Does pre-IPO investor attention affect post-IPO firm value?

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Abstract

This thesis applies and extends Merton´s investor recognition model within the Swedish primary market setting using data from 2000 to 2012. Initially, we show that our measure of pre-IPO investor attention is positively correlated with post-IPO firm value by carrying out a pooled OLS and GLS regression over three calendar year endings following each company's IPO. These findings are in line with Merton's Investor Recognition Model. Yet when carrying out individual regressions of each year, the positive correlation can only be confirmed the first year ending following the IPO. However, due a timing issue of the first year observation and further reliability concerns, we view the findings as an indication that there is a positive correlation between pre-IPO investor attention and post-IPO firm value, yet we do not consider the results evidence enough of a correlation between them two. We encourage further research within this subject matter.

Keywords: Investor attention, Media coverage, IPO, Firm value, Merton's investor recognition model

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1. Introduction

This examination intends to investigate whether there is a positive correlation between pre-IPO investor attention and firm value within the Swedish primary market setting. Our sample consists of 74 companies that completed their IPOs sometimes between 2000 and 2012. Further, by investigating three different points in time subsequent to each company's IPO, we also intend to answer the question when the potential effect of investor attention appears.

Further, the hypothesis presented in this examination is an extension of Merton's investor recognition model. Merton's investor recognition model predicts that stocks that receive more attention from investors should have lower rate of required return and thus higher valuation. Merton states that investors make rational decisions within their choice set, but their choice set only includes companies that they are aware of – companies that caught their attention. Accordingly, once investors become familiar with a company, they will continue to follow it and consider investing in it even when they would not consider investing in other similar companies that they have no familiarity with[1]. In the light of Merton's investor recognition model and additional extending research made on the topic investor attention, our hypothesis is rationalized as follows: a company that receive high investor attention prior to its IPO, should have lower rate of required return following the IPO and thus higher post-IPO valuation.

Moreover, the correlation between pre-IPO investor attention and post-IPO firm value is confirmed in the U.S market by previous research. These findings are considered suggestions that the same relationship may persist in the Swedish market, yet we do not believe the results of U.S research is directly applicable on Swedish companies. The reason for this is that there are substantial differences in the characteristics of the U.S and Swedish primary markets. One example is the quiet restriction period limiting U.S companies to only reveal new information about the company in the prospectus during the pre-IPO period[2]. These differences may be reason for concluding different results in this examination compared to previous research relating to the U.S market. Further, as no other research regarding investor attention within a Swedish primary market setting has been found, the results of our examination could breed valuable implications for both corporations and investors. For instance, corporations could implement the potential finding of a correlation

[1] R. Merton, 'A Simple Model of Capital Market Equilibrium with Incomplete Information', *The Journal of*
[2] M. Levis, S. Vismara, *Handbook of Research on IPOs,* Edward Elgar Publishing Limited, Cheltenham, 2013, P. 68-72.

between pre-IPO investor attention and post-IPO firm value by focusing on expansion of investor base in an early stage of the IPO and hence increase their chances of a successful persistent public performance after the IPO.

The way of testing the hypothesis of this examination is to conduct various multiple regression models where the focus independent variable, investor attention, is estimated as media coverage. This is in line with previous research[3]. The dependent variable firm value is estimated as the price-sales multiple of each company in the sample. Besides the focus independent variable, size, age and the possibility of the company being venture capital backed before the IPO are incorporated as control variables in order to improve the accuracy of our findings. Firstly, a pooled ordinary least square (OLS) regression including all years is presented, complemented by a generalized least square (GLS) regression to adjust for heteroscedasticity. Thereafter, we present individual regressions for each year examined. In the case of data being heteroscedastic in any of these years, a robust regression is carried out.

When turning to the results of the examination, it is quite clear that they point in different directions. The initial pooled OLS and GLS regressions suggest that there is a positive correlation between pre-IPO investor attention and post-IPO firm value. Yet, when conducting the individual regressions we can only confirm a significant positive correlation between pre-IPO investor attention and post-IPO firm value the first calendar year end subsequent to the IPO. However, due a timing issue of the first year observation and further reliability concerns, we view the findings as an indication that there is a positive correlation between pre-IPO investor attention and post-IPO firm value, yet we do not consider the results evidence enough of a correlation between them two. As we cannot fully conclude explanatory power of media coverage, we cannot conclude when the effect occurs. We believe that our results provide good reasons for further research in this area.

