# MASTER OF FINANCE PROGRAM
# SAINT MARY'S UNIVERSITY

## VALUATION AND PRICING STRATEGY FOR IPOS

Copyright By

Wang Kai, 2013

A research project submitted in partial fulfillment of the requirements for the Degree

of Master of Finance

Written for MFIN6692, August 2013

Under the Direction of Dr. Francis Boabang

**Approved: __Dr. Francis Boabang__**
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**MFIN Director**

**Date: _ _ Aug 27, 2013 _ _ _**

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**ACKNOWLEDGEMENTS**

This paper has been completed only because of the help and guidance provided by my faculty advisor Dr. Francis Boabang. I would also like to acknowledge the help given by Dr. Najah Attig who gave me a lot of useful advice. I also wish to acknowledge the insight and understanding that each one of my professors at Saint Mary's University has given me in the courses I have taken during the Master of Finance program, and which has helped in one way or another for bringing to fruition the paper.

## ABSTRACT

**VALUATION AND PRICING STRATEGY FOR IPOS**

By

WANG KAI

August, 2013

The purpose of this study was to investigate how underwriters estimate the fair value of IPO firms and how they decide on the final offer prices for IPOs. We employ comprehensive data on 2609 IPOs from 1975 to1984 extracted from Jay Ritter's database. Data on U.S. IPOs from 2000 to 2013 that include the offer price, first closing price from IPO SCOOP, and data from 1651 Japanese IPOs using book building from Sep 1997 to Dec 2009, that include the file price ranges, gross proceeds and first day returns. Since investors are price makers and they usually lack sufficient information, this paper may help increasing the understanding of valuation model that underwriters employed and available information that might potentially contribute the final offer price. We found that there are significant biases in offer prices, which is announced at the time the offer is filed. And our results show that the IPO pricing process is a complicated function of many factors. Some of the dynamics are explainable under the information asymmetry theory or the partial updating theory, but other patterns remain puzzles.

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# Chapter 1: Introduction

## 1.1 Overview

An initial public offering (IPO) is the process by which private companies go public and start trading on stock exchanges. After that, investors who purchase the stock in the market will become part of the ownership of the company. The intrinsic value of the firm is vital in determining the offer price. And the payoffs for the long-term investors depend on whether the office price reflects all available and relevant material.

Past researches reveal that underwriters generally apply price discount to set the final offer price. The reason for assigning an offer price below the fair value (price at a discount) may be that this serves as an incentive to encourage investors to participate, which result in strong demand which will help boost price, and result in which then bring about high initial period. IPO of Facebook is a typical example. Its underwriter, Morgan Stanley, faced claims that they had issued too many shares and that the offer price was too high. The stock lost over a quarter of its value in less than a month and went on to less than half its IPO value in three months.

## 1.2 Need for Study

Price discovery is one of the biggest problems faced in an Initial Public Offering, this consist of two parts, valuation and pricing strategy. Generally, issuers hire an investment bank to underwriter the securities issue (Baron, 1982). Since, investment banks have plenty of experience and as repeat players, it is believed that underwriters could fully incorporate all available information into the final offer price, which would satisfy all the participants at IPOs.

The IPO valuation and pricing process starts with the fair value estimate. Generally, underwriters use several financial models, like multiples valuation, dividend discount models and discounted cash flow (DCF) analysis, to determine fair value of the securities. Actually, there is not one single valuation technique that stands out in being more accurate than the others. Therefore, the underwriters employ more than one valuation models to value the IPO firm. Although final offer price might quite different from the estimation, valuation is still one of the most important parts at IPO process.

