reputable underwriters ***should*** be the ones performing at a higher level and leaving less money on the table, as a result. Again, it is very reasonable that the correlation for this variable is higher in Table 2A than Table 2B, because of the negative MLOT values skewing the correlation. This is one of the reasons why this study created a positive data set.

5.2 Difference Tests

Difference tests are used in this study to provide important statistics to compare different groups within a singular variable. It is used by taking one dependent variable and creating a parameter to produce two sub-groups. From there the independent variable of MLOT is analyzed for both groups and then compared. This simple test gives a chart for number of IPOs on either end of the parameter, the mean MLOT for each group, and the statistical significance of these results. This study used this tool to assess multiple dependent variables all against the amount of MLOT for the respective group.

5.2.1 Means Test for Number of Underwriters

A sample means test was constructed with the dependent variable being the *Number of Underwriters* with MLOT as the mean being tested. This test was constructed by breaking the *Number of Underwriters*' variable into two subgroups: above or at and below to the median *Number of Underwriters* from the positive data set. Using the median of four is more effective because it is an integer and would not cause any discrepancies within the data. In reference to Table 4A, the number of IPOs with underwriters above the median is 58, and the number of IPOs with underwriters at or below the median is 69. For the IPOs above the median *Number of Underwriters*, the average amount of MLOT is $66,743,019. Whereas the IPOs at or below the median *Number of Underwriters* had a mean of $29,637,891 MLOT. This is a statistically significant result with a p-value .003, which is significant at the three-star level.

This difference test shows that there is a pretty even distribution of IPOs between the *Number of Underwriters* above or at and below the median. It also shows that, *ceteris paribus,* IPOs that have underwriters above the median leave, on average, more than double what the IPOs below the median *Number of Underwriters* do in regard to MLOT. In this situation, more underwriters do not reduce the amount of MLOT; they actually increase it, all else equal. Therefore, IPOs should use fewer underwriters if they want to reduce their chance of underpricing, *ceteris paribus.*

5.2.2 Means Test for Number of All-Stars

The next variable tested using a difference test was for the total *Number of All-Stars* present on an IPO. As mentioned in Table 1B, the median *Number of All-Stars* from the positive data set is three all-stars. The median number was chosen for a few reasons, the

first being that you cannot have a portion of an underwriter. It was decided that the parameters for these two tests were any IPOs having more than the median *Number of All-Stars* and the other IPOs that were either at or below the median of three. This study chose to have the lower bound to be at or below the median, because the IPOs that are at or below were in a similar circumstance of not having excess All-Stars. Yet, any IPO that goes beyond the median of three *All-star Underwriters* should be receiving extraordinary coverage from these additional all-stars, therefore reducing underpricing. Using MLOT as the independent variable, the test was constructed to see if there were any statistically significant differences between the MLOT for IPOs having a *Number of All-Stars* greater than the median and those that do not.

This test provides this study with a statistically significant result. In reference to Table 4B, the amount of observations above the median of three *all-star underwriters* is 51 companies. The number of IPOs at or below the median of three *all-star underwriters* is 76. The mean amount of MLOT for those above the median is $66,995,447, and for the companies at or below the median *Number of All-Stars* the mean is $32,886,075. The difference in MLOT between the two groups' averages was $34,109,371.

On average, IPOs with a total amount of all-stars above the median leave approximately $34 million more on the table than IPOs with all-stars amounting from zero to three. Table 4B has a t-stat of 2.74 and a p-value of .007, showing that this is a statically significant result at the three-star level. With this level of significance, it can be said that there is a notable difference with the average MLOT between the two groups. To extrapolate, IPOs that have four or more all-star underwriters underprice an IPO's offer

amount with an accuracy that averages to $34 million more MLOT than those with fewer or no all-stars, *ceteris paribus.*

5.2.3 Means Test for Number of Lead All-Stars

In line with the hypothesis development, the next testable dependent variable is the number of *Lead All-Stars*. This specific test analyzes the effect of having more lead underwriters that are all-stars on the amount of MLOT. Table 1B shows that the median number of *Lead All-Stars* is two, which is why this study uses zero to two for the lower bound. It would be fair to assume that having an all-star, or multiple, in the lead underwriting position would create a more accurate IPO offer price, thus reducing the amount of MLOT.

Table 4C shows the difference of means test for this dependent variable. The sample amount that is above the median of two *Lead All-Stars* shows that there are only 20 IPOs from the positive data set fitting these criteria. The remaining 107 have two or less *Lead All-Stars* present for their IPOs. The mean amount of MLOT for an IPO above the median for *Lead All-Stars* is $62,110,105 while those below the median had a mean of $43,681,378. Between these two sub-groups the difference of means was $18,428,726, which did not produce any results considered to be statistically significant. The t-stat was 1.07 with a p-value of 0.285. Even though these results are not statistically noteworthy, they still hold weight within the research questions of this study. For the positive data set of 2015 IPOs, it was learned that having more *Lead All-Stars* does not influence MLOT in either increasing it or reducing it. This returns to the concept of how much more sought

after these all-star investment banking firms are for companies going public, yet *Lead All-Stars* underwriters make no beneficial impact for accurate pricing.