1.2 Previous literature

There is extensive previous research completed in the U.S touching on not only the subject investigated in this thesis, but also investor attention in general and its implications on market pricing. Much of this research uses Merton´s investor recognition model as its fundamental base, which is then normally extended or confirmed. In regards to previous research and literature relating to the U.S market, we have chosen to present the material that is essential

3 L. Xiaolei, A. Sherman and A. Zhang 'The Long-Run Role of the Media: Evidence from Initial Public Offerings' Management Science, vol. 60/no. 8, 2014, P.1945-1964.

when concluding the hypothesis of our thesis statement, along with material directly related to the questions investigated specifically. Further, pervious literature and research relating to the Swedish market are very few. Hence, all major research found on the subject relating to the Swedish market is examined further and presented in this section.

1.2.1 Previous literature relating to the U.S market

Merton´s Investor Recognition Model

In *A simple model of capital market equilibrium with complete information,* Merton concludes the investor recognition model that is, like with much other research, the fundamental analysis behind our thesis statement. The model predicts that stocks that receive more attention from investors should have lower rate of required return and thus higher valuation[4]. This reasoning is based on the fact that investors make rational decisions within their choice set, but their choice set only includes companies that they are aware of – companies that have caught their attention. Merton states that once investors become familiar with a company, they will continue to follow it and will consider investing in it even when they would not consider investing in other similar companies that they have no familiarity with.

By analyzing the implications of Merton´s investor recognition model, one could postulate, that current investor attention has effects on the company's future investor attention and hence firm value. When applying this postulation to a primary market setting, the implications would be that a company could, by attracting attention from investors prior to the company´s IPO, increase the post-IPO value of the company. Greater pre-IPO investor attention will then lower the post-IPO required rate of return and thus increase post-IPO firm value.

Further research relating to the U.S market

Before presenting the previous research and evidence supporting our extension of Merton´s investor recognition model, we present other pieces of research that provides essential facts relating to the subject and other significant support for Merton´s model.

Van Nieuwerburgh and Veldkamp verify parts of Merton´s investor recognition model by showing that individuals are more willing to continue to pay attention to stocks with which they are already familiar with. Investors do not choose to learn what others know;

[4] R. Merton, Op. Cit., P. 483-510.

rather they view specializing in what they already know as a more profitable strategy. To conclude these discoveries, the authors ask which assets investors learn about, rather than asking how much investors learn which indeed is the more commonly asked question. A two-country rational expectations general equilibrium model is used where investors first choose what home or foreign information to acquire, and then choose what assets to hold. By including investors endowed with a small home information advantage in the examination, the authors observed who choose what information to learn before they invest[5]. The findings of Van Nieuwerburgh and Veldkamp support Merton´s model in the sense that it provides an explanation for why a company with more investor attention would have a lower post-IPO required return. If investors only consider stocks with which they have a certain level of familiarity and specialization, then having more investors paying attention to the stock effectively shifts out the demand curve. The more attention, the higher demand for investment, which in turn drives down the required rate of return.

Further, Fang, Peress and Tetlock concludes that that stocks with no media coverage earn higher returns than stocks with high media coverage[6]. In addition, Fang and Peress control for well-known risk factors when testing the hypothesis that mass media can increase formal frictions and affect security pricing even if it does not supply soft news. Fang, Peress and Tetlock´s research verify a relationship between media coverage and asset pricing. As media coverage is used as a proxy for investor attention in our examination, Fang, Peress and Tetlock´s findings are considered empirical support for the reasoning presented in Merton´s investor recognition model.