Prior empirical evidence shows that the first day returns of IPOs are average approximately 15%, indicating that there is a systematic downward bias in the offer price compared with the price in the secondary trading market. (lowry & Schwert,

2012). It is believed that underwriters deliberately set the offer price at a discount of the estimated fair value. And, underwriters promote this price discount in order to boost investor participation in the auction or book building process. (lowry & Schwert, 2012). 'This results in higher price updates of the preliminary offer price that partially recover the discount. However, there is not a full adjustment but only a partial recovery of the intentional price discount. Consistent with the partial adjustment phenomenon part of the deliberate price discount remains and contributes to higher underpricing after controlling for other factors such as investor demand' (lowry & Schwert, 2012)

Although some theories are trying to explain the dynamics of the whole IPO pricing process, the facts are far away from clear. There are two popular theories of IPO underpricing. The first one is that information asymmetry is a determinant of underpricing. Beatty and Ritter (1986), Rock (1986), and Baron (1982) asserted that underpricing results from information asymmetry between the various parties involved in the IPO. 'Issues that are characterized by greater uncertainty are more underpriced to compensate for the higher costs of learning about these firms' true values'. (lowry & Schwert, 2012).

The other one is that Benveniste and Spindt (1989) suggest that 'underpricing is related to the information underwriters obtain from informed investors during the

registration period. Underwriters compensate these investors for the information they provide by only partially incorporating it into the offer price, thus allowing the informed investors to earn especially high returns on the first day the IPO firm trades'. (lowry & Schwert, 2012).

### 1.3 Purpose of Study

Although final offer prices are extremely important, how firms get prized is relatively unknown. This paper investigates how underwriters estimate fair value of IPO firms and how they decide final offer prices at IPOs. Since investors are price makers and they usually lack sufficient information, this paper may help increasing the understanding of valuation model that underwriters employed and available information that might potentially contribute the final offer price.

This paper mainly examines the whole IPO valuing and pricing process. Specifically, not only we will consider the price updates from price range on the preliminary prospectus to final offer price, but also we are going to test how predetermined information explain the first-day returns and the relationship between price updates and initial returns.

# Chapter 2: Literature Review

## 2.1 Purpose and Scope of Literature Review

Pricing strategy has received much attention in literatures. Though many researchers were all trying to explain the predictability in initial returns, but they have different aspects. For example, they have diverse markets in various conditions; distinctive hypotheses involved and even some investigators worked with similar models but come to different conclusions. Conversely, the valuation techniques of IPO were relatively lack of concern. Because the ex-ante IPO values and cash flow forecasts of U.S. IPO firms are normally unavailable, hence some papers focus on the multiples valuation, which only require fundamental information of comparable publicly traded companies.

First of all, whether investors can always have a gain in an IPO? Roger G. Ibbotson gave the answer in 1994. In his research, he confirmed that the mean initial performance of IPOs is positive. However, Ibbotson did not reject the hypothesis that an investor in a single random issue has an equal chance for a gain or loss. But, he claimed that an investor does have much more chance to have an extremely large positive performance than to have a correspondingly large negative performance. In addition, the writer raised a question that ‘whether issuers actually suffer losses or

whether they are somehow compensated by underwriter who in turn are compensated by investors.'

The extremely huge gains are usually due to the great price discount and, David P. Baron asserted that underpricing is the result of information asymmetry between issuers and bankers in 1982. He tested the impact of nonidentity of two parties informed about the capital market on the final offer price. And, by his effort, Baron concluded that the offer price would be optimal only if the issuers and the bankers were equally informed. Moreover, in the case of that an underwriter is better informed than is an issuer; the offer price would below the optimal one. The reason behind that is the issuer should compensate the underwriter for using superior information.