5.2.4 Means Test for the Singular Lead All-Star

After creating all of the inputs for the original data set, an additionally binary element was added for close juxtaposition. If there was only one *lead underwriter*, then that IPO was given a '1' for the *'Singular Lead'* column. Additionally, in order to distinguish these underwriters further, another binary column of *'Singular Lead All-Star?'* was created. A 2015 IPO like Invitae Corp. was brought public with J.P. Morgan as the sole lead underwriter. For Invitae Corp. both the *'Singular Lead?'* and *'Singular Lead All-Star?'* would have binary entries of '1' to indicate their positive relation with these descriptions.

Table 4D shows the difference test between the means of IPOs that had *Singular Lead All-Stars* and those that did not (Singular Lead Non-All-Star or Multiple Leads). There were only 19 IPOs that had an All-Star in the sole lead underwriting position and averaged $83,031,380 for MLOT, whereas the 108 IPOs not having a *Singular Lead All-Star* had an average of $40,171,420 for MLOT. This produced a statistically significant result that has a t-stat of 2.494 and a p-value of .014 which is significant at the three-star level. With Carter and Manaster (1990) saying that prestigious investment banking firms are less likely to take on risky IPOs, this number should be much lower than the rest of the fields. This means test for MLOT shows that *Singular Lead All-Stars* leave almost double the amount of MLOT compared to IPOs that have: Singular Lead Non-All-Stars, Multiple Leads without all-stars, and *Multiple Leads with an All-Star*. When analyzing this situation

in a vacuum, *Singular Lead All-Stars* are, on average, half as effective in accurately pricing an IPO compared to the other potential lead underwriting groups.

5.2.5 Means Test for Multiple Lead All-Stars

Table 4E has a very similar setup to the Table 4D with the only difference being that the dependent variable is now *Multiple Leads with an All-Star*. The binary entries are still used for both columns to represent their respective positive indication. For example, an IPO could have three lead underwriters with only one all-star and would produce a '1' in both the *'Multiple Leads?'* and the *'Multiple Leads with an All-Star?'* columns. This decision was made because an *all-star underwriter* being part of *multiple lead underwriters* should ideally have more accurate pricing of IPOs than singular leads (All-star and Non-All-Star) and Multiple Leads without an All-Star. Continuing with Carter and Manaster (1990), if prestigious underwriters only associate with less risky IPOs, then an IPO that has *Multiple Leads with an All-Star* should have accurate pricing. Having multiple lead underwriters and having at least one of them being an all-star should create the ideal complexion for firms going public.

Referencing back to Table 4E, it shows that the sample number (from the positive data set) of IPOs with Multiple Lead underwriters that include at least one all-star is 92 companies, while there are 35 IPOs that did not fit this description (Singular Leads, Singular Lead All-Stars, and Multiple Leads with no all-stars). The mean amount of MLOT for Multiple Lead Underwriters with an All-Star is $45,010,306, whereas the opposing group had a mean of $50,718,897. The difference between these two groups was -$5,708,590, showing that *Multiple Lead Underwriters with an all-star* had less MLOT. Table 4E shows that this not statistically significance in the sense of their differences due

to a -0.47 T-stat and a 0.685 P-value. Yet, compared to the rest of the sample group, *Multiple Lead Underwriters with an All-Star* were the most effective in producing an accurate offer when assessing their means for MLOT.

5.2.6 Means Test for Number of Lead Underwriters

The final difference test was made to analyze how the number of *Lead Underwriters* influences the amount of MLOT, *ceteris paribus.* Table 1B for the descriptive statistics of the Positive Data set shows that the median number of *Lead Underwriters* is two. To keep with the pattern of the past difference tests, the lower bound of the test consists of zero to two (median) *Lead Underwriters*. Any amount of *Lead Underwriters* greater than the median of two is the upper group for they should be receiving higher than normal coverage from three or more *Lead Underwriters*.