When turning to the research directly related to the question investigated in this thesis, one can conclude that there are few pervious examinations fulfilling the criteria of investigating both investor attention within a primary market setting and its effects during from a longer perspective than the subsequent days following the IPO. Many researchers have investigated either one or the other. The exception are Liu, Sherman and Zang, who shows that a measure of pre-IPO media coverage (measurement of investor attention) is positively correlated to the stock's long-term value, liquidity, analyst coverage, and institutional investor

[5] S. Van Nieuweburgh and L. Veldkamp 'Information Immobility and the Home Bias Puzzle', *The Journal of Finance,* vol.64/no.3, 2009, P.1187-1215
P. Tetlock 'All the News that's Fit to Reprint: Do Investors React to Stale Information?', *Review of Financial Studies,* vol.24/no.5, 2011, P.1481-1512

[6] L. Fang, and J. Peress, 'Media Coverage and the Cross-Section of Stock Returns', *The Journal of Finance,* vol. 64/no.5, 2009, P.2023-2052.

ownership. They also find that pre-IPO media coverage is negatively related to future expected returns, measured by the implied cost of capital[7]. Initially, Liu, Sherman and Zang distinctly conclude that investor attention persist years into the future. This relationship is an underlying assumption of our hypothesis: Pre-IPO investor attention persists years into the future. This assumption justify the part of our hypothesis stating that pre-IPO investor attention will have an impact on firm value a substantial amount of time after the IPO. In conclusion, Liu, Sherman and Zang´s findings imply that the role of media coverage is consistent with Merton's investor recognition model.

1.2.2 Previous literature relating to the Swedish market

Previous research regarding the effects of investor attention within the Swedish primary market has not been found. The only similar research investigates short-term post-IPO performance, which is substantially different from our choice of question. The fact that we are not able to identify any previous research in the Swedish primary market setting with our choice of subject is a primary driver for choice of question. However, there is research regarding investor attention in general. Bodnaruk and Ostberg conclude that investor recognition has predictable value in terms of returns of assets traded in a second market environment. A comprehensive database of Swedish shareholdings was used in the investigation and the results demonstrate that stock returns are positively related to the shadow cost of incomplete information. Bodnaruk and Ostberg essentially conclude that the shareholder base is negatively related to returns[8]. These findings indicate that the positive correlation between investor attention and firm value confirmed in the U.S markets may exist in the Swedish markets too, despite the differences in characteristics of primary market settings.

[7] L. Xiaolei, A. Sherman and A. Zhang, Op. Cit., pp.1945-1964
[8] A. Bodnaruk, and P. Ostberg 'Does Investor Recognition Predict Returns?' *Journal of Financial Economics,* vol. 91/no.2, 2009, P.208-226.

1.3 Definitions

In order to present the theoretical framework of this examination, a number of definitions have to be clarified. Firstly, a distinction between news articles has been made. There are articles presenting *hard information*, which is information previously not known by the public. Then there are articles presenting *soft information*, correspondingly this is information that is already known by the public. Furthermore, we have defined the pre-IPO period as four months before the issue date.

2. The characteristics of the Swedish IPO-market

The fact that there are several a noticeable differences between the Swedish and U.S IPO-markets makes the applicability of previous research relating to the U.S market questionable. The differences are many, for example there is a wide diversity in listing requirements, IPO mechanism choices and attitude towards IPO-cost when comparing the two markets. Also, European firms generally go public when they are much larger and older compared to U.S companies[9]. Because of the identified differences between the two markets, there is reason to believe the outcome of this examination to differ from the outcomes similar examinations investigating the subject matter in the U.S. Hence, it is reasonable to examine the hypothesis within the Swedish market setting rather than making the assumption that the relationships established in the U.S market would be applicable on the Swedish markets as well.