Furthermore, underpricing would also happen if issuers have strong demands for the advising function of underwriters. In that case, the issuers are willing to accept a lower price for the issue. However, Tim Loughran and Jay R. Ritter (2001) found that although underpricing is an indirect cost to issuers, serious underpricing happened only when issuers are getting richer in the form of unanticipated wealth increases. In their research, they emphasized the covariance of the price discounts and changes in the wealth of the issuing firm. Moreover, they asserted that the reason

why first-day returns are predictable based on lagged market returns is because offer prices only adjust partially to new material. Their model is:

$$OP_i = MID_i + \alpha_1 \cdot r_{0,T_i}^{\text{market}} \cdot MID_i + \alpha_2 \cdot r_{0,T_i}^{\text{public}} \cdot MID_i + \alpha_3 \cdot r_{0,T_i}^{\text{private}} \cdot MID_i + \tau_i \quad (1)$$

$$P_i = 1.14 \cdot \left[MID_i + \beta \cdot r_{0,T_i}^{\text{market}} \cdot MID_i + \gamma_2 \cdot r_{0,T_i}^{\text{public}} \cdot MID_i + \gamma_3 \cdot r_{0,T_i}^{\text{private}} \cdot MID_i\right] + \varepsilon_i. \quad (2)$$

Where MID is the midpoint of original file price range, r public is industry performance beat market performance.

In 1993, Kathleen Weiss Hanley confirmed the positive correlation between the underpricing and revisions in the final offer price from the filing of the prospectus to the offer date. She concluded that ‘issues that have positive revisions in the offer price and good information revealed are significantly more underpriced than other IPOs.’ Hanley finally suggested that investment bankers and issuers tend to underprice rather than increase allocation. The reason behind that is ‘if the issue is rationed, increasing the number of shares issued to meet demand will further dilute the original owners’ claim to both the voting rights and cash flows of the firm. ’ Therefore, underwriters and issuers prefer lowering the offer price to benefit investors in the form of higher initial returns rather than increasing the size of their residual claims. In addition, the writer examined the relationship between the final

offer prices to the offer range and long-term performance of IPOs. She got the results that the long-term performance of IPOs is not relative with offer price.

Moreover, Michelle Lowry and G. William Schwert (2001) found that information accepted during the registration period has positive correlation with future IPO volume and claimed that 'more companies file IPOs following periods of high underpricing suggests that the initial returns of recent IPOs contain information on the market's valuation of future IPOs.' And their research results showed that neither the number of subsequent filings nor the number of subsequent offerings significant explained firm characteristics portion of initial returns. Moreover, the authors believed that information received from the secondary market is not related to the number of following filings, but associated with the length of registration periods. They concluded that 'Investment bankers' learning processes throughout this registration period cause monthly aggregate initial returns to be auto correlated and to be positively related to future levels of IPO activity.'

Besides that, in order to reveal the other factors involved in the price making process, Einar Bakke, Tore E. Leite and Karin S. Thorburn (2011) presented a model that using public information to explain the initial returns of IPOs. Interesting, they asserted that 'market-wide information affects the underpricing required for investors to reveal their positive private signal.' The writers believed that the benefits from

hiding private information are related with the public outlook of the market. Specifically, the authors claimed that when public information is bad, underwriters are inclined to set more price discount as compensation to release good news, which is called incentive effect. Besides that, writers dug out those public and private signals are conditionally correlated and that the probability of underpricing an issue is higher in a positive market than if the outlook is poor. That is called demand effect in their paper.

### 2.2 Summary

Even though the fact that previews researchers could not reach the all agreed conclusion, the reasons are different. Based on diverse market conditions and from a different perspective, there is no absolute answer. In this paper, we will choose not only the data of U.S. IPOs, but also data on Japanese IPOs, which would reflect more accurately and more reliably.

# Chapter 3: Methodology

## 3.1 Data

In order to examine the pricing strategy, we obtain data of U.S. IPOs from 2000 to July 2013 that includes the offer price and first closing price from IPO SCOOP and data on 1651 Japanese IPOs using book building from Sep 1997 to Dec 2009 that includes the file price ranges, gross proceeds and first day returns from Takashi Kaneko and Richard Pettway. In addition, we get comprehensive data on 2609 IPOs from 1975 to1984 from Jay Ritter's database.