Table 4F shows that the number of IPOs with *Lead Underwriters* higher than the median is 34 companies. There are 93 companies that had two or less *Lead Underwriters*. The mean amount of MLOT by the group having more *Lead Underwriters* than the median is $54,012,341. For the IPOs having two or less *Lead Underwriters*, the amount of MLOT had a mean of $43,867,634. This amounts to a difference of $10,144,706, which proves to be not a significant result because of a 0.72 t-stat and a 0.475 p-value. However, it can still be seen that having more *Lead Underwriters* does not necessarily make a difference in how much money is left on the table when compared to those with one to two *Lead Underwriters*, *ceteris paribus.*

5.3 Regressions Analysis

These simple regressions were made with the data analysis function in Excel. They were performed only using the data from the Positive set and using MLOT as the independent variable. The purpose of this analysis is to see that if, *ceteris paribus,* there is a statistically significant correlation between MLOT and the dependent variable. These graphs also show how the dependent variables would influence the amount of money left on the table through the coefficient that is respective to them, all else equal.

5.3.1 Number of Underwriters

Simple regressions were created to see if the data provided was statistically significant when regressed against the independent variable of MLOT. The *Number of Underwriters* that an IPO has is the dependent variable for this regression. When testing it, there was a statistically significant result for how the number of underwriters relates to the amount of MLOT. In reference to Table 3A, there is a p-value of 0.0004 which is at the three-star significance level. This simple regression has an initial intercept of $10,305,596 for MLOT and each additional underwriter increases the amount of MLOT by increments of $6,735,817, *ceteris paribus.* IPOs for larger companies may have more underwriters and MLOT due to their high amount of complexity and risk. However, this regression still shows that there is a statistically significant result for MLOT being associated with more underwriters.

5.3.2 Number of All-Stars

Using the same regression analysis tool in Excel, the independent variable of MLOT is constant, while the dependent variable is the *Number of All-Stars* participating

in an IPO. this regression also produced a statistically significant result, like the test prior. In reference to Table 3B, there is a p-value of 0.0001 for this regression which is at the three-star significance level. Table 3B shows the initial intercept for MLOT is $17,044,217 and each additional *All-Star Underwriter* increases the MLOT by increments of $8,411,421, *ceteris paribus*. Both the intercept and the variable associated with the *Number of All-Stars* are higher than that of the *Number of Underwriters*. This may be because there are fewer All-Stars than underwriters, in general, which would increase these values respectively. IPOs that are less risky are associated with prestigious investment banks and have an inverse relationship with underpricing. Yet, this model for the Positive data set of 2015 IPOs show that there is a positive relationship with MLOT and the *Number of All-Stars* with a three-star significance, *ceteris paribus.*

5.3.3 Number of Lead Underwriters

Through the regression analysis tool in Excel, the amount of *Money Left on the Table* is along the Y-axis, with the dependent variable of *Number of Lead Underwriters* on the X-axis. Table 3C shows the results of this analysis and provides this study with a result that is not statistically significant. With a p-value of 0.65184 and a t-stat of -0.453, this study can deduce that there is no influential correlation between the *Number of Lead Underwriters* and how much money is left on the table as a result of underpricing. However, Table 3C does show that as the *Number of Lead Underwriters* has an inverse relationship with MLOT. As the *Number of Lead Underwriters* increases in singular increments, the amount of money left on the table is reduced by $3,496,529. A reduction in money left on the table per increase in *Number of Lead Underwriters* is a very

understandable relationship. This negative value is the first hint of an underwriter doing a beneficial job in producing a fair price, resulting in a lower amount of MLOT for an IPO, *ceteris paribus.* Having a reduction of MLOT per increase of *Lead Underwriter* is why this study broke an IPO's underwriters into sub groups so that they may be tested individually. Therefore, a more specific version of this test is applied to the next category.

5.3.4 Number of Lead All-Stars

With the independent variable remaining as MLOT, the dependent variable for this regression is the number of all-stars that are in a lead underwriter position. Unlike the first two regression tests, this test was not statistically significant. In reference to Table 4D, there is a p-value of 0.136 which is outside the realm of statistically significant results. However, this finding can still prove to be very important to this study. Extrapolating off of the regression results for this dependent variable, it shows that the *Number of Lead All-Stars* has no influence on MLOT, *ceteris paribus.* Meaning that having an All-Star in a lead underwriting position neither benefits nor harm the IPO. These All-Stars with high reputations, charge high fees, and turn away companies that seem undesirable. Yet, if this *Number of Lead All-Stars* is not making a difference in the amount of MLOT, then companies seeking underwriters to go public should pursue lower level investment banking firms. Table 4C shows in comparison, that having more *Lead Underwriters* as opposed to *Lead All-Stars* would provide a more accurate pricing for a 2015 U.S. IPO, *ceteris paribus.*

5.4 Multivariate Regression Analysis

The final test for this study was to use a multivariate regression analysis in order to encompass all the variables being tested. Due to the hypothesis development described in Chapter II of this paper, the variables chosen for this test were: Offer amount, *Number of Underwriters, Number of All-Star Underwriters, Number of Lead Underwriters,* and *Number of Lead All-Star Underwriters*. These variables were thought of as the most influential in this spotlight study on Underwriters and their influence of MLOT. However, offer amount was included because a higher offer amount usually results in more MLOT, so it adds an additional control for testing the other variables. For this multivariable regression analysis, the independent variable is MLOT. The chart shows how these five variables influence the amount of MLOT altogether, not as isolated dependent variables.