Despite the generous amount of differences identified between the two markets, only one will be brought to further attention in this section. The reason for this is that we believe that this characteristic, in isolation, may have sustainable impact on our result. The U.S IPO market is characterized by a so-called strict quiet period regulation. The quiet period extends from the time a company files a registration statement with the SEC until SEC staff declare the registration statement "effective". During this period, the federal securities laws limit what information a company and related parties can release to the public. Issuers in the U.S face substantial penalties if they reveal hard information in any way other than through the prospectus, where all investors have easy access to the information[10]. The strict quiet period regulations allow one to examine the effects of media coverage within a primary market setting when the coverage does not contain hard news. The benefit of isolation of soft news is that hard news generally attracts more media coverage. If hard news is included in the analysis, a company could in reality affect the amount of hard news revealed and hence its media coverage. As the Swedish markets do not have any equivalence to the U.S quiet period regulations, the risk of the media variable being affected by the companies themselves increases. The fact that companies may affect their media coverage variable contradicts an essential requirement for the variable; that the company should be considered newsworthy by a media source rather than considered newsworthy by the company itself. To minimize the

[9] M. Levis, S. Vismara, Op. Cit., P. 68-72.
[10] U.S Securities and Exchange Commission, 'Fast answers - Quiet period', U.S Securities and Exchange Commission, September 2011, Viewed on 5 march 2015, http://www.sec.gov/answers/quiet.htm

effects of this issue as far as possible, press releases are excluded from the media coverage variable.

3. Hypotheses

In the light of previous research we believe it is reasonable to pose the following hypothesis regarding companies listed on the Swedish markets: Pre-IPO investor attention has a positive correlation with post-IPO firm value. In accordance, we will try to answer the questions: does investor attention have a positive correlation with post-IPO firm value? If this is the case, when does the effect occur? It is important to point out that the hypothesis is not referring to short-term effects on post-IPO performance, such as the effects the subsequent days of the IPO.

4. Data

4.1 Sample Design and Collection

Our core sample consists of Swedish companies listed between the years 2000-2012. Initially, the sample collected from SDC Platinum amounted to 153 companies. The reason for not collecting data closer in time is that the data-types was collected the at the end of the same calendar year the company went public (labeled year one), the end of the second calendar year (labeled year two) of being public and lastly the end of third calendar year of being public (labeled year three). In line, any companies listed after 2012 could not be included in the sample since there was not enough time after the listing in order to complete all observations required for the examination. It is important to notice that the observation labeled year one may not be an entire year from the IPO, rather the remaining time between the IPO date and the last day of the calendar year. Hence, the companies that was listed during the last month of the year was categorized with the companies going public the next year in order to make sure that there was a substantial time between the IPO and the first point in time measured. The objective with this correction is to avoid the noise of short-term effects, such as distortions from sentiment investors. Further, as we also examine when the potential effect of pre-IPO investor attention occurs, data from more than one year was considered appropriate for the study. Yet we want to clarify that the changes over time in terms of media coverage is beyond the scope of this paper, the examination aims to answer the question if there is a effect and when the potential effect occurs, rather than if the effect of media coverage changes over time. In addition, the fact that the databases used did not provide more than 74 companies fulfilling the conditions of our examination requirements makes our results subject to the risk of being non-representable; this issue is discussed in section 6.4.2. This is another reason for collecting data over several years. An examination of panel data makes the analysis more complex, and allows us to test the results in several different time dimensions.

The data-types collected year one, two and three from SDC Platinum were tickers, foundation dates, IPO dates, assets, share prices, and EBIT[11] for each company in the sample. A static datatype for whether the company was venture capital backed before going public was also collected. SDC Platinum did not provide values for all years and companies; nearly all companies had incomplete datatypes. Consequently, DataStream was used to collect complementing data for these companies. If the missing values were not found in DataStream,

[11] The EBIT data is excluded and replaced by Sales (Further explanation in section 4.2.1)

Retriever was used to collect the data manually from annual reports. Further, the companies in the sample are listed on Aktietorget, OMX Stockolm, or First North Stockholm.

