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| Erasmus university Rotterdam / Erasmus School of economics |
| IPO Anomalies in Indonesia |
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| This paper looks into the underpricing anomaly amongst initial public offerings in Indonesia for the period 1990 till 2012. The total sample period is divided into four subsamples to investigate the effects of the independent variables over time. Furthermore, the full sample is split into companies listed on the Main or Development Board to see how size and track record influence the IPO underpricing. Independent variables which are looked into are sigma, beta, offer price, market capitalization, number of shares, stock volume, and number of uses. Significant results are found for sigma, beta, volume and offer price. Lastly, stock movements in the short term are explored.  Keywords: Initial public offering (IPO); IPO underpricing; IPO anomaly; Indonesia; ex ante uncertainty  JEL Classification Codes: G20, G24 |

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# Chapter 1. Introduction

The first time a company brings its stock to the market is through an initial public offering (IPO). Worldwide these offerings have received a great deal of attention from investors and researchers. The reason for this is the anomaly of underpricing: the first day return of the offering is systematically large. Stoll and Curley (1970) were the first to document this phenomenon. They found an average undervaluation of 75% under 169 companies in the United States in the years 1957, 1959, and 1963. Ever since, research on underpricing has led to many countries, time periods, and possible explanations.

The interest of researchers on this subject comes forth out of the violation of the Efficient Market Hypothesis. This hypothesis states that markets are efficient, therefore all possible information is immediately reflected in the price of a stock. As the true value of the company doesn’t increase significantly on the first trading day of the stock and the company is assumed to be evaluated correctly, the stock shouldn’t make extreme returns as observed. Consequently, other explanations must lie at the basis of this anomaly.

Over the years, research extended from western markets to developing markets. A common observation that was found, was the higher level of IPO undervaluation in these developing markets. This paper will investigate the IPO anomaly in Indonesia, the largest emerging market in Asia. Although Indonesia recently has been receiving more negative prospects, since 2003 it has had a relatively high, constant GDP growth of 5% to 6%. Its capital markets underwent structural changes, improved its trading techniques and the Jakarta Composite Index increased by an incredible 982% between December 1997 and December 2012 (Composite Index (JKSE)).

Relatively little research has been done on the Indonesian IPO market. Even less research has been conducted in English. This paper will be the first to investigate the underpricing anomaly, in English, over such a long time period: 01/01/1990 to 31/12/2012. Furthermore, by splitting the sample into four subsamples the effects across time can be observed. This paper will help give insight in the underlying reasons of underpricing in Indonesia and how the development of the capital market might have changed this.

This thesis is structured as follows. Firstly, background information is provided on the Indonesia Stock Exchange. Secondly, the literature review discusses previous research and its accompanying explanations on underpricing. Thirdly, data and methodology are described. Following are the results of the univariate and multivariate tests. Subsequently, the implications of the results are presented. This thesis ends by going into the limitations of this research and by giving a conclusion.

# Chapter 2. Background Information

*This chapter provides background information on the Indonesia Stock Exchange (IDX), necessary for a full understanding of the Indonesian stock market and of the underpricing phenomenon. First, section 2.1 presents the history of the IDX. Second, section 2.2 distinguishes between the two IDX boards. Section 2.3 describes the IPO process in Indonesia.*

## 2.1 History of the IDX

The Indonesian capital market was established in Jakarta in the year 1912 under the name Jakarta Stock Exchange (JSX). At that point in time Indonesia was a colony of the Netherlands, and the capital market served purpose for the Dutch East Indies (VOC). After 2 years the stock exchange was forced to close due to World War I. In the subsequent period up to 1977, the exchange was merely opened for 17 years due to wars, political transitions and limited investor interest.

The JSX reopened in 1977 and has been continuously active since. Up to 1987 only 24 companies were listed as a result of legislations which prevented firms from going public. This combined with people’s preference of investing their money in banks, lead to limited investor interest and low trading activity. In 1987 deregulation gave way to initial public offerings and foreign investors, who up till then weren’t allowed to invest in Indonesia. At the end of 2012, the number of listed companies on the IDX reached 459 (Indonesia Stock Exchange, 2012).

Since its deregulation the JSX has kept its focus on attracting foreign investors, stimulating IPOs and modernizing trading mechanisms. Through its privatization in 1992, the introduction of the Jakarta Automatic Trading System (JATS) in 1995, the scripless trading system in 2000, and the remote trading system in 2002, the JSX is gradually developing into the competitive stock exchange it wants to be.

In 2007, coinciding with its 30 year anniversary, the JSX merged with the Surabaya Stock Exchange, which was established in 1989, and continued under the name Indonesia Stock Exchange.

## 2.2 Structure of the IDX

When it comes to company listings the IDX is split into two categories called boards. Firstly, the ‘Main Board’, called ‘Papan Utama’ in Indonesian, is intended for large companies with long track records. Secondly, the ‘Development Board’, called ‘Papan Pengembangan’, contains the smaller companies and companies going through a reorganization. Table 1 on the next page shows the 9 criteria companies must meet in order to be eligible for an IPO. The difference in size and track record between ‘Main Board’ issuers and ‘Development Board’ issuers can clearly be observed.

Table 1. Listing requirements for the Main Board and the Development Board (Purwono, D. S., 2013).



## 2.3 IPO process

Every IPO process in Indonesia starts with the prospective issuer submitting a listing proposal to the IDX. The IDX then has up to 10 working days to respond and possibly grants the company with a Preliminary Agreement of Securities Listing if the proposal is approved.

Subsequently, a Registration Statement is filed to the Bapepam-LK, the capital market supervisory agency, containing documents like a preliminary prospectus, a legal audit report, and an underwriting agreement. The submission is assessed by a regulator within 20 working days, allowing requests for further information and clarification to the issuer. When approved, the issuer must publish and provide the Bapepam-LK with its preliminary prospectus within 2 working days.

Following is the book building process, ranging from 7 to 21 working days, during which the offering is marketed to mostly institutional investors. In Indonesia the participation of retail investors is small and only takes up 10% to 20% of the offered equity (Purwono, 2012). Despite efforts by the IDX and other regulatory authorities to improve retail participation and thereby increase market liquidity, underwriters don’t see significant improvements in retail subscriptions to offerings.

The final step is the provision of the Statement of Effectiveness by Bapepam-LK to the issuer. The company then has 1 working day for last minute corrections or additions to the preliminary prospective. The initial public offering follows within 2 working days and may take up to 3 working days.

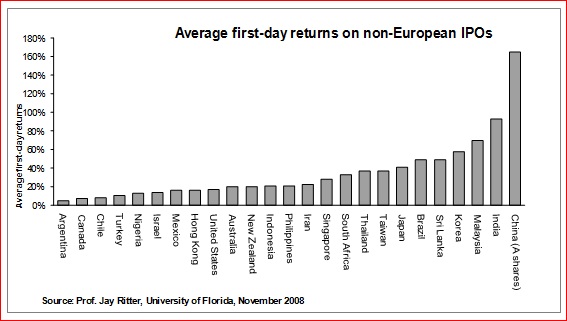
# Chapter 3. Literature review

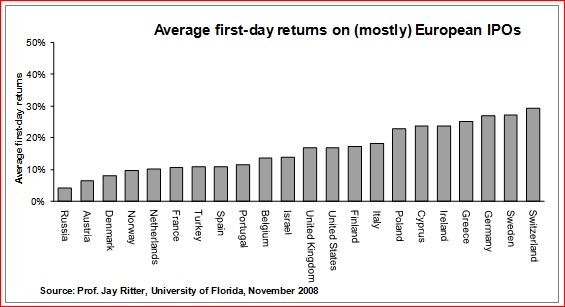
*This chapter discusses previous literature on the potential causes of IPO underpricing. Section 3.1 commences with the general phenomenon of underpricing. Section 3.2 and 3.3 present literature on the short-term and long-term underpricing of IPOs. Following is section 3.4 which describes the previous research conducted on the Indonesian IPO market.*

## 3.1 IPO Underpricing

As mentioned in the introduction, Stoll and Curley (1970) were the first to document the underpricing anomaly of initial public offerings. In the years 1957, 1959, and 1963 they found an average undervaluation of 75% amongst 169 companies in the United States. Shortly after, Shaw (1971) and Logue (1973), amongst others, confirmed systematic positive first day returns for firms going public. By now, evidence for this anomaly was found all around the globe. Ritter (1998) clearly shows that IPO underpricing is a worldwide phenomenon and that it greatly varies between countries. For example in Belgium, from 1984 till 1990 initial returns averaged in 10.1% while in Switzerland between 1983 and 1989 it was 34.1%. This study also gives indication of the higher initial returns of less developed markets. Korea’s underpricing in the period from 1980-1990 was 78.1% and that of Brazil from 1979 to 1990 was 78.5%. When looking at more recent years this difference in underpricing magnitude persists. Figure 1 is an overview made by J.R. Ritter on the underpricing levels in 2008 for European and non-European countries. In the top bar chart, most developing countries are located to the right side. Note, the bar charts have different scales.

Figure 1. Underpricing levels in 2008.





Numerous theories have been carried forward as explanations for the anomaly of underpricing. However, none of these theories is conclusive and each of them is able to account for underpricing in its own way. Nonetheless, researchers have developed several main explanatory theories which focus on ex ante uncertainty: investors require a risk premium for the uncertainty they face when subscribing to an offering. The first of these are based on the concept of information asymmetry. A second widely used theory focuses on the allocation of shares.

### 3.1.1 Theories based on information asymmetry

Information asymmetry focuses on the difference in quantity and quality of information between issuer and investor. This can be split into two categories. Firstly, the issuer is better informed than the investor. As a result, rational investors fear for Akkerlof’s so called ‘lemon’ problem. This refers to the situation in which only issuers with lower than average quality would go public. This in turn, is anticipated by investors by either not participating in the offering or participating only when the risk reflects the return. This adverse selection makes it unattractive for higher quality issuers to go public. Consequently, they try to overcome this problem by signaling their quality through a lower offer price, and thereby selling below the company’s actual value. Issuers can make up for the money ‘left on the table’ in future issuing activities (Welch 1989), market responses to future dividend announcements (Allen And Faulhaber, 1988) and more positive analyst coverage (Chemmanur, 1993). The ‘lemon’ problem is further confirmed by Lucas and McDonald (1990). They state that issuers know the value of their firm, when it is overvalued and when it is undervalued. In order to raise the highest amount of proceeds they will issue stocks during bull markets, when stocks are often valued higher. To compensate for the risk of subscribing to an overvalued firm, investors require a high initial return.