Table 5 shows the output for this multivariate regression analysis using the coding program Statistical Analysis System (SAS). SAS takes all of these dependent variables and calculates their influence on the intercept (MLOT) while balancing for each dependent variable's respective affect. This means that certain dependent variables have more influence on MLOT when isolated or in a vacuum, as opposed to the multivariate regression analysis which allows this study to see how all of these variables, when tested together, influence the amount of MLOT for the Positive data 2015 U.S. IPOs.

Table 5 shows how all of these dependent variables come together. The first variable being offer amount is statistically significant, which is not a shock, for an IPO with a higher offer amount will have more MLOT due to their larger margin for error. None of the dependent variables thereafter are statistically significant, yet they still shine light on how underwriters can influence MLOT. In this model, the *Number of Underwriters*

shows that each incremental increase in the total number of investment banking firms actually decreases the amount of MLOT by $264,162 per underwriter. Table 5 also shows that each additional *All-Star Underwriter* decreases the amount of MLOT by increments of $4,589,297. Next, the *Number of Lead All-Stars* actually reduces the most amount of money per increase in the dependent variable. Every additional *Lead All-Star Underwriter* assists in more accurate pricing which reduces the amount of MLOT by increments of $11,965,029. Finally, the *Number of Lead All-Star Underwriters* increases the amount of MLOT with each increase of the variable. For every additional *Lead All-Star* that 2015 IPOs had, the amount of MLOT will increase by increments of $11,277,245.

While none of these variables, besides offer amount, prove to be statistically significant results, this multivariable regression analysis still helps develop a wider picture for the process of underwriting an IPO. Table 5 shows that having more underwriters, as part of a syndicate, does produce a more accurate IPO price, but is not as effective as other dependent variables in this analysis. Having more *All-Star Underwriters* participating in an IPO does reduce the amount of MLOT, however having an All-Star in a lead underwriting position produces more MLOT, *ceteris paribus*. In this regression, it shows that for 2015 IPOs having more *Lead All-Star Underwriter* was not advantageous. Table 5 also shows that the most successful IPOs from 2015 were companies that had multiple All-Star Underwriters as part of syndicate and multiple Lead Underwriters that were not All-Stars. This correlates with the Means Difference test from Table 4E as Multiple Lead Underwriters with an All-Star had the most effective pricing of 2015 IPOs.

CHAPTER VI

CONCLUSION

In 2015, there were 201 companies that brought their enterprises to the public market in order to produce capital through the process of an Initial Public Offering. When these companies want to publicly exchange shares for capital on the public market, they are most often underwritten by a large investment banking firm. These underwriters provide companies seeking to go public with legal expertise, risk aversion, and the knowledge to price the shares for the IPO. However, most of these IPOs are dramatically underpriced resulting in a spread between the offer price and the final closing price on the first-day of trading. This spread results in *Money Left on the Table*, which is a loss in potential capital that goes unnoticed because of a more superficial gain in wealth. This study serves to fill a gap in knowledge about whether or not underwriters actually assisted a 2015 U.S. IPO with the amount of MLOT when going public.

The aim of this paper is to understand how *Underwriters*, *Lead Underwriters, All-Star Underwriters, Lead All-Star Underwriters, and Singular Lead All-Star Underwriters versus Multiple Lead Underwriters with an All-Star* all influence how much Money is left on the Table for 2015 IPOs. Through the creation of data sets that incorporated multiple variables and different sub-groups, this study deduced that there is no statistically significant empirical result between these groups of underwriters and how they influenced MLOT.

However, there were certain aspects of this study that proved to be highlights of interest. Simple regressions from Tables 3A and 3B show that there are statistically significant results when testing the amount of MLOT against the *Number of Underwriters* and the *Total Number of All-Stars*, respectively (*ceteris paribus)*. In the Means difference test these two variables had a tendency to leave more money on the table, yet when incorporated into the Multivariate Regression Analysis it showed to have the inverse effect. The *Total Number of All-Stars* succeeded in lowering the amount of MLOT when analyzed in the multivariate mode.

The *Number of Lead Underwriters* proved to be the most consistent variable through all of the tests. This group showed no significance in the Table 3F, resulting in no benefits associated with a greater *Number of Lead Underwriters.* Yet, when entered into the multivariate regression they reduced the most money left on the table per additional *Lead Underwriter.*

The *Total Number of Lead All-Stars* actually increased the amount of money left on the table. However, *ceteris paribus,* the means difference test in Table 3D does show that IPOs for 2015 with a *Singular Lead All-Star Underwriter* had the poorest methodology of accurate pricing. Against the rest of the data field, the 19 IPOs with a *Singular Lead All-Star Underwriter* averaged more than double the amount of MLOT as all of the other groups. *Multiple Lead Underwriters with an All-Star* were the most successful group in analyzing the fair price of an IPO. The Means Difference test in Table 3E shows that there is no statistical significance for this result, yet *Multiple Lead Underwriters with an All-Star* had the lowest average.