SDC Platinum provided a large number of duplicates, which were excluded. Also, in keeping with prior IPO research, closed-end funds, mutual funds, real estate companies, unit offers, demutualization of banks, insurance companies and reverse leverage buyouts were excluded, as the price-sales multiple is especially hard to use for comparison within these industries[12]. Exclusions of incomparable company types and duplicates reduced the sample size from 153 to 102. In addition, 19 companies were excluded due to the fact that the three databases combined did not provide complete values over the timeline. This may be because the company was taken private, was acquired or merged, or went bankrupt less than three years after the IPO. Five companies were explicitly excluded because of these reasons, while the reason for lack of data in the case of the other 14 companies has not been identified. Nevertheless, the majority of these companies were listed very early or late in the time spectrum investigated. This implies that there is less information about early IPOs in the databases and that information regarding IPOs recent years has not been entered into the database yet. Moreover, nine companies had to be excluded due to the fact that their sales multiple was zero one or more years and hence we were not able to calculate the price-sales multiple[13] for one or more observation points. After these exclusions, our sample consists of 74 companies that have been listed more than two years after the company´s IPO. A consequence of the requirement of all companies in the sample being listed for more than two whole years is that the sample is truncated. The implications a truncated sample is discussed further in the section 6.4.1.

When collecting data for the investor attention variable, solely Retriever was used. The data-type collected was in this case the number of articles mentioning the company during the pre-IPO period within specific frames of media sources. We want to highlight that the media coverage variable is static and does not change during the time frame investigated.

[12] G. Pollok, P. Rindova and G. Maggitti 'Market Watch: Information and Availability Cascades among the Media and Investors in the U.S. IPO Market' *Academy of Management Journal*, vol.51/no.2, 2008, P.335-358.
[13] The price-sales multiple is our proxy for firm value.

4.2 Data treatment and Variables

4.2.1 Dependent variable: Firm value

Our dependent variable, firm value, is estimated as price per share over sales per share. The reason for choosing a multiple rather than for example solely market price, is that a multiple allows us to adjust the estimate for the company's operational performance at each specific point in time. This adjustment is in line with Merton's investor recognition model, which states that companies that receive a higher level of attention from investors will have a higher value, for a given level of performance[14]. Nevertheless there are several multiples suitable as a proxy for firm value and our first intention was to use the price-EBIT multiple. However, when calculating the price-EBIT multiple for each company in the sample, approximately half of the companies had negative multiples in one or more years observed. A negative multiple is not explanatory or of usage to this examination and instead of excluding more than half of the remaining sample, the price-sales multiple was used to estimate firm value. This is in line with previous research and business practice when facing the problem of a negative multiple. Additional advantages of using the price-sales multiple are that the multiple is more stable and harder to manipulate than price-EBIT[15]. Yet, a negative aspect of using a price-sales multiple is the fact that it does not take costs into account when incorporating operational effects.

Due to the fact that the sales data for the sample was collected after our access to SDC platinum was expired, it is only collected using DataStream and Retriever. We do not consider this a problem since the sales values essentially comes from the same original source, the annual report of the company. Additionally, the price data is the last closing price of the year, since most companies were not traded at the calendar year-end date. The sales data are the total sales during the same calendar year. The price-sales multiple is measured in absolute values and is not log-transformed before carrying out the regressions.

4.2.2 Focus independent variable: Investor attention

Investor attention is estimated as media coverage, which is in line with previous research[16]. In order to measure the amount of pre-IPO media coverage of each company in the sample, the

[14] L. Xiaolei, A. Sherman and A. Zhang, Op. Cit., P.1945-1964.
[15] B. Petitt, K. Ferris, *Valuation for mergers and Acquisitions 2nd edition*, FT Press, New Jersey, 2013, Ch. 5
[16] L. Xiaolei, A. Sherman and A. Zhang, Op. Cit., P.1945-1964

Retriever database was used to manually count the number of times each company had been mentioned in an article during a specific time frame. When choosing the timeframe, we wanted aim for actual time it takes for a company to prepare for the IPO, essentially the time from the decision to take the company public to the actual event of going public. This timeframe was approximated estimating the average time between the prospectus being turned in to relevant authorities (and application to a certain listing committee) and offering date, this is essentially the average time of the listing process. According to Nasdaq OMX Stockholm, the listing process need not take more than two to four months, provided a company is well prepared[17]. As companies not always are fully prepared, a four-month timeframe was chosen as the "pre-IPO period".