## 3.2 Introduction to Research Design

Firstly, the prices of issuing companies' stock usually have a big update when the IPO occurs, which is known as initial return. Generally, the percent change between closing price on the first day of trading and the offer price is huge. The mean first-day return is 62.6% in Japan since Sep 1997 to Dec 2009. However, there should not have a persuasive explanation about high initial returns if the offer price is fully reflect the public information between the file dates and offer dates. Therefore, we believe that underwriters just adjust offer price partially to the public information deliberately in order to expend less market effort and increase investors demand. Therefore, we design a regression function like below:

$$\text{Initial Returns} = \alpha + \beta 1 NIPO + \beta 2\ BV + \beta 3\ SHRS + \beta 4\ NYSE + \beta 5\ NAS + \beta 7\ AMEX + \varepsilon,$$

In which, NIPO is the number of IPOs happened in particular years, and BV stands for the book value of equity. SHRS is the number of shares the company issued and NYSE, NAS and AMEX are dummies.

The design of the model is explained by the following contents: firstly, we retain some independent variables those are already decided at the time the offer is filed, like SHRS. In addition, we want to capture the effects of firm size in the form of add tangible book value of equity as an independent variables into the regression. Generally, firms with higher book value of equity are likely to have less underpricing and hence smaller price updates. Besides that, the mean first-day return presented a positive correlation with number of IPOs; thus, we also add that into the model. Moreover, empirical evidences show that companies that list on NYSE and NAS usually have greater degree of price volatility than firms list on AMEX; therefore, we form those three exchange dummies, equal to 1 if the IPO was listed on the correspondent market and 0 otherwise.

Secondly, the extremely high first-day return draw us attention. Therefore, we are going to examine the relationship between price update from price range to offer price and initial returns. Also, we retain some predetermined variables like age of

companies and number of total offering shares:

$$\text{Initial returns} = \alpha + \beta 1\ \Delta P + \beta 2\ AGE + \beta 3\ SHRS + \varepsilon,$$

In which, $\Delta P$ stands for the price updates and we define the price updates as the difference between final offer price and middle point of price range. AGE is the age of the IPO firms and SHRS is the number of shares IPO companies issued.

We design the function like above because, the initial returns are performing in the form of percentage, thus we set percentage changes on price update to explain the initial returns. In addition, we wonder whether offer price itself and gross proceeds would affect the initial return. However, gross proceeds are calculated by timing offer price with the number of share offering. Therefore, we just keep the SHRS.

## Chapter 4: Results and Analysis

### 4.1 Introduction

This section of the paper is divided into two parts: (1) Analysis of data. In this part, we are going to process and analysis the data. (2) Interpretation of the Results and Statistical Tests.

### 4.2 Analyses of Data

**Table 1: Numbers of Initial Public Offerings, First-Day Return, and Revisions from the File Price Range by Cohort Year, 1990-2012**

| Cohort Year | Number of IPOs | Percentage First-day Return | Percentage of IPOs with OP<LO | Percentage of IPOs in the Middle | Percentage of IPOs with OP>Hi |
|---|---|---|---|---|---|
| 1990 | 95 | 9.6 | 25.3 | 51.5 | 23.2 |
| 1991 | 263 | 11.0 | 20.2 | 55.5 | 24.3 |
| 1992 | 362 | 9.9 | 37.8 | 40.6 | 21.5 |
| 1993 | 458 | 11.6 | 21.4 | 54.4 | 24.2 |
| 1994 | 334 | 8.6 | 37.4 | 49.7 | 12.9 |
| 1995 | 387 | 19.9 | 19.9 | 45.0 | 35.1 |
| 1996 | 598 | 16.0 | 24.9 | 50.2 | 24.9 |