Secondly, information asymmetry exists when investors are better informed than the issuer. This can be the case when the issuer has no idea of what the company’s actual market value is due to difficult valuations of intangible assets, inaccurate predictions of future income or being the first in an industry to go public, thereby making peer comparisons impossible. Rock (1986) describes the winner’s curse as a viable reason for underpricing. This portrays the situation in which well-informed investors stay absent from overvalued IPOs and crowd out undervalued IPOs. To ensure that this signaling of well-informed investors does not occur, issuers have to offer their stocks at a discount, thereby guaranteeing that uninformed investors will always subscribe to the offering. This is related to Welch’s (1992) phenomenon of informational cascade which is commonly referred to as herding behavior. Issuers lower their offer value to trigger the most optimistic investors to subscribe, who in turn will be followed by more investors.

Thirdly, there is the possibility of information asymmetry between the issuer and the underwriter concerning the true value of the firm. Baron (1982) describes how underwriters can better determine the value of the firm than the issuer itself. This theory is contradicted by Muscarella and Vetsuypens (1989) whom investigated the level of underpricing of 38 investment banks which were also their own underwriter. In this situation information asymmetry does not exist. However, the banks showed similar levels of underpricing as other initial public offerings.

### 3.1.2 Theories based on symmetric information

With these theories a difference in quality or quantity of information does not play a role in explaining underpricing. The most important explanation in this category is the reduction of legal liability hypothesis (Tinic, 1988). In short, companies whose stock price drops significantly compared to the offer price are likely to be sued as they are liable for the losses made by investors. In order to avoid this, issuers intentionally start off with underpriced shares. However, evidence for this theory is not conclusive. Drake and Vetsuypens (1993) find that sued IPOs had higher, not lower underpricing. A counter argument was made by Lowry and Shu (2002) stating that companies which anticipated a law suit also underpriced more. All in all, there is less support for symmetric information theories than for asymmetric information theories.

### 3.1.3 Theories based on allocation of shares

Firstly, there is the market feedback hypothesis. In order to make an accurate valuation of the issuing company, the underwriter, during the book building process, needs to see what the general opinion of institutional investors towards the issue is like. This information is not revealed by investors unless it benefits them as well. Therefore, the underwriter compensates the investor through underpricing. This hypothesis is related to the asymmetric information theories in the sense that underwriters are not fully aware of the demand the institutional investors have for the issue. Evidence for this theory is provided by Hanley (1993) who finds that even when demand is high, underwriters will still maintain a level of underpricing by not fully adjusting the price upwards.

Secondly, the ownership dispersion hypothesis provides explanation for underpricing. Issuers will use underpricing to create excess demand, thereby making sure the shares are allocated over a large number of small shareholders. Reason for this strategy is to create a liquid market, and to hold off corporate takeovers (Booth & Chua, 1996).

Thirdly, agency problems between the issuer and underwriter may result in underpricing. Issuers want the offer price to be as high as possible in order to raise most funds. Underwriters on the other hand, want all shares to be sold and therefore favor a lower price. Furthermore, underwriters sometimes make use of what is called ‘spinning’, shares are deliberately underpriced and allocated to long term clients to reward them for their loyalty (Ritter, Welch, 2002).

### 3.1.4 Board structure and board members

Recent literature has started to focus more on the structure of the company’s board. An important variable in this is the board size as it influences the effectiveness of corporate governance and monitoring (Pearce and Zahra, 1992). Furthermore, Lipton and Lorsch (1992) describe that larger boards lead to more problems of communication and decision making. On the other hand, large boards also have positive aspects, namely that they are able to provide better advise in large, complex companies (Dalton et. al., 1999), and that it would lead to better monitoring (Boone et al., 2007). Previous studies on the influence of board size on underpricing show inconclusive results. Certo et al. (2001) show a negative relationship while Hearn (2011) shows a positive relationship between size and underpricing percentage.

Board independence, the number of outside members present in the board, is a second way to investigate the influence of board structure on underpricing. Also here, no uniform results were found. Millstein and MacAvoy (1998) show a positive relationship, while Lin and Chuang (2011) show a negative relationship between board independence and underpricing levels.

## 3.2 Short-term performance

The short run performance of post-IPO stocks is influenced by the price support of the underwriter. The mechanism to do this is commonly called the ‘Green Shoe Option’, which refers to the company first ever to make use of this technique: Green Shoe Manufacturing Company. The legal name for this option is the ‘Over-Allotment Option’. With this option the underwriter can decide to short sell up to 15% more shares than was originally planned. Underwriters use this technique to stabilize the demand for a stock and thereby conserve investor confidence. In Indonesia, the regulation on the over-allotment option was introduced in the beginning 1996. Momentarily, in Indonesia, new legislations are being drafted to better clarify the dos and don’ts of the green shoe option (Respati & Siahaan, 2013).

Ruud (1993) describes several features which point towards underwriter price support. Firstly, this is the distribution of the underpricing. IPOs can be deliberately underpriced and therefore have a positive mean. The distribution of the initial underpricing should then still be of a similar shape around this higher mean. However, most distributions are skewed to the right, as also Tables 1 through 5 in appendix A point out for the samples used in this paper. If underwriter price support is present and decreasing in the first four weeks, the left tail should become larger and the distribution more symmetrical as time passes. This phenomenon can be observed in the distribution graph, the smaller minimum and the decreasing level of the skewness. A different indicator of underwriter price support is the decreasing number of 0% returns.

## 3.3 Long-term underperformance

Next to systematic first day underpricing, IPOs also have the tendency to underperform on a long-term basis. This phenomenon indicates that newly listed companies systematically don’t act according to the Efficient Market Hypothesis in the long run.

Evidence was first recorded by Ritter (1991) in 1991 by looking at IPOs over a period from 1975 to 1984 in the United States. Ritter concludes that when looking on a three year basis IPO firms significantly underperform relative to similar already listed companies. Ritter (1998) finds additional proof in companies going public during 1970 and 1993. When compared to matching firms based on market capitalization, the recently listed firms underperform 5.2% per year in the five years after listing. Both studies take the first day closing price as starting point, thereby assuming that offer price are an incorrect indication of the companies actual value and that all available information is incorporated after the first trading day. Ritter (1998) proposes several theories as possible explanations for this phenomenon.

Firstly, there is the divergence of opinion hypothesis. This theory states that because of existing uncertainty concerning the valuation of the issuing company, investors will have heterogeneous opinions about the likely success of the IPO. As a result, the most optimistic investors will value the company higher than the pessimistic investors. As time passes and more information is revealed, the optimistic investor’s valuation will converge to the mean valuation and consequently make the price drop.

Secondly, the windows of opportunity hypothesis refers to the situation in which companies ‘time’ their offering. In order to raise the largest amount of funds, companies try to take advantage of positive investor sentiment, business cycles, and positive outlooks. Consequently, these IPOs are overvalued and this is corrected by longer term underperformance. This theory implies that IPOs of ‘hot’ issue periods are more likely to have the lowest long run returns.

Recent literature, however, finds that long-term underperformance is no longer present. Östberg (2012) shows this in a period from 2002-2011 for various countries in Europe. Furthermore, Brav, Geczy and Gompers (2000) use the Fama-French three factor approach and conclude that IPO long-term underperformance is not an anomaly, but solely an effect caused by the size and the value of the company.

## 3.4 Previous literature on Indonesian IPO market

Relatively few studies have been conducted on the Indonesian IPO market, even less of these were written in English. Luckily, all abstracts are written in English even when the actual paper is in Indonesian. One of these Indonesian papers is written by Ismiyanti (2010) and focuses on the relationship between underpricing and the company motive to go public, herding behavior in the stock market, and the size of the company in term of net assets in the years 1990 through 2008. In the sample of 257 companies, only the size of the company had a significant effect, which was negatively related to the level of underpricing. Another such paper is Bachtiar (2012) which looks at several factors that possibly explain underpricing during a relatively short but recent time period, 2008 to 2010. Of these factors, growth of total assets, return on equity and debt to equity have a significant influence on underpricing.

Suherman (2011) investigates the connection between post-IPO institutional ownership and the level of underpricing in order to provide an answer to whether monitoring is a reason for going public. No significant results were found after controlling for variables such as firm age, firm size, aftermarket liquidity, market returns, and market risk. A sample of 94 firms in the years 1999 to 2005 was taken for the purpose of this study.

A study of Darmadi (2012) researches the influence of board structure and corporate ownership among Indonesian IPO firms in the years 2003 to 2011. It reveals that underpricing is significantly and positively related to board independence at the 5% level. Furthermore, board size and institutional ownership show a significant negative relationship at the 5% and 10% level respectively.

Razafindrambinina (2013) looks at another aspect of IPO underpricing, namely underwriter and auditor reputation in a period from 1999 to 2005. Results show that these two variables have a negative relationship with underpricing, thereby reducing the money left on the table by issuers.

# Chapter 4. Data and Methodology

*This chapter starts with describing the data and its sources in section 4.1. Following are descriptive statistics of the excess underpricing. Afterwards, in section 4.2 the variables used in the regressions are presented with their descriptive statistics. Lastly, section 4.3 describes the methodology used to calculate the first day underpricing and the short run underpricing.*

## 4.1 Sample selection and data sources

This study focuses on IPOs in Indonesia in the period from 01/01/1990 till 31/12/2012. The initial data set, obtained through Thomson One Banker (T1), contains 415 observations. These are not all the IPOs which occurred in this period as the number is lower than official reports from the Indonesia Stock Exchange display. According to their end of year reports, whose first edition appeared in 2002 but containing information about IPOs from 1987 onwards, the number of observations in this period should be around 460. After deleting observations with incomplete or incorrect data (i.e. no offer prices, no correct offer prices, and non matching daily trading data) and identical observations 323 IPOs remain. This is similar to what Ismiyanti (2010) finds in his paper. His sample for the period 1990 to 2008 consists of 257 observations, while in this paper the number of observations for that same time period is 256. In Figure 2 the yearly distribution of the number of IPOs can be found.