While the findings of this study were underwhelming in their statistical significance, the purpose of this study still has merit in its contribution to future studies. It is the hope that an additional study will be done on how underwriters, All-Stars and not, influence the amount of MLOT relative to the IPOs offer amount. Appendix B shows the means difference tests for each distinctive group, yet the number is a percentage of the firm's MLOT relative to their respective offer amount. Future studies will be able to control for proportional risk through the use of this standardized metric.

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APPENDICES

APPENDIX A: CHARTS AND FIGURES

TABLE 1: Descriptive Statistics for 2015 IPOs

A) Descriptive Statistics of IPOs for Positive Data Set (Positive Money Left on the Table values only)

Descriptive Statistics for 2015 IPOs - Positives Only (N= 127)					
Variable	Mean	Median	Std Dev	Maximum	Minimum
Share Price	$ 15.26	$ 15.00	$ 6.95	$ 52.00	$ 4.00
Number of Shares	10,185,263.39	6,550,000.00	9,698,587.70	48,000,000.00	683,250.00
Offer Amount	$ 171,409,830.96	$ 96,900,000.00	$ 210,783,386.05	$ 1,203,500,000.00	$ 4,099,500.00
Money Left on the Table	$ 46,583,540.25	$ 16,032,000.00	$ 70,490,226.44	$ 359,532,250.00	-
MLOT/Offer Amount	30.07%	16.25%	38.96%	218.00%	0.00%

B) Descriptive Statistics of Underwritrers for Positive Data Set (Positive Money Left on the Table values only)

Descriptive Statistics for 2015 IPOs - Positives Only (N= 127)					
Variable	Mean	Median	Std Dev	Maximum	Minimum
Number of Underwriters	5.39	4.00	3.26	17.00	1.00
Total Number of All-Stars	3.56	3.00	2.77	12.00	-
Total Number of Lead Underwriters	2.11	2.00	0.84	5.00	1.00
Total Number of Lead All-Stars	1.56	2.00	0.97	4.00	-
Money Left on the Table	$ 45,725,963.03	$ 15,681,000.00	$ 71,274,443.18	$ 359,532,250.00	-
MLOT/Offer Amount	30.07%	16.25%	38.96%	218.00%	0.00%

TABLE 1: Descriptive Statistics for 2015 IPOs (Continued)

C) Descriptive Statistics of IPOs for Original Data Set (Positive and Negative values)

Descriptive Statistics for 2015 IPOs (N = 177)					
Variable	Mean	Median	Std Dev	Maximum	Minimum
Share Price	$ 14.91	$ 14.00	$ 7.99	$ 68.56	$ 4.00
Number of Shares	10,660,163	6,365,000	14,608,120	160,000,000	683,250
Offer Amount	$ 175,015,332.00	$ 88,235,280.00	$ 265,837,707.00	$ 2,560,000,000.00	$ 4,099,500.00
Money Left on the Table	$ 30,610,219	$ 5,400,000	$ 65,192,952	$ 359,532,250	$ (57,101,000)
MLOT/Offer Amount	18.93%	7.80%	37.73%	218.00%	-38.46%

D) Descriptive Statistics of Underwriters for Original Data Set (Positive and Negative values)

Descriptive Statistics for 2015 IPOs (N = 177)					
Variable	Mean	Median	Std Dev	Maximum	Minimum
Total Number of Underwriters	5.39	4.00	3.23	17.00	1.00
Total Number of All-Star Underwriters	3.34	3.00	2.75	12.00	0.00
Total Number of Lead Underwriters	2.18	2.00	0.95	6.00	1.00
Total Number of All-Star Lead Underwriters	1.53	2.00	1.06	5.00	0.00
Money Left on the Table	$ 30,610,219	$ 5,400,000	$ 65,192,952	$ 359,532,250	$ (57,101,000)
MLOT/Offer Amount	18.93%	7.80%	37.73%	218.00%	-38.46%

TABLE 2: Correlation Matrices for 2015 IPOs

A) Correlation Matrix for Positive Data Set (Positive Money Left on the Table values only)

Correlation Matrix - Positive Data Set					
	Number of Shares	Offer Amount	Number of Underwriters	Total Number of All-Stars	Money Left on the Table
Number of Shares	1				
Offer Amount	0.87046	1			
Number of Underwriters	0.59665	0.69422	1		
Total Number of All-Stars	0.59939	0.71490	0.91960	1	
Money Left on the Table	0.59097	0.55087	0.30695	0.32795	1