| | | | | | |
|---|---|---|---|---|---|
| 1997 | 420 | 13.8 | 30.0 | 46.0 | 24.0 |
| 1998 | 284 | 21.4 | 27.5 | 50.0 | 22.5 |
| 1999 | 465 | 70.3 | 14.8 | 37.4 | 47.7 |
| 2000 | 371 | 57.2 | 22.1 | 39.1 | 38.8 |
| 2001 | 77 | 14.3 | 26.0 | 57.1 | 16.9 |
| 2002 | 67 | 8.7 | 32.8 | 53.7 | 13.4 |
| 2003 | 65 | 12.4 | 15.4 | 55.4 | 29.2 |
| 2004 | 173 | 12.3 | 37.6 | 41.6 | 20.8 |
| 2005 | 161 | 10.1 | 34.2 | 42.9 | 23.0 |
| 2006 | 155 | 11.6 | 39.4 | 40.6 | 20.0 |
| 2007 | 157 | 14.3 | 32.5 | 41.4 | 26.1 |
| 2008 | 21 | 6.4 | 47.6 | 38.1 | 14.3 |
| 2009 | 43 | 10.6 | 32.6 | 41.9 | 25.6 |
| 2010 | 97 | 9.3 | 48.5 | 39.2 | 12.4 |
| 2011 | 81 | 13.5 | 37.0 | 30.9 | 32.1 |
| 2012 | 102 | 21.2 | 40.2 | 35.3 | 24.5 |
| 1990-2012 | 5236 | 21.7 | 27.6 | 45.7 | 26.7 |

The pricing process begins at the time the IPO is filed, however, final offer prices are normally not within the price range. From 1990 to 2012, only 45.7 percentages of IPOs with offer price in the middle of the price ranges listed in the preliminary prospectuses. Moreover, the number showed lowering trend with increasing

percentage of IPOs with offer price that below the range. At this part, we mainly investigate how price updates from price range to final offer price explain the performance of the first-day returns and if those predetermined variables account for the high returns.

**Figure 4. 1: Percentage of IPOs and average first-day returns relative to file price range**

**Percentage of IPOs relative to file price range:**

| | Below | Within | Above |
|---|---|---|---|
| 1980-1989 | 30% | 57% | 13% |
| 1990-1998 | 27% | 49% | 24% |
| 1999-2000 | 18% | 38% | 44% |
| 2001-2012 | 35% | 43% | 22% |
| 1980-2012 | 28% | 49% | 23% |

**Average first-day returns relative to file price range:**

| | Below | Within | Above |
|---|---|---|---|
| 1980-1989 | 0% | 6% | 20% |
| 1990-1998 | 4% | 11% | 32% |
| 1999-2000 | 8% | 26% | 121% |
| 2001-2012 | 3% | 11% | 31% |
| 1980-2012 | 3% | 11% | 50% |

As Figure 4.1 showed, from 1980 to 2000, the percentage of IPOs below file price range was declining, and from 2001 to 2012, the percentage jumped to 35%, which is

much higher than the percentage of IPOs above file price range. On average, less than 50 percentages of IPOs within file price range and the number seems to keep dropping. Moreover, the average first-day returns were 50% above the file price range. And it is worth noting that from 1999 to 2000, the average first-day returns were 121%.