Besides choosing the appropriate timeframe, the suitable types of media sources provided by Retriever had to be defined. Metropolitan press, provincial press, municipal press, journals, scientific press and news agencies were included, while press releases were excluded. The purpose of these exclusions is to minimize the effects of media converge insinuated by the company itself, as one requirement of the variable is that the company were to be considered newsworthy by a reporter/media source and not by the company itself. For the same reason, articles mentioning the company in a long list of other companies day after day with no other information provided were excluded.

Further, there was no attempt to classify the articles as positive or negative. One reason is that would be too time consuming, but the major reason for not classifying articles is that prior research that attempts to do this type of classifications found that the vast majority of the articles where mainly descriptive[18]. The objective of the measurement of pre-IPO media coverage is to identify if a media source felt that the company was newsworthy, not whether the tone of the article was positive or negative. Also worth mentioning is the fact that the pre-IPO media coverage measurement includes articles based on both hard and soft news.

Lastly, the media coverage variable is log-transformed along with the other independent variables, as we have modeled a level-log regression. As some of the companies had media coverage of 0, we added 1 to all original values to make the log-transformation possible.

L. Fang, and J. Peress, Op.Cit., P.2023-2052.

[17] The NASDAQ OMX Group, 'Listing Process', Nasdaq – Listing, January 2015, Viewed on 10 March 2015, http://www.nasdaqomx.com/listing/europe/primarylisting/listingprocess

[18] R. Cook Dennis and S. Weisberg 'Residuals and Influence in Regression', *Biometrical Journal,* vol.91/no.1, 1982, P.80

4.2.3 Control variable: Size

The sizes of the companies are estimated as total assets at calendar year end at each specific point in time and are included in the examination as a control variable. The reason for including this control variable is quite intuitive as a larger company generally receives more attention by media sources, but most importantly because it affects firm value. As the asset data was collected from SDC Platinum, DataStream and Retriever, some of the assets values were in USD and some in SEK. The yearly average USD/SEK exchange rate was retrieved from Oanda in order to convert all the values to SEK[19]. Similarly, the values provided by the databases were in nominal and had to be adjusted for inflation. This adjustment was considered specifically important since data was collected during a timeframe of 12 years, a rather big window considering the size of the sample. The consumer price index from Statistiska Centralbyrån was used for the adjustment of inflation, all values was adjusted to have the purchasing power as year 2000[20]. Lastly, the asset values were log-transformed.

4.2.4 Control variable: Age

The second control variable included in the examination is the company's age at the points in time measured. The supposition of age affecting firm value is based on the reasoning that the older company is, the greater chance of the company being in a higher amount of investor´s choice sets. By the logic presented in Merton's investor recognition model and the assumptions made when presenting the hypothesis of this examination, one can conclude that if a company is within higher amount of investor's choice sets, this implies a higher firm value for the company.

The age of the company is calculated as offering year less foundation year. As a few of the companies were founded the same year as its IPO, we added 1 to the age variable in order to make it possible to log-transform the age variable too. To further clarify, age year one is calculated as (offering year - foundation year + 1), age year two as (offering year - Foundation year + 2), and age year three as (offering year - foundation year + 3).

[19] OANDA Corporation, 'Historical Exchange Rates' Oanda, April 2015, Viewed 20 March, http://www.oanda.com/currency/historical-rates/

20 Statistiska Centralbyrån - Statistic Sweden, 'Konsumentprisindex (1980=100), fastställda tal' April 2015, Viewed on 10 March 2015, http://www.scb.se/sv_/Hitta-statistik/Statistik-efter-amne/Priser-och-konsumtion/Konsumentprisindex/Konsumentprisindex-KPI/33772/33779/Konsumentprisindex-KPI/272151/

4.2.5 Control Variable: Venture capital backed or not before the IPO

The last control variable included in the examination the possibility that the company was venture capital backed before the IPO. The presence of a venture-capital backed control variable is in line with previous research based on IPO-events[21]. The venture-capital backed variable is included in the regression model as a dummy denoted VC, where "1" is the denotation used if the company was venture capital backed before the IPO and "0" if not. Because of the variable being incorporated as a dummy, it is the only independent variable that is not log-transformed.