Figure 2. Number of IPOs per year.

With an average of 14 IPOs per year the frequency of an IPO in Indonesia is substantially higher than the frequency in an average developed country. For example in the Netherlands, a country although much smaller but with a higher GDP up to 2011, from 1990 to 2003 an average of 5 companies per year went public (Hoving, 2008). In Spain from 2000 until 2010 only 4 IPOs per year occurred (Antón et al.). When comparing it to the frequency of other developing Asian countries, Indonesia has a similar rate of IPOs. Thailand between 1997 and 2007 newly lists 12 companies per year (Chorruk, 2010).

When looking at Figure 2 it can be seen that in 1990 only 3 companies went public. The year before 29 companies made their way to the stock exchange and the years thereafter a minimum of 10 IPOs per year was reached. No explanation is to be found for this small number of offerings. Similarly, 1998 and 1999 also show a substantial decrease in IPOs. However, this time the Asian Financial Crisis, which started in 1997 in Thailand, can be appointed as a direct cause. In 2005 and 2006 Indonesia faced a ‘mini-crisis’ due to rising international oil and import prices. This forced the government to cut its fuel subsidies in order to stabilize the downfall of its currency, which in turn lead to the doubling of consumer fuel costs and double digit inflation (BBC News, 2005).

Thomson One Banker does not contain first trading day closing prices in Indonesia’s native currency the Rupiah. Furthermore, the data in T1 from the offer prices and first day closing prices in US dollars were scarce and inaccurate. As many Indonesian stocks would be penny stocks in the U.S. their price was often rounded off to two decimal points. Hence, the DataStream database was used to obtain the unadjusted closing prices in Indonesian Rupiah for the first trading day. DataStream automatically adjusts stock prices for stock splits, second equity offerings and any other number of stock altering techniques. Therefore, the ‘unadjusted’ price is used when investigating IPOs. DataStream was also used to retrieve the unadjusted daily prices for the first 20 trading days. These are used to investigate the short-term performance of newly listed companies.

The IPO’s initial return is the return the IPO stock makes when comparing its first trading day closing price to its offer price. As initial returns are mostly positive and the stock at offering is thereby underpriced, the term underpricing is often used to describe the first day return. In this paper initial return, underpricing and undervaluation are used interchangeably. In short, underpricing is calculated as follows:

In the total sample period the average level of underpricing is statistically significant from 0 at 24.16%. This is respectively larger and smaller than in the aforementioned studies on the Netherlands and Thailand, which showed an average underpricing of 18.2% and 36.23% over their sample periods. This is in line with the average underpricing of 28.89% Ismiyanti (2010) finds in his paper. The lower average percentage of underpricing is partly the result of the low underpricing in 2009 and 2011 when it was around the 10% level. Figure 3 shows the level of underpricing for each year in blue. As can be observed, IPOs are on average only overvalued in 1990 and 1995 by 4.17% and 0.37% respectively. What is interesting to see is that the level of underpricing is larger in and after periods of crisis. The Asian Financial Crisis hit Indonesia in 1998, and in 1999 underpricing levels averaged at 68.57%. Also in subsequent years IPOs were at least undervalued by 50%. Also in 2006, the year of the extreme oil price rises, underpricing increased to 35.09% even though from 2002 onwards underpricing gradually decreased from 31.42% to 16.47%. Remarkably enough, the current Global Financial Crisis did not have any obvious effects on Indonesian IPOs.

Figure 3. Underpricing and market excess underpricing per year.

To ensure that IPO underpricing is not caused by regular stock market increases, the market return is subtracted from the initial underpricing. The MSCI Indonesia is used as a proxy for the market return. This leads to the following formula in which ‘i’ represents a company and ‘j’ the offer date:

Figure 3 also displays the market excess levels of underpricing per year. It can be seen that the difference between these two variables is very small. Over the entire sample period the level of market excess underpricing is 24.33%, which is 0.17% higher than the raw level of underpricing. Thereby, the substantial first day positive return of firms going public is, although the two values are not statistically different from each other, further confirmed.

Table 2 shows additional descriptive statistics of the excess underpricing for the full sample and the different subsamples. In each subsample underpricing is significantly different from 0. Subsample 1 shows the lowest average undervaluation, 9.03%, and subsample 2 shows the highest, 41.97%. The percentage of undervalued firms in each sample is at least 75%. Also when looking at the different subsamples, the distribution is always skewed to the right. All samples, except subsample 4, reject the Jarque-Bera test of normality at the 5% level. However, due to the large number of observations and the central limit theory this does not become a problem when running the OLS regressions. Appendix A contains the distribution graphs of the different samples. What clearly can be observed from these graphs is that the samples are skewed to the right.

Table 2. Descriptive statistics of the market excess underpricing.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Full Sample 1990-2012 | Subsample 1 1990-1995 | Subsample 2 1996-2001 | Subsample 3 2002-2007 | Subsample 4 2008-2012 |
| Mean | 24.33% | 9.03% | 41.97% | 28.48% | 21.19% |
| T-statistic, mean = 0 | 9.35\*\*\* | 3.33\*\*\* | 5.23\*\*\* | 6.23\*\*\* | 8.11\*\*\* |
| Median | 11.33% | 2.72% | 17.88% | 20.53% | 12.57% |
| Maximum | 479.31% | 210.57% | 479.31% | 99.38% | 79.73% |
| Minimum | -83.48% | -36.85% | -83.48% | -32.40% | -19.34% |
| Standard Deviation | 46.75% | 26.27% | 74.86% | 31.67% | 25.33% |
| Skewness | 4.18 | 4.96 | 2.92 | 0.40 | 0.67 |
| Kurtosis | 33.70 | 38.30 | 15.70 | 2.09 | 2.41 |
| Jarque-Bera p-value | 0.00\*\*\* | 0.00\*\*\* | 0.00\*\*\* | 0.23 | 0.01\*\* |
| # of observations | 323 | 94 | 87 | 48 | 94 |
| % of underpricing | 81.11% | 75.53% | 83.91% | 85.42% | 81.91% |
| % of overpricing | 18.58% | 24.47% | 16.09% | 12.50% | 18.09% |

*Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively.*

In section 2.2 the structure of the IDX is described. Table 1 shows the criteria which companies must meet in order to be eligible for one of the two boards. To make this paper more robust, it will control for size and track record of the company by dividing the entire sample amongst the two boards. The data for this is collected from the Indonesia Stock Exchange official website. The database only contains information about companies currently present in the stock market. Therefore, this data is not available for the entire sample. Furthermore, company name changes may cause the company names in the data from Thomson One Banker and the Indonesia Stock Exchange database to be different. In most of these cases however, official company websites and company codes make it possible to connect the different names to one another.

The entire sample contains 323 observations. Of these 323 observations 283 can be allocated to one of the two boards. The development board, ‘Papan Pengembangan’, and the main board, ‘Papan Utama’, contain 130 and 153 companies respectively. Table 3 shows the descriptive statistics of the first day market excess return of the boards. The development board has a higher underpricing of 27.66% compared to the Main Board, which has an underpricing of 17.92%. The distribution of the Main Board is less spread out as can be deducted from the standard deviation, the lower minimum and maximum percentage underpricing. The percentage of companies underpriced or overpriced is relatively similar amongst the two boards.

Table 3. Descriptive statistics of market excess underpricing in the Development Board and Main Board.

|  |  |  |
| --- | --- | --- |
|  | Development Board | Main Board |
| Mean | 27.66% | 17.92% |
| T-statistic, mean = 0 | 6.70\*\*\* | 8.26\*\*\* |
| Median | 11.51% | 9.99% |
| Maximum | 269.62% | 165.78% |
| Minimum | -49.30% | -29.58% |
| Standard Deviation | 47.05% | 26.85% |
| Skewness | 2.35 | 1.95 |
| Kurtosis | 10.5 | 9.17 |
| Probability | 0.00\*\*\* | 0\*\*\* |
| Observations | 130 | 153 |
| % of underpricing | 79.23% | 81.70% |
| % of overpricing | 20.77% | 18.30% |
| *Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively* | | |

For all regressions in this paper the market excess underpricing will be used as the dependent variable. Therefore, from here onwards market excess underpricing will also be referred to as underpricing.

## 4.2 Variables

In order to explain the IPO anomaly in Indonesia, underpricing is regressed on several variables. Both Thomson One Banker and the DataStream databases were used to obtain the data. The following variables were investigated for being possible explanations of the underpricing phenomenon:

* **20 day sigma of after IPO returns.** Sigma represents the difficulty investors have in deciding what the true value of the stock is. When the company value is uncertain investors need a higher compensation for the risk they face. A higher sigma therefore leads to a higher level of underpricing.
* **20 day market beta.** This is the correlation between the 20 day market returns and the 20 day company returns after the offering. If the company that is going public is similar to other already publically listed firms, the valuation of the offering should be more accurate and the level of underpricing will be lower.
* **20 day average after IPO volume of the stock.** This reflects the liquidity present in the secondary market after the offering. A higher liquidity means that investors can easier get rid of the stock and thereby reduces holding risk. Therefore, less of a compensation is required for investors subscribing to the offering and the underpricing should be lower. Variable is in thousands of stock trades.
* **Offer price.** Large companies more often prefer having highly priced stocks in order to be less attractive for unstable retail investors. This is called the clientele hypotheses. More information is available for large companies due to corporate responsibilities and already substantial interest from institutional investors. Therefore the company should be more accurately valuable and the underpricing should be lower.
* **Number of shares issued.** A higher number of shares, leads to a more liquid secondary market and portrays the confidence of a firm in the future.
* **Market capitalization of the IPO.** Larger firms, which are more easily valuable, will have bigger IPOs. Furthermore, issuing a large IPO reflects the confidence of the firm in the future and should therefore decrease the risk for the investors. Thus, a larger market capitalization will lead to lower underpricing.
* **The number of uses of the proceeds.** A higher number of proceeds would indicate a less concrete plan of what to do with the additional funds and would therefore not result in more profit for the firm. Thus, the number of uses is negatively related to underpricing.