**Figure 4. 2: Summary Table of Book-built IPOs in Japan since September 1997**

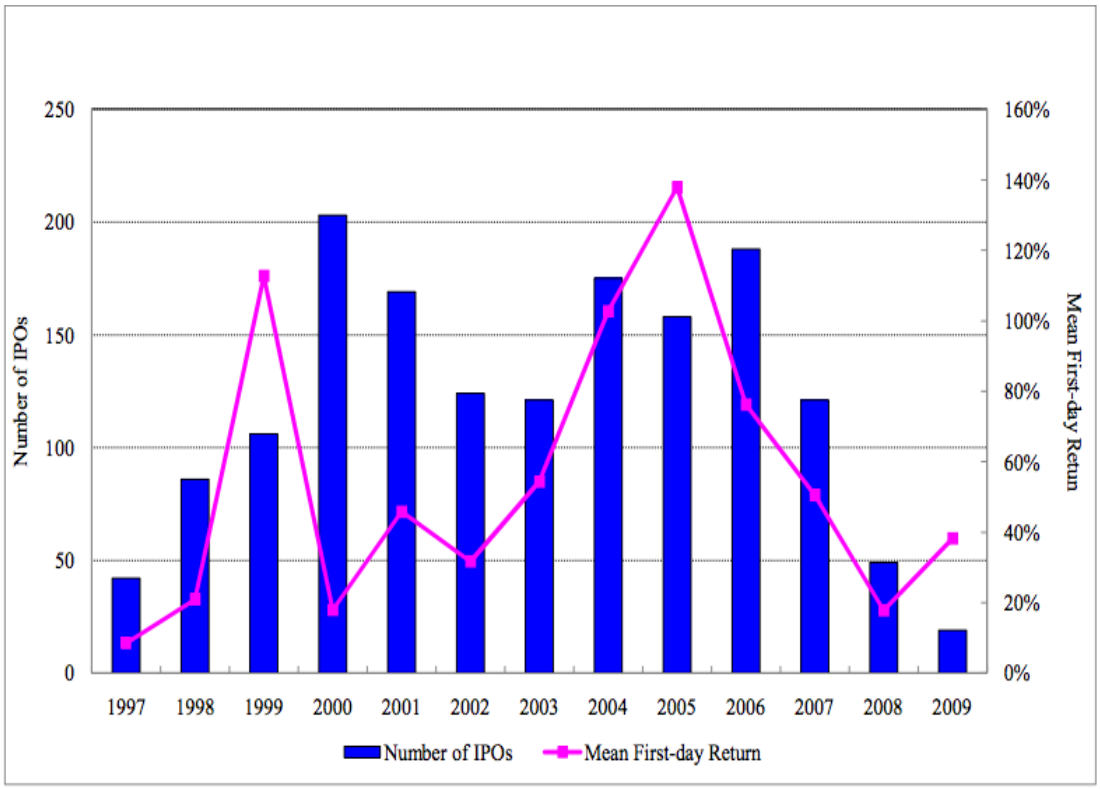
| Total | | | By market | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | All Markets | | Representative Three Markets for New Listing Companies | | | | | | TSE 1st & 2nd Sections | | Other Markets | |
| | | | OTC / JASDAQ | | TSE Mothers | | NASDAQ-Japan / Hercules | | | | | |
| | Number of IPOs | Mean First-day Return | Number of IPOs | Mean First-day Return | Number of IPOs | Mean First-day Return | Number of IPOs | Mean First-day Return | Number of IPOs | Mean First-day Return | Number of IPOs | Mean First-day Return |
| 1997 | 42 | 8.5% | 29 | 10.2% | - | - | - | - | 1 | 0.0% | 12 | 5.0% |
| 1998 | 86 | 20.9% | 62 | 23.8% | - | - | - | - | 14 | 17.2% | 10 | 8.4% |
| 1999 | 106 | 112.7% | 73 | 134.8% | 2 | 227.6% | - | - | 7 | 74.5% | 24 | 46.7% |
| 2000 | 203 | 17.9% | 97 | 21.2% | 27 | 7.6% | 33 | 27.0% | 24 | 11.1% | 22 | 9.6% |
| 2001 | 169 | 45.8% | 97 | 34.4% | 7 | 98.0% | 43 | 76.3% | 16 | 11.8% | 6 | 40.2% |
| 2002 | 124 | 31.7% | 68 | 27.5% | 8 | 19.1% | 24 | 56.6% | 20 | 27.2% | 4 | 2.8% |
| 2003 | 121 | 54.4% | 62 | 37.2% | 31 | 101.9% | 7 | 73.3% | 17 | 33.9% | 4 | 6.3% |
| 2004 | 175 | 102.7% | 71 | 94.2% | 56 | 137.6% | 16 | 105.1% | 22 | 44.2% | 10 | 92.6% |
| 2005 | 158 | 137.9% | 65 | 104.9% | 36 | 166.4% | 22 | 267.7% | 18 | 30.3% | 17 | 149.5% |
| 2006 | 188 | 76.2% | 56 | 58.6% | 41 | 107.7% | 37 | 145.4% | 29 | 9.2% | 25 | 39.3% |
| 2007 | 121 | 50.5% | 46 | 42.1% | 23 | 88.3% | 25 | 60.7% | 13 | 15.0% | 14 | 30.5% |
| 2008 | 49 | 17.8% | 18 | 2.9% | 12 | 56.0% | 9 | 29.8% | 7 | -10.1% | 3 | -17.2% |
| 2009 | 19 | 38.2% | 6 | 34.0% | 4 | 58.8% | 1 | -2.0% | 6 | 42.6% | 2 | 16.3% |
| Whole | 1,561 | 62.6% | 750 | 53.6% | 247 | 104.1% | 217 | 95.8% | 194 | 23.2% | 153 | 43.2% |