B) Correlation Matrix for Original Data Set (Positive & Negative Money Left on the Table values)

Correlation Matrix - Original Data Set					
	Number of Shares	Offer Amount	Number of Underwriters	Total Number of All-Stars	Money Left on the Table
Number of Shares	1				
Offer Amount	0.93551	1			
Number of Underwriters	0.57127	0.66084	1		
Total Number of All-Stars	0.52481	0.64051	0.90072	1	
Money Left on the Table	0.24339	0.29356	0.21167	0.27080	1

TABLE 3: Means Difference Test for 2015 IPOs from Positive Data Set

A) Means Difference Test for MLOT by Total Number of Underwriters

Total Number of Underwriters				
>=5	0-4			
n = 58	n = 69			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
$ 66,743,019.52	$ 29,637,891.00	$37,105,128.52	3.05	0.003

TABLE 3: Means Difference Test for 2015 IPOs from Positive Data Set (Continued)

B) Means Difference Test for MLOT by Total Number of All-Star Underwriters

Total Number of All-Star Underwriters				
>=4	0-3			
n = 51	n = 76			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
$ 66,995,447.87	$ 32,886,075.92	$34,109,371.95	2.74	0.007

C) Means Difference Test for MLOT by Total Number of Lead All-Star Underwriters

Total Number of Lead All-Star Underwriter				
>=3	0-2			
n = 20	n = 107			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
$ 62,110,105.18	$ 43,681,378.58	$18,428,726.61	1.07	0.285

D) Means Difference Test for MLOT by Singular Lead All-Star Underwriters

Singular Lead Underwriters Being an All-Star or Not				
SL All-Stars	NO SL All-Stars			
n = 19	n = 108			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
$ 83,031,380.62	$ 40,171,420.18	$ 42,859,960.44	2.49	0.014

E) Means Difference Test for MLOT by Multiple Leads with an All-Star Underwriter

Multiple Lead Underwriters Being an All-Star or Not				
ML All-Stars	No ML All-Stars			
n = 92	n = 35			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
$ 45,010,306.63	$ 50,718,897.19	-$5,708,590.57	-0.41	0.685

F) Means Difference Test for MLOT by Total Number of Lead Underwriters

Total Number of Lead Underwriters				
>=3	0-2			
n = 34	n = 93			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
$ 54,012,341.27	$ 43,867,634.50	$10,144,706.77	0.72	0.475

TABLE 4: Regression Analysis of Hypotheses for 2015 IPOs from Positive Data Set

A) Regression Analysis for Number of Underwriters and Money Left on the Table

Regression Analysis - Number of Underwriters				
VARIABLE	*Coefficients*	*Standard Error*	*t-stat*	*p-value*
Intercept	10,305,596.03	11,702,295.58	0.881	0.3802
Number of Underwriters	6,735,817.13	1,868,030.26	3.606	0.0004

Regression Statistics	
Multiple R	0.307
R Square	0.094
Adjusted R Square	0.087
Standard Error	67,355,236.52
Observations	127

Line Fit Plot Diagram – Graph 1

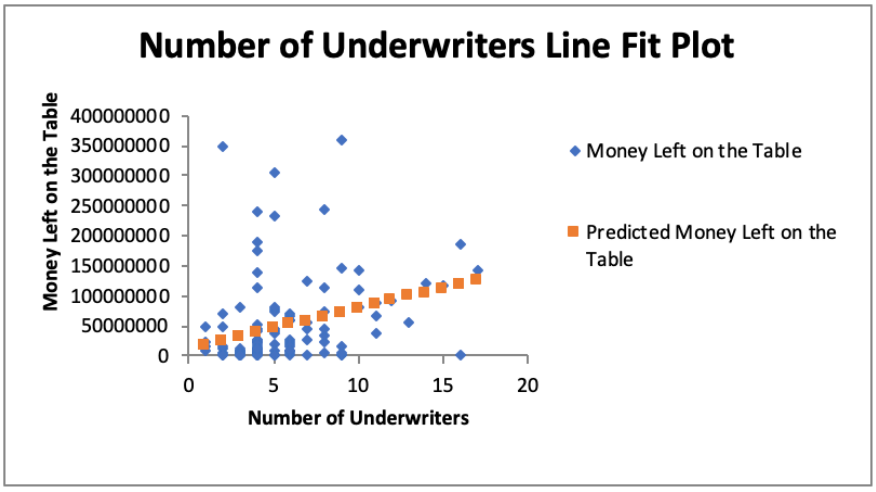

TABLE 4: Regression Analysis of Hypotheses for 2015 IPOs from Positive Data Set (Continued)