### 4.2.1 Full sample and subsamples

Table 4 shows the descriptive statistics of each of these variables. As can be observed, the average volume greatly increases between samples 1, 2, and 3 from around 800 thousand, to almost 5 million and to almost 38 million. Between samples 3 and 4 the volume changes relatively little with an increment of 1.2 million. Furthermore, the minimum volume traded is far beneath the mean.

The average offer price drops greatly after the first sample. In period 1 the average is 4451 Rupiah, with a maximum of 12600 and a minimum of 625. In both periods 3 and 4 the maximum offer price is 14000 Rupiah. The average is around 800 to 900, indicating that more smaller offerings are taking place. The market capitalization of IPOs and the number of shares issued gradually keep increasing when looking at the average, minimum and also the maximum.

Appendix B.1 shows the correlation matrix between the variables to check for a potential multicollinearity problem. As can be observed, none of the variables has a correlation higher than 0.6 with another variable. The largest correlation is between the variables ‘number of shares issued’ and ‘market capitalization of the IPO’. This is a logical consequence of the way market capitalization is calculated, namely price multiplied by the number of shares.

### 4.2.2. Development Board and Main Board

Table 5 shows the descriptive statistics of each of the independent variables when companies are categorized in one of the two boards. The sigma of the Main Board is on average smaller than the sigma of the Development Board by 0.03 indicating that after IPO returns are less volatile for Main Board companies. The beta of the Main Board is larger than that of the Development Board, meaning that larger companies have the tendency to move in a similar way as the market. The following 5 variables, all larger for the Main Board, give a clear picture of the consequences of the different listing requirements between the two boards. Appendix B.2 and B.3 show the correlation matrixes of the independent variables of the two boards. In the development board a multicollinearity problem exists between the variables “Numbers of shares issued” and “the market capitalization” as can be seen by their correlation of 0.67. However, as neither of these variables are used in multivariate models, this doesn’t pose a problem.

Table 4. Descriptive statistics of the independent variables.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Full Sample 1990-2012 | Subsample 1 1990-1995 | Subsample 2 1996-2001 | Subsample 3 2002-2007 | Subsample 4 2008-2012 |
| Sigma of 20 day  returns | Mean | 0.080 | 0.043 | 0.126 | 0.089 | 0.070 |
| Maximum | 1.071 | 0.472 | 1.071 | 0.232 | 0.198 |
| Minimum | 0.003 | 0.003 | 0.007 | 0.013 | 0.006 |
| Skewness | 4.78 | 5.65 | 3.68 | 1.28 | 2.86 |
| 20 day beta | Mean | 0.10 | 0.10 | 0.13 | 0.07 | 0.10 |
| Maximum | 0.72 | 0.68 | 0.72 | 0.50 | 0.67 |
| Minimum | -0.57 | -0.57 | -0.50 | -0.41 | -0.45 |
| Skewness | -0.28 | -0.29 | -0.15 | -0.45 | -0.35 |
| Average 20  day volume | Mean | 17920.17 | 796.49 | 4984.34 | 37895.59 | 39059.88 |
| Maximum | 262451.10 | 23655.18 | 41946.78 | 225619.50 | 262451.10 |
| Minimum | 0.20 | 0.20 | 8.90 | 49.30 | 269.90 |
| Skewness | 3.23 | 6.36 | 3.30 | 1.61 | 2.21 |
| Offer price | Mean | 1881.21 | 4451.60 | 797.76 | 831.24 | 917.67 |
| Maximum | 14000.00 | 12600.00 | 3250.00 | 14000.00 | 14000.00 |
| Minimum | 19.50 | 625.00 | 19.50 | 105.00 | 102.00 |
| Skewness | 1.93 | 1.09 | 1.77 | 5.87 | 2.85 |
| Number of  shares issued | Mean | 6.69E+08 | 2.52E+07 | 1.27E+08 | 1.23E+09 | 1.53E+09 |
| Maximum | 1.00E+08 | 2.00E+08 | 1.09E+09 | 5.50E+09 | 1.15E+10 |
| Minimum | 1.15E+10 | 8.51E+05 | 2.10E+07 | 5.00E+07 | 6.80E+07 |
| Skewness | 3.61 | 3.00 | 3.69 | 1.35 | 2.60 |
| Market  Capitalization | Mean | 6.02E+11 | 9.30E+10 | 8.62E+10 | 1.30E+12 | 1.37E+12 |
| Maximum | 1.15E+10 | 2.00E+08 | 1.09E+09 | 5.50E+09 | 2.86E+13 |
| Minimum | 8.51E+05 | 8.51E+05 | 2.10E+07 | 5.00E+07 | 1.17E+10 |
| Skewness | 9.35 | 2.42 | 4.07 | 5.85 | 4.68 |
| Number of  uses of proceeds | Mean | 1.90 | 1.06 | 1.34 | 2.33 | 3.06 |
| Maximum | 6 | 3 | 3 | 5 | 6 |
| Minimum | 1 | 1 | 1 | 1 | 1 |
| Skewness | 1.20 | 4.85 | 1.50 | 0.60 | 0.16 |

Table 5. Descriptive statistics of the independent variables of the Development and Main Board.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Development  Board | Main  Board |
| **Sigma of 20 day returns** | Mean | 0.09 | 0.06 |
| Maximum | 0.61 | 0.37 |
| Minimum | 0.00 | 0.01 |
| Skewness | 2.61 | 2.26 |
| **20 day beta** | Mean | 0.09 | 0.13 |
| Maximum | 0.67 | 0.72 |
| Minimum | -0.57 | -0.47 |
| Skewness | -0.36 | -0.28 |
| **Average 20 day volume** | Mean | 12495.87 | 25537.27 |
| Maximum | 178493.30 | 262451.10 |
| Minimum | 0.20 | 0.80 |
| Skewness | 3.53 | 2.64 |
| **Offer price** | Mean | 1732.46 | 2026.93 |
| Maximum | 9950.00 | 14000.00 |
| Minimum | 100.00 | 102.00 |
| Skewness | 1.60 | 2.12 |
| **Number of shares issued** | Mean | 5.25E+08 | 8.44E+08 |
| Maximum | 1.11E+10 | 6.65E+09 |
| Minimum | 850800 | 2500000 |
| Skewness | 5.226303 | 2.263628 |
| **Market capitalization** | Mean | 2.61E+11 | 9.54E+11 |
| Maximum | 4.60E+12 | 2.86E+13 |
| Minimum | 1.28E+09 | 6.45E+09 |
| Skewness | 4.42 | 6.85 |
| **Number of uses of proceeds** | Mean | 1.73 | 2.22 |
| Maximum | 5 | 6 |
| Minimum | 1 | 1 |
| Skewness | 1.12 | 0.84 |

## 4.3 Methodology

### 4.3.1 Initial Underpricing

Firstly, univariate models are used to determine the effect of each variable on the excess underpricing separately. The R2 displays the percentage with which the model accounts for its variance. Each model contains a constant, to represent the other variables which are not part of the model, and an independent variable and is thus of the following form:

Secondly, multivariate models are used to find the explanatory power of a combination of two or more variables. Only the variables which displayed significant results in the univariate models are used for this. F-tests determine if the additional variable significantly contributes to the model. Furthermore, the adjusted R2 is used to see whether the additional variable increases the explanatory power of the model.

This research will firstly focus on the complete sample of 23 years. To make the projection more realistic, separate models are developed which include a dummy for the Asian Financial Crisis and the Oil Crisis. The Asian Financial Crisis hit Indonesia in late 1997 and officially lasted for two years. Therefore, this dummy variable covers the years 1998 and 1999. However, because of long-standing problems in the banking industry such as lax banking supervision and heavy unhedged foreign borrowing leading to a technically bankrupt banking system, a second dummy for this crisis will be used for the years 1998 to 2001 (McCarthy, 2003). The Oil Crisis dummy covers the year 2006. The dummy variables will take a value of 1 in a crisis year and a value of 0 in a non-crisis year.

Afterwards, the sample is divided into 4 sub periods of 5 or 6 years. The Indonesian economy in general and its capitals markets have had a strong, relatively constant growth in the past 20 years. Trading volumes increased, capital markets were more easily accessible for both investors and companies and new trading systems were implemented. The subsamples are used to see how the effect of the variables changed over time. Table 2 presents the descriptive statistics of the level of underpricing in the different subsamples. In all subsamples underpricing is statistically present. Except for subsample 1, the average undervaluation is above 20%. In subsample 2 the average underpricing has a value of 41.97%, with a maximum initial increase of 479.31%.

### 4.3.2 Development Board and Main Board

The excess underpricing of the Development Board and Main Board will be regressed on the same independent variables described above and with the methodology described in 4.3.1. The entire period will be used for this. These subsamples are not further divided into sample with different time periods as the number of companies per sample will be too small. Furthermore, the division into the two boards is to look at influence of company size and track record for the period as a whole.

### 4.3.3 Short run underperformance

The short run performance will be measured at 4 points in time: closing price of the 5th, 10th, 15th, and 20th trading day. To check whether returns do not suddenly increase on the days right after the offering, returns at the closings of days 2, 3, and 4 are presented. Again, the short-term performance will be investigated in the entire sample and in the 4 subsamples. This way the influence of underwriter price support can be observed over time. Table 6 shows the returns for the different intervals in the different samples.

Table 6. Short run excess returns.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Full Sample 1990-2012 | Subsample 1 1990-1995 | Subsample 2 1996-2001 | Subsample 3 2002-2007 | Subsample 4 2008-2012 |
| Initial Underpricing | 24.33% | 9.03% | 41.97% | 28.48% | 21.19% |
| 2 day excess return | 27.20% | 10.18% | 44.15% | 32.44% | 26.42% |
| 3 day excess return | 29.50% | 9.88% | 45.53% | 40.97% | 28.48% |
| 4 day excess return | 31.58% | 9.87% | 48.93% | 44.83% | 30.13% |
| 5 day excess return | 32.50% | 9.42% | 50.09% | 46.82% | 31.32% |
| 10 day excess return | 32.87% | 10.89% | 49.26% | 46.35% | 31.64% |
| 15 day excess return | 34.19% | 10.45% | 51.05% | 49.18% | 33.39% |
| 20 day excess return | 33.56% | 10.84% | 45.49% | 50.38% | 35.31% |

In the full sample and in subsamples 2, 3, and 4, the after IPO returns keep increasing substantially compared to the initial underpricing. In subsample 2, at the 5th closing day the stock price increases 8.12%, while in subsample 3 this is 18.34% and in subsample 4 for this is 10.13%. In sample 1 the return also increases but with merely 1.81% after 20 days. When looking at days 2, 3, and 4 it can be seen that the stock price increases are gradual and not fixed on one particular day.