Source: Kaneko and Pettway's Japanese IPO Database (KP-JIPO).

From Figure 4.2, we found that the mean first-day return were extremely high in Japanese markets. From 1997 to 2009, 1561 companies went public and the mean first-day return was 62.6%, which is three times of that in the U.S. market. Moreover,

representative three markets in Japan for new listing companies show difference in average first-day return. Specifically, the firms listed on TSE Mothers and NASDAQ-Japan/Hercules had higher returns than the others and TSE 1st and 2nd Sections had lowest mean first-day return, 23.2%.

**Figure 4. 3: Summary Figure of Total Book-built IPOs in Japan since Sep 1997**




Source: Kaneko and Pettway's Japanese IPO Database (KP-JIPO).

As Figure 4.3 illustrated, the number of IPOs and mean first-day return shared certain trends. But, in 2000, the number of IPOs was over 200 and the mean first-day return was quite low, just above 20%.

### 4.2 Interpretation of the Results and Statistical Tests

**Figure 4. 4: Model 1 Test Results**

```
. reg  ir  nipo  shrs  bv  nas   amex  nyse

      Source |       SS       df       MS              Number of obs =    2292
-------------+------------------------------           F(  6,  2285) =   19.24
       Model |  260065.118     6  43344.1863           Prob > F      =  0.0000
    Residual |  5147112.95  2285  2252.56584           R-squared     =  0.0481
-------------+------------------------------           Adj R-squared =  0.0456
       Total |  5407178.06  2291  2360.18248           Root MSE      =  47.461

------------------------------------------------------------------------------
          ir |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        nipo |  -.0127905   .0033864    -3.78   0.000    -.0194313   -.0061497
        shrs |   .0006608   .0000714     9.25   0.000     .0005207    .0008009
          bv |  -.0000855   .0000285    -3.00   0.003    -.0001414   -.0000295
         nas |   1.689982   3.716728     0.45   0.649    -5.598532    8.978496
        amex |   -13.7211   12.07923    -1.14   0.256    -37.40849    9.966301
        nyse |  -1.467403   11.28399    -0.13   0.897    -23.59534    20.66053
       _cons |   23.69692   3.859908     6.14   0.000     16.12763    31.26621
------------------------------------------------------------------------------
```

The Stata results table using data on 2609 IPOs from 1975 to1984 from Jay Ritter's database are mostly consistent with the findings of prior literature. Specifically, firms with higher tangible book value of equity tend to have lower initial returns (t-statistics of -3.00). And, we find that firms listed on Amex are less likely to have high fist-day returns. The coefficient of AMEX is -13.7211 with t-statistics of -1.14. Although its t-value is not significant, we believe that it is because of lack of data and only few companies listed on Amex from 1975 to 1984.