B) Regression Analysis for Number of All-Star Underwriters and Money Left on the Table

Regression Analysis - Number of All-Star Underwriters				
VARIABLE	*Coefficients*	*Standard Error*	*t-stat*	*p-value*
Intercept	17,044,217.64	9,649,811.45	1.766	0.0798
Total Number of All-Stars	8,411,421.46	2,167,169.23	3.881	0.0002

Regression Statistics	
Multiple R	0.328
R Square	0.108
Adjusted R Square	0.100
Standard Error	66,857,514.28
Observations	127

Line Fit Plot Diagram – Graph 2

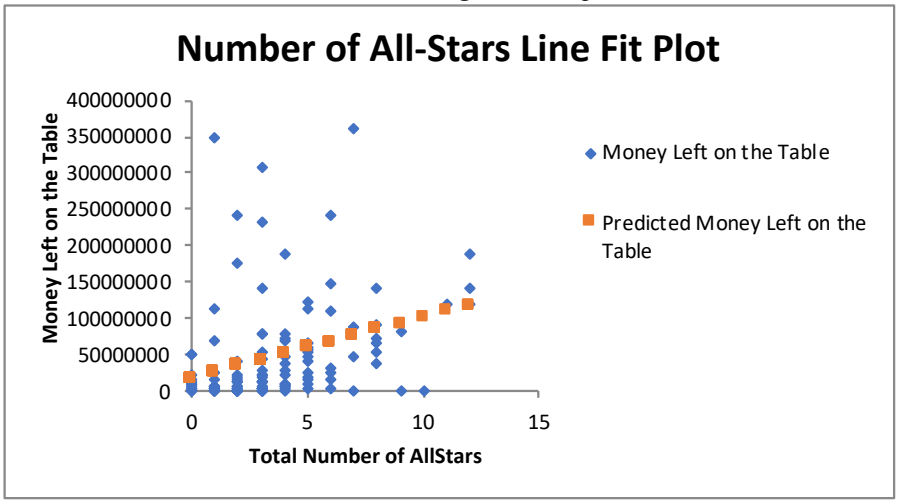

TABLE 4: Regression Analysis of Hypotheses for 2015 IPOs from Positive Data Set (Continued)

C) Regression Analysis for Number of Lead Underwriters and Money Left on the Table

Regression Analysis - Number of Lead Underwriters				
VARIABLE	*Coefficients*	*Standard Error*	*t-stat*	*p-value*
Intercept	53,934,509.56	17,422,041.64	3.09576	0.00242
Total Number of Lead Underwriters	(3,496,528.47)	7,730,739.70	-0.45229	0.65184

Regression Statistics	
Multiple R	0.040
R Square	0.002
Adjusted R Square	-0.006
Standard Error	70,713,786.96
Observations	127

Line Fit Plot Diagram – Graph 3

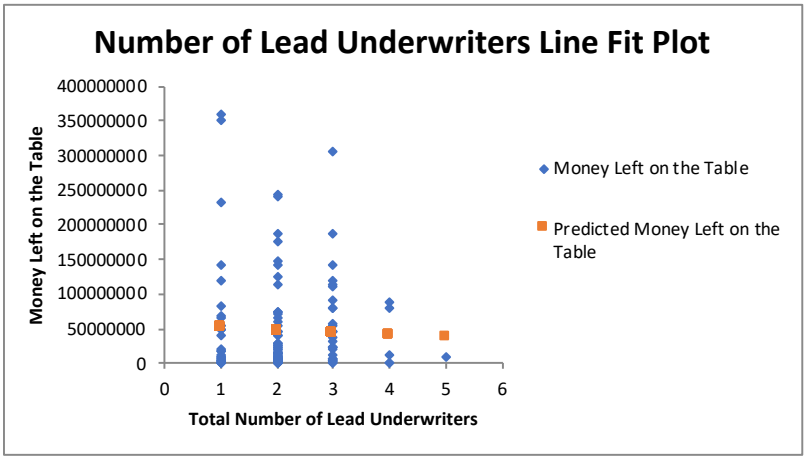

TABLE 4: Regression Analysis of Hypotheses for 2015 IPOs from Positive Data Set (Continued)

D) Regression Analysis for Number of Lead All-Star Underwriters and Money Left on the Table

Regression Analysis - Number of Lead All-Stars				
VARIABLE	*Coefficients*	*Standard Error*	*t-stat*	*p-value*
Intercept	31,316,267.78	11,935,560.60	2.62378	0.00978
Number of Lead All-Stars	9,792,644.46	6,532,234.31	1.49913	0.13636

Regression Statistics	
Multiple R	0.040
R Square	0.002
Adjusted R Square	-0.006
Standard Error	70,713,786.96
Observations	127