4.2.6 Descriptive Statistics

Table 1 Descriptive Statistics

Variables	Mean	Median	SD	Min	Max
Firm value	10.72	1.95	31.27	0.11	200.21
Investor attention	66.39	19.00	339.10	1.00	2948.00
Size	2 800	230	14 000	1.563	120 000
Age	16.86	10.00	16.97	2.00	80.00
VC-backed	0.14	0.00	0.34	0.00	1.00

Table 1 presents each variable´s mean, median, standard deviation (SD), minimum and maximum value. The descriptive statistics are based on winsorized values.

The descriptive statistics are based on winsorized values. When winsorizing, two real changes were made for Price-Sales, Size and Age while no real changes were made for the Media coverage variable. The reason for winsorizing all variables is the presence of considerable outliers. For example, the firm value variable has an original maximum price-sales multiple of 347.52 while the median is 1.95. When winsorizing the firm value variable, the maximum value decreases to 200, which makes it somewhat closer to the mean and average. The same concern for outliers occurred for the majority of variables included in the examination, all variables except the VC-backed variable was winsorized at the 1 and 99 percentile[22].

[21] L. Xiaolei, A. Sherman and A. Zhang, Op. Cit., pp.1945-1964
L. Fang, and J. Peress, Op.Cit., P.2023-2052
R. Cook Dennis and S. Weisberg, Op. Cit. P.90
[22] The VC-backed variable could not be winsorized as it is incorporated as a dummy in the regression models.

Table 1 shows the mean, standard deviation, minimum, and maximum values for all variables and observations (n=222). The values presented are not log-transformed in order to give an overview of original values. All asset values are expressed in million SEK. One can conclude that the there is a great difference between the mean, median and maximum value which suggest that there is still noticeable outliers after winsorizing. We also want to point out that the standard deviation of most variables is rather large, which means that there is a large variance between the observations and the statistical average. We conclude that 14% of the companies in the sample was venture capital backed before the IPO, the age ranges between one and 79 years and the size variable ranges from 1.563 MSEK to 120 000 MSEK. Turning to the focus dependent variable, media coverage ranges from 0 articles to almost 3000. As the mean is noticeable higher than the average, we can conclude that a few companies subject to intense media surveillance drives up the average. The most extreme example is Telia AB, which represents the maximum value of the media coverage variable.

5. Methodology

In this section we initially clarify the timeline and variables used in the examination and then lay out the statistical and econometric models applied in our empirical analysis. In describing the statistical models used, we begin by presenting analyses using Ordinary Least Square (OLS) regression. Then a number of the underlying assumptions made in order to conduct the OLS regression are tested and analyzed. As data used for several regression models were concluded heteroscedastic, we lastly present the complementing models used when the homoscedasticity assumption is violated. Further, the reason for not incorporating fixed effects in the empirical analysis is the fact that the media coverage variable is static and hence the correlation of media coverage in such analysis is omitted.

5.1 Clarification of timeline and variables

Table 2 describes each variable´s way of measurement, estimation, definition and denotation. The definition is the specific way of handling each variable before the empirical analysis, while the denotation is the label of each variable used in the empirical analysis.