Appendix D tables 1 till 4 show the descriptive statistics of the returns at the short term intervals. If price support is present and generally retreats, the minimum should become larger. The stabilization does not influence the right tail of the distribution as its goal is to prevent the stock from having negative returns. Furthermore, its level of skewness should decrease over time as the distribution will converge more into a normal distribution. The number of 0% returns should be extremely high, as the underwriter price support is to delete the negative returns, and not necessarily cause positive stock returns. The decline of price support is therefore confirmed by the decrease of the level of kurtosis.

# Chapter 5. Results & Analysis

*This chapter presents and discusses the results of the empirical tests on the data. Section 5.1 starts with univariate models for the full sample and the different subsamples. Section 5.2 presents multivariate models for both the full and the subsamples. Section 5.3 provides the analysis and section 5.4 covers the aspect of underwriter price support and short term performance.*

## 5.1 Univariate Model Full Sample

Table 7 below contains univariate models of the variables described in chapter 4 for the entire sample period. As can be observed the 20-day sigma of the returns has a significant positive effect, showing a 4.38 percentage point increase in underpricing when sigma were to increase by 1. The adjusted R2 of 84.44% of this model shows that already a great deal of the variance in the level of underpricing can be explained by sigma. Sigma, reflecting ex ante uncertainty, is therefore the biggest determinant of the level of underpricing amongst these variables. A second significant variable is the 20-day market beta. With a coefficient of -0.20 it negatively influences underpricing, which shows that the more the IPO stock return is correlated to the market return the lower the level of underpricing will be. However, its explanatory power of 1.09% is little.

Table 7. Univariate models for full sample

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Constant | -0.11\*\*\*  (-11.00) | 0.26\*\*\*  (6.22) | 0.23\*\*\*  (4.86) | 0.33\*\*\*  (5.89) | 0.23\*\*\*  (5.01) | 0.25\*\*\*  (5.80) | 0.22\*\*\*  (5.28) |
| Sigma of 20  day returns | 4.38\*\*\*  (41.32) |  |  |  |  |  |  |
| Beta 20  days |  | -0.20\*\*\*  (-2.63) |  |  |  |  |  |
| Average 20  day volume |  |  | 9.53E-07\*  (1.79) |  |  |  |  |
| Offer price |  |  |  | -4.9E-5\*\*\*  (-3.82) |  |  |  |
| Number of shares issued |  |  |  |  | 1.56E-11  (1.10) |  |  |
| Market  Capitalization |  |  |  |  |  | 3.99E-15  (-0.53) |  |
| Number of  uses of proceeds |  |  |  |  |  |  | 0.01  (0.94) |
| Adjusted R² | 0.8438 | 0.0109 | 0.0056 | 0.0573 | 0.0023 | 0.0004 | 0.0012 |

*Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively. The values within brackets are the t-statistics, corrected for serial correlation and/or heteroskedasticity if necessary.*

The offer price is the third variable significant at the 1% level. Its negative relationship with underpricing shows that a higher price leads to a lower level of underpricing. Per one Rupiah the percentage of undervaluation decreases by 0.000049. This coefficient seems small, but with offer prices ranging from 19.50 Rupiah to 14,000 Rupiah, as can be observed in Table 4., it still has a significant impact. The R2 shows that it has greater explanatory power than the market beta. The average 20 day volume shows significance at the 10% level. Its positive effect on the level of underpricing is however very little. The number of uses of the proceeds and the market capitalization is not significant. In every univariate model the constant is significant at the 1% threshold.

Table 8. Univariate models full sample with first AFC dummy.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Constant | -0.11\*\*\*  (-8.28) | 0.26\*\*\*  (6.20) | 0.21\*\*\* (4.59) | 0.33\*\*\*  (5.68) | 0.23\*\*\*  (4.86) | 0.25\*\*\*  (5.67) | 0.20\*\*\* (3.49) |
| Sigma Return  20 day | 4.40\*\*\*  (40.85) |  |  |  |  |  |  |
| Beta 20 day |  | -0.16\*\*  (-2.33) |  |  |  |  |  |
| Average  volume |  |  | 1.04E-06\*\* (1.83) |  |  |  |  |
| Offer price |  |  |  | -4.85E-05\*\*\*  (-3.72) |  |  |  |
| Number of  shares |  |  |  |  | 1.87E-11  (1.27) |  |  |
| Market  capitalization |  |  |  |  |  | -3.69E-15  (-0.50) |  |
| Number of uses of proceeds |  |  |  |  |  |  | 0.02 (1.43) |
| Dummy Asian  Financial Crisis | -0.26  (-0.79) | -1.43\*\*\*  (-2.80) | 1.40E-04\*\*\* (4.11) | 1.22E-04  (0.51) | 1.53E-09  (1.52) | 8.31E-13  (0.52) | 0.29\*\*  (2.01) |
| Dummy Oil  Crisis | 0.40  (0.46) | -0.50\*\*\*  (4.34) | 2.10E-07  (0.44) | -1.07E-04\*\*  (-2.35) | -2.56E-11\*\*  (-2.22) | -7.2E-14\*\*\*  (-2.05) | -0.03\*\*  (-1.94) |
| Adjusted R² | 0.8447 | 0.0241 | 0.0356 | 0.0588 | 0.0066 | 0.0013 | 0.0135 |

*Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively. The values within brackets are the t-statistics, corrected for serial correlation and/or heteroskedasticity if necessary.*

### 5.1.1 Crisis dummies

As can be observed in Figure 3. in chapter 4 the level of underpricing greatly increases during and shortly after periods of crisis. Hence, to see if this affects the outcomes above, dummy variables for the Asian Financial crisis and the Oil Crisis are used. The results are presented in Table 8 for the AFC dummy which covers the years 1998 and 1999 and Table 9 for the AFC dummy which covers the years 1998-2001.

When comparing the different models in Table 8 it can be seen that the crises have a significant impact on the 20 day beta coefficient. Without the two crises the coefficient is smaller than in Table 7. During the Asian Financial Crisis the effect of beta on the level of underpricing decreased with -1.43 to -1.59 per increase of 1 in beta. Also during the oil crisis the beta coefficient becomes more negative by 0.5, showing that companies which are more similar to the market will be undervalued less. The increase in R2 shows that due to the inclusion of the dummy variables, the model better reflects the data.

The offer price, still significant at the 1% level, without including the crises, becomes more negative during the oil crisis by 0.000107. On the other hand, the dummy of the Asian Financial Crisis, although not significant, has a positive coefficient, meaning that a higher price would also lead to higher underpricing. Although not by a lot, the R2 of the model with dummies increases.

The variable average 20 day volume without the crises becomes significant at the 5% level compared to a 10% in Table 7. Its coefficient increases slightly between the two models. When the Asian Financial Crisis dummy takes the value of 1, the change in the coefficient of 0.00014 is significant. The oil crisis doesn’t affect the coefficient of the average volume. The R2 of the model including dummies increases by 3% compared to the initial model.

Table 9 below, uses a different Asian Financial Crisis dummy which covers the years 1998 up and till 2001. The variables sigma, beta and offer price all stay significant at the 1% level, like in the previous dummy model. The average volume is no longer significant. When looking at the change the AFC dummy variables cause, it can be seen that it greatly affects sigma, volume, price and uses. The oil crisis dummy on the other hand, has less off an impact compared to the previous model. The market beta changes significantly at the 1% level and the number of shares variable does so at the 5% level. The R2 of offer price increases from 5.88% in the previous model, to 8.25% in this model. The number of uses of the proceeds has quite a lot of explanatory power in this model, especially compared to Table 8. Its R2 increases from 1.35% to 14.93%.

Table 9. Univariate models full sample with second AFC dummy.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Constant | -0.09\*\*\* (-6.53) | 0.26\*\*\* (6.32) | 0.21\*\*\* (4.93) | 0.30\*\*\* (8.88) | 0.20\*\*\* (5.93) | 0.23\*\*\* (5.76) | 0.14\*\*\* (3.37) |
| Sigma return  20 day | 3.90\*\*\* (12.71) |  |  |  |  |  |  |
| Beta 20 day |  | -0.26\*\*\* (-3.34) |  |  |  |  |  |
| Average  volume |  |  | 8.99E-07 (1.60) |  |  |  |  |
| Offer price |  |  |  | -4.45E-05\*\*\* (-4.03) |  |  |  |
| Number of  shares |  |  |  |  | 2.37E-11\* (1.84) |  |  |
| Market  capitalization |  |  |  |  |  | -2.14E-15 (-0.31) |  |
| Number of uses of proceeds |  |  |  |  |  |  | 0.02 (1.28) |
| Dummy Asian  Financial Crisis | 0.59\*\* (2.04) | 0.50 (1.30) | 2.09E-05\*\* (2.10) | 2.92E-04\*\*\* (2.92) | 1.54E-09\* (1.73) | 2.15E-12\* (1.72) | 2.87E-01\*\*\* (2.70) |
| Dummy Oil  Crisis | 0.65 (0.96) | -0.40\*\*\* (-4.70) | 4.04E-07 (0.85) | -8.73E-05 (-0.42) | -2.31E-11\*\* (-2.03) | -5.96E-14\* (-1.83) | -9.70E-03 (-0.82) |
| Adjusted R² | 0.8489 | 0.0229 | 0.0387 | 0.0825 | 0.0506 | 0.0201 | 0.1493 |

*Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively. The values within brackets are the t-statistics, corrected for serial correlation and/or heteroskedasticity if necessary.*

Unfortunately, a limitation of Eviews is that it cannot calculate the p-value of the joint coefficient of the initial value and its change caused by the dummy variable. Therefore, it is impossible to determine if the variables are now insignificant, i.e. the number of shares, market capitalization, and number of uses, would become significant with the inclusion of these significant dummy variables.