In addition, companies with more offering issues are tend to have higher initial returns (t-statistics of 9.25). And a high initial return usually means a deliberate underpricing. That is consistent with our inferring that underwriters prefer to apply a

price discount to increase investor demand and save their effort. Interesting, the result showed that the number of IPOs has negative correlation with initial returns, which is quite different from the relationship we found from the Japanese market. However, its t-value is significant (t-statistics of -3.78), which means the total number of IPOs in one particular year do affect the initial returns of all companies offering in that year. One reasonable interpretation is that when investors facing hundreds of investment choice, they tend to be discreetly about their investment. Thus, the investor demands for each IPO is declined, and then negatively affect the initial returns. In addition, which exchange IPO firm list seems to have little effect on initial returns in this period. All three exchanges dummies is not significant in the regression.

**Figure 4. 5: Model 2 Test Results**

```
. reg  firstdayreturnopeningprice  percentagechanged  age  totalofferingnumberoftotalshares

      Source |       SS       df       MS              Number of obs =    1561
-------------+------------------------------           F(  3,  1557) =   51.49
       Model |  1387771.29     3  462590.432           Prob > F      =  0.0000
    Residual |  13988958.6  1557  8984.55917           R-squared     =  0.0903
-------------+------------------------------           Adj R-squared =  0.0885
       Total |  15376729.9  1560  9856.87815           Root MSE      =  94.787

------------------------------------------------------------------------------
firstdayre~e |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
percentage~d |    2.11753   .3308166     6.40   0.000     1.468637    2.766423
         age |   -1.35787   .1437902    -9.44   0.000    -1.639913   -1.075827
totaloffer~s |  -1.04e-07   1.28e-07    -0.82   0.414    -3.55e-07    1.46e-07
       _cons |   80.60595   4.616365    17.46   0.000       71.551     89.6609
------------------------------------------------------------------------------
```

The first thing to note about the second model is that total issues offering shows negative correlation with initial return and its t-value is -0.82, which is far away from significant. This is opposite to the result we got above using data on U.S. market. Moreover, firms with shorter history tend to have higher initial returns (t-statistics of -9.44). We believed that underwriters have less confidence in their estimate value of young firms. Thus, they prefer to set higher price discount to perform their marketing duties.

Moreover, underwriters need to sell the stocks to potential investors; meanwhile, they keep receiving new public and private information and seek to obtain more accurate estimates about the true value of the company. We find that the percentage change on offer price from price range is significant (t-statistics of 6.4) and every one percentage of positive price updates leads initial return to increase more than two percentages.

The relationship between price updates and initial return is quite complicated. On the one side, if we consider the whole price update is a process that issue prices keep closing to the market value of the companies, then the correlation between price updates from price range to offer price and initial returns should be negative. The more available public and private information underwriters incorporate into the final

offer price, the less possibility the IPO has a high initial return. However, on the other hand, if we take potential investors' minds into account, assuming investors know that underwriters would not fully incorporate all available materials into offer price, and then it is easy to explain that investors take price updates as a positive signal of money left on the table and buy these issues, which further promoting initial returns.

## Chapter 5: Conclusion

This paper investigated the relationship between final offer prices and the file price range, the relationship between independent variables those are already decided at the time the offer is filed and initial returns and how price updates explained the initial returns. While some of our findings provide added support for one or more of the existing theories of IPO pricing, others cannot be explained with these theories.

We found that there are significant biases in offer prices, which is announced at the time the offer is filed. And, the price updates, defined as the percent difference between the midpoint of this file range and the final offer price, is predictably related to publicly known firm- and offer- specific characteristics. Apparently, companies and investment bankers do not incorporate all available information when setting the price range.

Finally, the predictability of initial returns shows that underwriters only partially incorporate information that is learned during the filing period into the final offer price. This finding is consistent with Benveniste and Spindt's partial updating theory. In summary, our results show that the IPO pricing process is a complicated function of many factors. Some of the dynamics are explainable under the information asymmetry theory or the partial updating theory, but other patterns remain puzzles.

## Chapter 6: Reference

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