Line Fit Plot Diagram – Graph 4

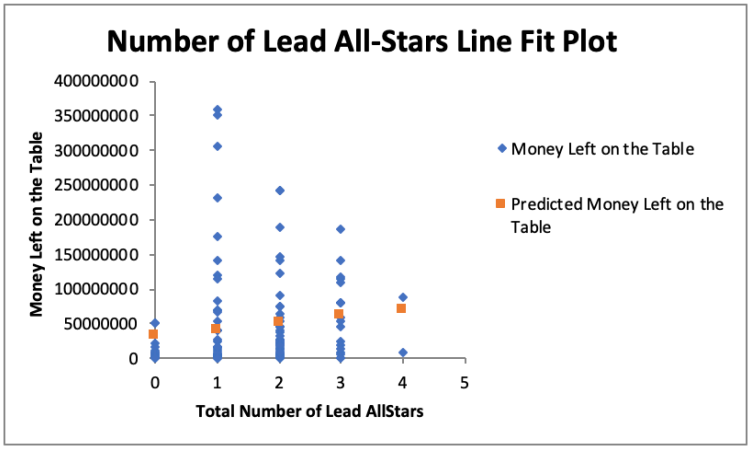

TABLE 5: Multivariate Regression Analysis for 2015 IPOs (Positive Data Only)

Multivariate Regression Analysis for 2015 IPOs (Positive Data Set)					
VARIABLE	DF	Parameter Estimate	Standard Error	t-stat	p-value
Intercept	1	34,341,485	16,615,183	2.07	0.0409
Offer Amount	1	0.21793	0.03658	5.96	<.0001
Number of Underwriters	1	(264,162)	4,770,991	-0.06	0.9559
Number of All-Stars Underwriters	1	(4,589,297)	6,461,156	-0.71	0.4789
Number of Lead Underwriters	1	(11,965,029)	10,303,295	-1.16	0.2478
Number of Lead All-Stars Underwriters	1	11,277,245	10,671,613	1.06	0.2927

Root MSE	59,206,261
Dependent Mean	46,583,540
R-Square	0.3225
Adj R-Sq	0.2945
Coeff Var	127.09695

APPENDIX B: ADDITIONAL CHARTS AND FIGURES

Table 6: Means Difference Tests for 2015 IPOs (Percentage Data from MLOT/Offer Amount)

A) Means Difference for Percentage of MLOT/Offer Amount by Total Number of Underwriters

Total Number of Underwriters Above or Below Median				
>=5	0-4			
n = 58	n = 69			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
26.22%	33.31%	-7.09%	-1.021	0.002

B) Means Difference for Percentage of MLOT/Offer Amount by Total Number of All-Star Underwriters

Total Number of All-Star Underwriters Above or Below Median				
>=4	0-3			
n = 51	n = 76			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
26.92%	32.18%	-5.26%	-0.745	0.004

C) Means Difference for Percentage of MLOT/Offer Amount by Total Number of Lead All-Star Underwriters

Lead Underwriters All-Stars Above or Below Median				
>=3	0-2			
n = 20	n = 107			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
25.46%	30.93%	-5.47%	-0.575	0.078

Table 6: Means Difference Tests for 2015 IPOs (Percentage Data from MLOT/Offer Amount) Continued

D) Means Difference for Percentage of MLOT/Offer Amount by Singular Lead All-Star Underwriters

Singular Lead Underwriters Being an All-Star or Not				
SL All-Stars	No SL All-Star			
n = 19	n = 108			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
28.15%	30.40%	-2.25%	-0.231	0.601

E) Means Difference for Percentage of MLOT/Offer Amount by Multiple Leads with an All-Star Underwriter

Multiple Lead Underwriters Being an All-Star or Not				
ML All-Stars	No ML All-Star			
n = 92	n = 35			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
26.63%	39.11%	-12.48%	-1.62	0.006

F) Means Difference for Percentage of MLOT/Offer Amount by Total Number of Lead Underwriters

Total Number of Lead Underwriters				
>=3	0-2			
n = 34	n = 93			
Mean	*Mean*	*Difference*	*t-stat*	*p-value*
23.79%	32.37%	-8.58%	-1.1	0.009

AUTHOR'S BIOGRAPHY

Matt Ahearn is a fourth-year Finance major with a minor in Technical and Analytical Writing at the University of Maine. He was born in Wellesley, Massachusetts, and currently resides in Medway, Massachusetts. During his time at the University of Maine, he was the President of the Men's Club Lacrosse team, a member of the Senior Skulls Honors Society, and a brother of Phi Gamma Delta where he held the positions of Scholarship and Philanthropy Chair. After graduating, he plans to move to Portland with his dog, Copper, and will work at Stone Coast Hedge Fund Services. In his near future he hopes to pursue higher level education whether it be a Master of Business Administration or a Chartered Financial Analyst.