### 5.1.2 Univariate Model Subsamples

Appendix C. Tables 1-4 show the univariate models with t-statistics for the different subsamples. Table 10 below gives an overview of the significant variables within the separate univariate models. The variables which are not significant are left out. When comparing the different time periods, it can be seen that the only factor which is continuously a determinant for the level of underpricing, is the 20 day after IPO sigma. It is significant at the 1% level in every subsample. With a coefficient between 3.95 and 4.55 its effect is fairly constant over time. Also the R2 of this univariate model remains high across the samples. In subsample 1, sigma has the lowest explanatory power, accounting for 64.89% of the variance in the model.

The other variables are not constantly present throughout the subsamples. The 20 day market beta is significant in the 3rd and 4th sample at the 10% and 5% level relatively. Interesting to see here is that this model in sample 3 has a higher explanatory power than the model in sample 4 even though the beta in sample 3 is less significant. Indicating that the constant is the main determinant in this model. The 20 day average volume is only significant in sample 2 at the 10% threshold.

The offer price is significant in 2 of the samples, namely 2 and 4. In sample 2 it is significant at the 5% level and in sample 4 this is at the 1% level. Its adjusted R2 of 10.29% and 4.85% relatively, show that these models have some explanatory power. Except in subsample 4, the number of shares issued is not significant. For the market capitalization of the IPO only significance is found in the first sample. The number of uses of the proceeds is only significant in the 2nd sample.

Table 10. Summary significant variables of the univariate models in the subsamples.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Full Sample 1990-2012 | Subsample 1 1990-1995 | Subsample 2 1996-2001 | Subsample 3 2002-2007 | Subsample 4 2008-2012 |
| Sigma of 20 day  returns | 4.38\*\*\* | 3.95\*\*\* | 4.55\*\*\* | 4.19\*\*\* | 4.5\*\*\* |
| 20 day beta | -0.20\*\*\* |  |  | -0.36\* | -0.24\*\* |
| Average 20 day  volume | 9.53E-07\* |  |  | 1.40E-06\* |  |
| Offer price | -4.90E-05\*\*\* |  | -3.38E-4\*\* |  | -5.02E-05\*\*\* |
| Number of  shares issued |  |  |  |  | 2.56E-11\*\* |
| Market  Capitalization |  | -4.76E-13\* |  |  |  |
| Number of uses  of proceeds |  |  | 0.32\* |  |  |

*Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively.*

### 5.1.3 Development Board and Main Board

Table 11 shows the results the univariate models of the Development Board. The 20 day after IPO sigma is significant at the 1% level, just as it is in the previous univariate models of the full sample and the different sub periods. With a coefficient of 4.50 it shows that uncertainty plays a slightly bigger role in the development board. Its R2 is similar to previous results and the model accounts for 86.08% of the variance. The other significant variable is the offer price.

Table 11. Development Board univariate models

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Constant | -0.13\*\*\*  (-6.85) | 0.27\*\*\*  (4.76) | 0.27\*\*\*  (4.11) | 0.38\*\*\*  (5.05) | 0.26\*\*\*  (4.19) | 0.28\*\*\*  (4.58) | 0.23\*\*\*  (2.58) |
| Sigma of 20 day returns | 4.50\*\*\*  (32.81) |  |  |  |  |  |  |
| 20 day beta |  | 0.00  (0.02) |  |  |  |  |  |
| Average 20 day  volume |  |  | 6.29E-07  (0.57) |  |  |  |  |
| Offer price |  |  |  | -6.00E-05\*\*\*  (-3.33) |  |  |  |
| Number of  Shares issued |  |  |  |  | 2.07E-11  (1.38) |  |  |
| Market  capitalization |  |  |  |  |  | -1.78E-15  (0.93) |  |
| Number of uses of proceeds |  |  |  |  |  |  | 0.02  (0.80) |
| Adjusted R² | 0.8608 | 0.0000 | 0.0013 | 0.0760 | 0.0051 | 0.0000 | 0.002917 |

*Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively. The values within brackets are the t-statistics, corrected for serial correlation and/or heteroskedasticity if necessary.*

Table 12 shows the univariate models for the Main Board. The sigma is significant at the 1% level, as observed in previous models. Its explanatory power of 79.36% is lower than in previous models. The 20 day beta is significant at the 1% level and has a coefficient of -0.26. The variables average 20 day volume and offer price are significant at the 1% threshold. The 20 day volume variable has a positive coefficient, therefore an increase in total volume will increase the level of underpricing, indicating that holding risk is not the reason for underpricing.

Table 12. Main Board univariate models

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Constant | -0.09\*\*\*  (-5.95) | 0.21\*\*\*  (6.90) | 0.14\*\*\*  (4.92) | 0.23\*\*\*  (8.08) | 0.16\*\*\*  (6.34) | 0.18\*\*\*  (6.90) | 0.14\*\*\*  (6.90) |
| Sigma of 20 day returns | 4.36\*\*\*  (24.09) |  |  |  |  |  |  |
| 20 day beta |  | -0.26\*\*\*  (-3.22) |  |  |  |  |  |
| Average 20 day  volume |  |  | 1.44E-06\*\*\*  (3.67) |  |  |  |  |
| Offer price |  |  |  | -2.48E-05\*\*\*  (-3.13) |  |  |  |
| Number of  Shares issued |  |  |  |  | 2.20E-11  (1.40) |  |  |
| Market  capitalization |  |  |  |  |  | 1.40E-15  (0.26) |  |
| Number of uses of proceeds |  |  |  |  |  |  | 0.02  (0.26) |
| Adjusted R² | 0.7936 | 0.0532 | 0.0574 | 0.0539 | 0.0129 | 0.0002 | 0.0104 |

*Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively. The values within brackets are the t-statistics, corrected for serial correlation and/or heteroskedasticity if necessary.*

When comparing the univariate models from the two boards it can be observed that sigma and offer price are significant in the two boards. Both coefficients in the Development Board are higher and both these models have a greater explanatory power. The shorter track records of companies listed on the development board, cause more uncertainty and require a higher underpricing to compensate for this risk. The offer price is a variable which investors use to get a more accurate valuation of the company.

In the Main Board, in contrary to the Development Board, the 20 day beta is significant. Companies which enlist on the Main Board are therefore either similar to companies already listed in this board or their similarity is easier deductible from their track record. The volume variable is also only significant in the Main Board model.

## 5.2 Multivariate Models

Table 13 below shows the multivariate models containing different combinations of the significant factors of the univariate models for the full sample. Models 1 through 6 are made up of a constant, the 20 day sigma of returns and one or more of the significant variables from the previous models. In these multivariate models sigma is always significant at the 1% level. Its coefficient remains positive and is quite similar to the sigma in the univariate models, indicating that it is the most influential variable present. In models 2, 4, 5 and 6 the variable ‘average 20 day volume’ is added. In each of these models this variable is positive and significant at the 1% level. The market beta and the offer price are both not significant when sigma is included in the model.

F-tests are used to determine if the addition of extra variables significantly improves the model. In model 2 the F-test is rejected at the 1% level indicating that the inclusion of the volume variable is relevant for the model. As can be observed in model 1 and 3, the addition of the beta and offer price variable do not statistically improve the model. Models 4, 5, and 6 show, with help of the F-test, the relevance of each of the variables separately and also combined. What can be observed in model 5 and 6, is that the market beta and the offer price also jointly are not of value to the model. The combination of beta or offer price with the volume does have a significant impact on the model, but this is caused by the volume variable. Furthermore, the adjusted R2 of models 1 through 6 hardly increases when other variables are added. The adjusted R2 of the univariate model with only sigma is 84.38% while that of the multivariate model with sigma and volume is 84.68%.

Model 7, 8, 9, and 10 do not include the sigma. In model 7 both the volume and the beta are significant. Remarkably enough in model 9 and 10, the 20 day average volume is then not significant. In model 8 both the beta and the price are significant. In the last 2 models the F-test shows that the volume is an irrelevant variable. Of these 4 models, model 8 has the highest explanatory power of 6.38%.

**Table 13. Multivariate Models full sample.**

****

### 5.2.1 Multivariate models of the Board samples

Table 14 shows the multivariate models of the Main Board. Only the significant variables from the univariate models are used to build these models. Models 1 through 4 are a combination of the 20 day sigma and one or more of the other significant variables. In each of these variables sigma is significant at the 1% level. Also beta and average 20 day volume are significant at the 1% level when added. F-tests are used to determine if the addition of another variable improves the model. In model 2 and 3 this is the case, both the beta and the volume variable improve the model. When comparing the R2 of these two models to the univariate model containing only sigma it can be seen that the R2 increases by almost 1 percentage point. The offer price doesn’t improve the model. The addition of both the beta and the volume variable in one model causes the explanatory power to increase by 1.55 percentage point. Both variables are separately significant to the model at the 5% level. The combination of these two variables rejects the F-test at the 1% level.

Table 14. Multivariate models of the Main Board.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| Constant | -0.07\*\*\*  (-4.29) | -0.10\*\*\*  (-8.08) | -0.08\*\*\*  (-4.48) | -0.08\*\*\*  (-4.86) | 0.18\*\*\*  (4.86) | 0.23\*\*\*  (5.03) |
| Sigma of 20 day returns | 4.29\*\*\*  (24.06) | 4.28\*\*\*  (24.71) | 4.31\*\*\*  (25.12) | 4.22\*\*\*  (23.83) |  |  |
| 20 day beta | -0.12\*\*\*  (-2.99) |  |  | -0.11\*\*\*  (-2.81) | -0.23\*\*\*  (-2.90) | -0.25\*\*\*  (-3.15) |
| Average 20 day  volume |  | 5.86E-07\*\*\*  (3.78) |  | 5.32E-07\*\*  (2.46) | 1.30E-06\*\*\*  (3.27) | 9.11E-07\*\*  (2.04) |
| Offer price |  |  | -5.02E-06  (-0.94) |  |  | -2.17E-05\*\*\*  (-2.89) |
| Adjusted R² | 0.8026 | 0.8003 | 0.7930 | 0.8091 | 0.0876 | 0.1191 |
| F-test, c(3)=0 | 0.00 |  |  | 0.01 | 0.00 |  |
| F-test, c(4)=0 |  | 0.00 |  | 0.01 | 0.00 | 0.04 |
| F-test, c(5)=0 |  |  | 0.35 |  |  | 0.00 |
| F-test, c(3)=c(4)=0 |  |  |  | 0.00 |  |  |
| F-test, c(4)=c(5)=0 |  |  |  |  |  | 0.00 |

*Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively. The values within brackets are the t-statistics, corrected for serial correlation and/or heteroskedasticity if necessary.*

Models 5 and 6 do not contain the sigma variable in order to observe the interaction of these variables without this main determinant, sigma, present. When sigma is absent all the other variables are significant at the 1% level and all significantly improve the model. The R2 increases from around 5% in the corresponding univariate models from section 5.1.3. to 8.76% and 11.91% respectively in the multivariate models.

Table 15 shows the multivariate model of the Development Board, consisting of the variables sigma and offer price. The addition of the offer price is relevant to the model. The increase of the R2 compared to the univariate model consisting of only sigma, is 0.39 percentage point.

Table 15. Development Board multivariate model

|  |  |
| --- | --- |
| Constant | -0.18\*\*\*  (-6.29) |
| Sigma of 20 day returns | 4.65\*\*\*  (27.45) |
| Offer price | 1.81E-05\*\*  (2.38) |
| Adjusted R² | 0.8647 |
| F-test, c(3)=0 | 0.02 |

*Note: \*\*\*, \*\* and \* denote significant at the 1%, 5% and 10% levels respectively. The values within brackets are the t-statistics, corrected for serial correlation and/or heteroskedasticity if necessary.*

## 5.3 Analysis

The overall significance and the high explanatory power of the 20 day after IPO sigma implies that the uncertainty about the true company value is the main reason why underpricing in Indonesia exists. Through the volatile demand investors reflect the disagreement on the price and thereby, according to the Efficient Market Hypothesis, the true value of the company. The different sub periods show no clear trend as to whether investor uncertainty is increasing or decreasing. Sigma in all samples except one, has an explanatory power between 77.61% and 86.55%. In subsample 1 it only accounts 64.89% of the variance. Reason for this could be the limited investor activity at the time. Interesting to see is that the sigma of the development board has a larger coefficient and a larger explanatory power. Due to the limited, and less elaborate track record, the investor uncertainty about the value of the company requires a higher risk premium.

The other variables on which the excess underpricing is regressed show mixed results. Many of these variables are only significant in particular subsamples and never in all subsamples. The correlation of the stock with the market, the beta, is present in three out of five univariate models and multivariate models 7, 8, and 9. Its explanatory power is low, but it again points into the direction of how underpricing is related to company valuation. A higher correlation with the market indicates that the company is similar to already listed companies, making an accurate estimate by means of multiples easier. The beta is significant at the 10% in the subsample 3 and significant at the 5% level in subsample 4. A possible trend might be arising in which similarity to the market can become a greater indicator of underpricing. The presence of a significant beta in the Main Board sample indicates that similar companies lead to less underpricing.

The clientele hypothesis, resulting from the offer price, is present in two, nonconsecutive, univariate models and in multivariate models 8, 9, and 10. Its explanatory power ranges from 4.85% to 10%. A possible explanation for the relatively low R2 is that most investors in Indonesia are institutional investors (Sipahutar, 2013). Consequently, the additional investor interest for larger companies might be reduced. When dividing the full sample between the two boards, the offer price is significant at the 1% level in both models. In the development board price has a larger coefficient and a larger explanatory power, possibly indicating that price is the determinant of company size or that it reflects the ambitions of the company, thereby portraying less of a risk to the investor.

The number of shares issued and the market capitalization variables are present in only two univariate subsamples. Size does not have a significant influence on the level of underpricing in Indonesia. Also in the board subsamples these variables are not statistically significant. Therefore, the additional information normally present for the valuation of large companies does not lead to lower underpricing. The number of uses of the proceeds is barely present in one subsample. Therefore, investors do not attach value to the accuracy of the purposes of the proceeds.

Lastly, the volume is present in two univariate sample and in multivariate models 2 and 4 through 7. Although its explanatory power is low, less than 2%, hot issue IPOs, lead to a higher level of underpricing. This can be the result of Rock’s winner’s curse or the company’s reputation. Investors want to have the shares of a hot IPO because it is crowded out by institutional investors or because of the company product, leading to a greater demand, a higher price and thereby a bigger level of underpricing. The two board samples more clearly depict this effect. In the Development Board the average volume is not significant. In contrary to the Main Board, where it has an R2 of 5.74%. The Development Board normally has less big and less well-known companies listed. As a result, less investors want to have these stocks. A higher volume could in this board be caused by higher uncertainty or a slightly mispriced asset. However, this increase in volume is not sufficient to greatly influence the return. In the Main Board the increase in demand is so high, that it has a significant effect on the level of underpricing.

## 5.4 Underwriter price support

Table 6 in section 4.3.3. and appendix D show the excess returns at different intervals in the short term for the different samples. In all of these samples the level of excess return keeps increasing rapidly. This is the opposite of what Ruud (1993) finds in her paper. She finds that the average stock price stays more or less the same in the 20 days after the initial public offering, but that the distribution of the returns changes. In the IPOs in Indonesia the mean return increases. Furthermore, the distribution changes. In all samples the data skews more to the right as time passes. When underwriter price support is present the opposite occurs. As the underwriter decreases its support the left tail of the distribution becomes more prominent and the skewness decreases. Furthermore, the minima of the different samples don’t decrease as greatly as the maxima increase.

Figure 4 show the distributions of the full sample at the different points in time. These distribution graphs are another way to detect possible underwriter price support. There is no clear shift towards more negative returns as time passes, indicating that the stocks were not, heavily, supported by the underwriters. Note, the full sample in this case refers to the years from 1996 onwards, as price support was not allowed before that in Indonesia.

Figure 4. Short term distributions for the full sample.

# Chapter 6. Limitations

This research contains several limitations which might influence the found relationships between variables. Firstly, around 45 observations are missing due to data limitations. The inclusion of these observations might change the regression output, thereby making variables significant or not significant anymore. This would be especially relevant for the variables other than sigma. Sigma shows a clear and strong effect in all of the samples and should therefore not greatly vary after the inclusion of additional observations.

Secondly, for the short-term performance of the observations a 20 trading day period is used. In most cases a closed stock market is displayed by an empty cell in excel, thereby not influencing the data. However, possibility exists that a closed stock market is displayed by a 0% return for that day. In Indonesia the celebrations of the four main religions, Islam, Christianity, Buddhism, and Hinduism, all count as national holidays in which the stock market is closed. As checking every possible closed trading day in every year would be a bit tedious, this 0% return is included in the 20 trading days. Although minor, this could have an effect on the results.

Thirdly, the data of the variable volume is presented in thousands and thus likely to be rounded off. More accurate data cannot be obtained. This might influence the effect of the volume on the level of excess returns.

Fourthly, a lot of information about the Indonesian IPO market is written in its domestic language. The Indonesia Stock Exchange website has an English version from which some, scarce, data can be obtained. The capital market supervisory agency Bapepam-LK doesn’t have a English version. On this website possibly interesting information in prospectuses should be written.

# Chapter 7. Conclusion

To conclude, the underpricing anomaly of initial public offerings in Indonesia is clearly present, differs across time and is greatly influenced by crises. Ex ante uncertainty can be appointed as the cause of the high levels of undervaluations. In the full sample and all subsamples this variable is significant at the 1% level. The samples of the two boards indicate that lack of financial data to base the company valuation on leads to higher underpricing. Offer price and market beta can be used to help value the company and indicate its future intentions. Furthermore, hot IPOs in the Main Board, lead to higher levels of underpricing, indicating that herding behavior amongst investors is present. Across time no clear pattern or significance of the other independent variables exists. Indicating that underpricing is caused by a combination of many factors and that these factors do not always have to be the same.

The short term performance of the IPOs suggests that even after the first trading day, the companies are not accurately valued yet. These high returns in the first month after the IPO inform investors not to sell at the end of the first trading day, like normally would be the advice in European IPO markets. Furthermore, the increase in level of skewness as time passes, indicates that the risk of obtaining negative returns decreases. Although, the Indonesian authorities are currently drawing up new legislations concerning underwriter price support, the data doesn’t indicate that this support is frequently used.

Further research into the Indonesian IPO market will lead to a better understanding of what causes the first day returns to be systematically large. This paper has found some relationships between independent variables and underpricing. The additional research can use variables as sigma, offer price, volume, and market beta as starting points for the election of new variables. Furthermore, variables like market capitalization, number of uses, and number of shares issued can, at least in Indonesia, be ruled out as reasons for underpricing.

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# Appendix

## Appendix A. Distribution of excess first day returns

Subsample 1: 1990-1995



Full sample

### 

Subsample 3: 2002-2007

Subsample 2: 1996-2001



Subsample 4: 2008-2012

## Appendix B. Correlation matrix of the independent variables

### 1. Correlation matrix for independent variables of the whole sample

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Sigma of 20 day returns | Beta 20 days | Average 20 day volume | Offer price | Number of shares issued | Market capitalization | Number of uses of proceeds |
| Sigma of  20 day returns | 1.00 |  |  |  |  |  |  |
| 20 day beta | -0.08 | 1.00 |  |  |  |  |  |
| Average 20  day volume | 0.03 | -0.03 | 1.00 |  |  |  |  |
| Offer price | -0.27 | -0.06 | -0.27 | 1.00 |  |  |  |
| Number of  shares issued | 0.00 | -0.03 | 0.37 | -0.21 | 1.00 |  |  |
| Market  capitalization | -0.06 | -0.02 | 0.09 | 0.24 | 0.42 | 1.00 |  |
| Number of uses  of proceeds | 0.00 | 0.10 | 0.39 | -0.32 | 0.30 | 0.15 | 1.00 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Sigma of 20 day returns | Beta 20 days | Average 20 day volume | Offer price | Number of shares issued | Market capitalization | Number of uses of proceeds |
| Sigma of  20 day returns | 1.00 |  |  |  |  |  |  |
| 20 day beta | 0.02 | 1.00 |  |  |  |  |  |
| Average 20  day volume | 0.03 | 0.10 | 1.00 |  |  |  |  |
| Offer price | -0.37 | -0.09 | -0.27 | 1.00 |  |  |  |
| Number of  shares issued | 0.04 | -0.11 | 0.23 | -0.23 | 1.00 |  |  |
| Market  capitalization | -0.10 | -0.07 | 0.21 | -0.07 | 0.67 | 1.00 |  |
| Number of uses  of proceeds | 0.03 | 0.20 | 0.49 | -0.41 | 0.39 | 0.34 | 1.00 |

2. Correlation matrix for independent variables of the Development Board

3. Correlation matrix for independent variables of the Main Board

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Sigma of 20 day returns | 20 day beta | Average 20 day volume | Offer price | Number of shares issued | Market capitalization | Number of uses of proceeds |
| Sigma of  20 day returns | 1.00 |  |  |  |  |  |  |
| 20 day beta | -0.14 | 1.00 |  |  |  |  |  |
| Average 20  day volume | 0.16 | -0.11 | 1.00 |  |  |  |  |
| Offer price | -0.21 | -0.08 | -0.31 | 1.00 |  |  |  |
| Number of  shares issued | 0.04 | 0.01 | 0.38 | -0.22 | 1.00 |  |  |
| Market  capitalization | -0.04 | -0.04 | 0.04 | 0.33 | 0.43 | 1.00 |  |
| Number of uses  of proceeds | 0.06 | 0.02 | 0.29 | -0.32 | 0.19 | 0.09 | 1.00 |

## Appendix C. Univariate models of subsamples

### 1. Univariate Models Subsample 1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | |
| Constant | -0.08\*\*\*  (-4.20) | 0.10\*\*\*  (3.32) | 0.09\*\*\*  (3.20) | 0.17\*\*\*  (2.75) | 0.11\*\*\*  (-0.94) | 0.13\*\*\*  (3.66) | 0.19\*\*\*  (1.80) |
| Sigma of 20 day returns | 3.95\*\*\*  (7.05) |  |  |  |  |  |  |
| Beta 20 days |  | -0.06  (-0.57) |  |  |  |  |  |
| Average 20 day volume |  |  | 2.66E-07  (0.03) |  |  |  |  |
| Offer price |  |  |  | -1.73E-5  (-1.41) |  |  |  |
| Number of shares issued |  |  |  |  | -8.5E-10 (-0.94) |  |  |
| Market Capitalization |  |  |  |  |  | -4.76E-13\*  (1.76) |  |
| Number of uses  of proceeds |  |  |  |  |  |  | -0.09  (-0.97) |
| Firm age |  |  |  |  |  |  |  |
| Adjusted R² | 0.6489 | 0.0035 | 0.0000 | 0.0211 | 0.0095 | 0.0326 | 0.0102 |

### 2. Univariate Models Subsample 2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Constant | -0.17\*\*\*  (-4.30) | 0.45\*\*\*  (4.88) | 0.39\*\*\*  (3.13) | 0.67\*\*\*  (3.65) | 0.44\*\*\*  (3.59) | 0.49\*\*\*  (3.49) | -0.01  (-0.07) |
| Sigma of 20 day  returns | 4.55\*\*\*  (23.39) |  |  |  |  |  |  |
| Beta 20 days |  | -0.31  (0.97) |  |  |  |  |  |
| Average 20 day  volume |  |  | 6.84E-06  (1.02) |  |  |  |  |
| Offer price |  |  |  | -3.38E-4\*\*  (-2.48) |  |  |  |
| Number of s  hares issued |  |  |  |  | -1.24E-10  (-0.55) |  |  |
| Market  Capitalization |  |  |  |  |  | -8.7E-13  (-1.46) |  |
| Number of uses  of proceeds |  |  |  |  |  |  | 0.32\*  (1.94) |
| Firm age |  |  |  |  |  |  |  |
| Adjusted R² | 0.8655 | 0.0113 | 0.0055 | 0.1029 | 0.0006 | 0.0239 | 0.0637 |

### 3. Univariate Models Subsample 3

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Constant | -0.09\*\*  (-2.42) | 0.32\*\*\*  (6.70) | 0.23\*\*\*  (2.65) | 0.29\*\*\*  (5.84) | 0.28\*\*\*  (4.59) | 0.29\*\*\*  (5.91) | 0.40  (3.91) |
| Sigma of 20 day  returns | 4.19\*\*\*  (12.63) |  |  |  |  |  |  |
| Beta 20 days |  | -0.36\*  (-1.83) |  |  |  |  |  |
| Average 20 day  volume |  |  | 1.40E-06\*  (1.76) |  |  |  |  |
| Offer price |  |  |  | -8.28E-6  (-0.36) |  |  |  |
| Number of  shares issued |  |  |  |  | 7.80E-12  (0.25) |  |  |
| Market  Capitalization |  |  |  |  |  | -8.77E-16  (-0.08) |  |
| Number of uses  of proceeds |  |  |  |  |  |  | -0.05  (-1.58) |
| Firm age |  |  |  |  |  |  |  |
| Adjusted R² | 0.7761 | 0.0696 | 0.0567 | 0.0028 | 0.0014 | 0.0001 | 0.0442 |

### 4. Univariate Models Subsample 4

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Constant | -0.10\*\*\* (-5.66) | 0.23\*\*\* (7.47) | 0.18\*\*\*  (5.58) | 0.25\*\*\*  (7.70) | 0.17\*\*\*  (5.41) | 0.22\*\*\*  (7.48) | 0.20\*\*\*  (2.70) |
| Sigma of 20 day  returns | 4.50\*\*\*  (22.69) |  |  |  |  |  |  |
| Beta 20 days |  | -0.24\*\*  (-2.30) |  |  |  |  |  |
| Average 20 day  volume |  |  | 7.69E-7  (1.37) |  |  |  |  |
| Offer price |  |  |  | -5.02E-5\*\*\*  (-3.90) |  |  |  |
| Number of  shares issued |  |  |  |  | 2.56E-11\*\*  (2.06) |  |  |
| Market  Capitalization |  |  |  |  |  | 1.25E-15  (0.42) |  |
| Number of uses  of proceeds |  |  |  |  |  |  | 0.01  (0.24) |
| Firm age |  |  |  |  |  |  |  |
| Adjusted R² | 0.8484 | 0.0479 | 0.0199 | 0.0485 | 0.0442 | 0.0002 | 0.0006 |

## Appendix D. Short term descriptive statistics

1. Full sample (years 1996-2012)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Initial underpricing | 5th day excess return | 10th day excess return | 15th day excess return | 20th day excess return |
| Mean | 0.3061 | 0.4170 | 0.4142 | 0.4341 | 0.4234 |
| Median | 0.1538 | 0.1485 | 0.1534 | 0.1514 | 0.1381 |
| Maximum | 4.7931 | 6.4848 | 7.5403 | 8.0534 | 7.0635 |
| Minimum | -0.8348 | -0.7438 | -0.7573 | -0.8622 | -1.1647 |
| Std. Dev. | 0.5166 | 0.8068 | 0.8491 | 0.9285 | 0.8741 |
| Skewness | 3.8470 | 3.4531 | 3.7434 | 3.7943 | 30924 |
| Kurtosis | 29.2046 | 20.3007 | 25.6765 | 25.4647 | 18.5438 |

2. Subsample 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Initial underpricing | 5th day excess return | 10th day excess return | 15th day excess return | 20th day excess return |
| Mean | 0.4197 | 0.5009 | 0.4926 | 0.5105 | 0.4549 |
| Median | 0.1788 | 0.1729 | 0.1864 | 0.2007 | 0.1579 |
| Maximum | 4.7931 | 6.4848 | 7.5403 | 8.0534 | 7.0635 |
| Minimum | -0.8348 | -0.7438 | -0.7573 | -0.8622 | -1.1647 |
| Std. Dev. | 0.7486 | 1.0502 | 1.1367 | 1.2521 | 1.1247 |
| Skewness | 2.9160 | 3.2589 | 3.5210 | 3.5666 | 3.2139 |
| Kurtosis | 15.7011 | 16.1212 | 19.3666 | 18.9000 | 16.4445 |

3. Subsample 3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Initial underpricing | 5th day excess return | 10th day excess return | 15th day excess return | 20th day excess return |
| Mean | 0.2848 | 0.4682 | 0.4635 | 0.4918 | 0.5038 |
| Median | 0.2053 | 0.2005 | 0.1581 | 0.1984 | 0.1762 |
| Maximum | 0.9938 | 3.0039 | 2.5803 | 2.6463 | 2.5030 |
| Minimum | -0.3239 | -0.3235 | -0.4775 | -0.4388 | -0.5002 |
| Std. Dev. | 0.3167 | 0.7079 | 0.6666 | 0.7091 | 0.7183 |
| Skewness | 0.3951 | 1.8975 | 1.1893 | 1.2440 | 1.1723 |
| Kurtosis | 2.0873 | 6.7409 | 3.7829 | 3.8622 | 3.5549 |

4. Subsample 4

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Initial underpricing | 5th day excess return | 10th day excess return | 15th day excess return | 20th day excess return |
| Mean | 0.2119 | 0.3132 | 0.3164 | 0.3339 | 0.3531 |
| Median | 0.1257 | 0.1147 | 0.1203 | 0.1114 | 0.1184 |
| Maximum | 0.7973 | 3.3414 | 3.4445 | 3.4651 | 3.4334 |
| Minimum | -0.1934 | -0.2876 | -0.3519 | -0.4003 | -0.4366 |
| Std. Dev. | 0.2533 | 0.5514 | 0.5758 | 0.6266 | 0.6584 |
| Skewness | 0.6701 | 2.5758 | 2.4174 | 2.1019 | 1.9339 |
| Kurtosis | 2.4056 | 12.1959 | 11.4463 | 8.9627 | 7.6733 |