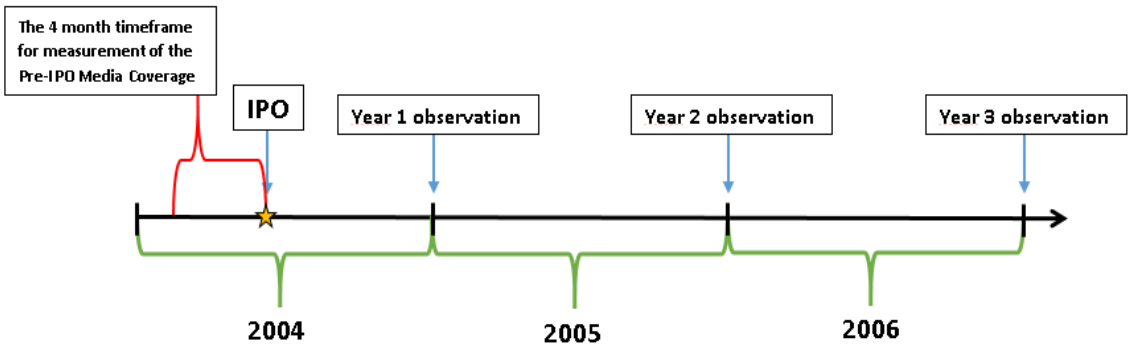
Table 2 Description of variables

Variables	Estimation	Definition	Denotation
Firm value	Price/Sales	Price per share/Sales per share	PS
Investor attention	Media Coverage	Log(number of articles+1)	Media
Size	Total Assets	Log(total assets)	Size
Age	Company age	Log(year founded-(year of IPO+t))	Age
VC-backed	Dummy variable	1 if VC backed, 0 if not	VC

Table 2 describes each variable´s way of measurement, estimation, definition and denotation. The definition is the specific way of handling each variable before the empirical analysis, while the denotation is the label of each variable used in the empirical analysis.

Further, presented below is a clarification of the timeline of observations. The red bracket illustrates pre-IPO period and the star illustrates the IPO date. As one may notice, this is an example of one firm initiating its IPO in June 2004. At calendar year-end 2004 (t=1), the first observation of the company's firm value, size and age are collected.

Consistently, at the second and third observation is collected at calendar year-end 2005 (t=2) and year-end 2006 (t=3).



5.2 The Ordinary Least Square regression

To make an accurate diagnosis of which variables that have explanatory power of firm value we analyze the price-sales multiple, media coverage, size, age and whether the company was venture capital backed before the IPO using a standard OLS regression model. Since the aim of the examination is to conclude if media coverage have a significant positive correlation with the price-sales multiple and the relative strength of media coverage´s effect on the price-sales multiple, a regression analysis is considered the appropriate model for the examination. More specifically, a multiple regression is used as the analysis includes several control variables. As we also want to conclude when the potential effect of media coverage arises individual regressions will be carried out each year distinctly.

More specifically, we are conducting level-log regression where the independent variables are log-transformed and the dependent variable is not[23]. A level-log regression may be applied when suspecting that the independent variables have diminishing effect on the dependent variable. For example, if a company has a high amount of media coverage, the effect of one additional article will only have a marginal effect on firm value if any effect at all. By log-transforming the independent variables, the relationship between the variables will be more linear and the chance of multivariate normality increases[24]. Both of these effects are desirable when conducting an OLS regression. Another reason for log-transforming media coverage is that it allows us to create a scale of media coverage rather than the count of

[23] The VC-backed variable is not log-transformed as it is a dummy variable
[24] P. Edlund, Associate Professor Stockholm School of Economics, Tutoring meeting, 31 March 2015

number of articles which is considered more intuitive as the estimate represents investor attention.

When turning to the underlying techniques of standard OLS regression, it is a statistical technique that attempts to find the linear function, which most closely approximates the observed data, sometimes referred to as the "best fit". In general, the least squares method is used to fit a straight line through a set of data-points, so that the sum of the residuals from the actual data-points is minimized. Below, the multiple regression model equation of the examination is presented:

$$\mathrm{PS_i} = \beta_0 + \beta_1 \log(\mathrm{Media}_i) + \beta_2 \log(\mathrm{Size}_i) + \beta_3 \log(\mathrm{Age}_i) + \beta_4 \mathrm{VC_i} + \varepsilon_i$$

5.2.1 Pooled OLS regression

As an initial assessment to conclude if media coverage has explanatory power in terms of the price-sales multiple, a pooled multiple regression was carried out controlling for size, age and whether the company has been venture capital backed before the IPO. A pooled regression is among the simplest method to handle panel data as it estimates a single equation on all the data together. The data of each variable was stacked up into a single column containing all the cross-sectional and time-series observations and OLS regression was conducted. Accordingly, all observations are treated equally, the time dimensions are disregarded and the error term captures everything[25]. However, the downside of using a pooled regression is that the usual formula for OLS standard errors in a pooled regression typically overstates the precision gains, leading to underestimated standard errors and t-statistics that can be inflated[26].

5.2.2 Individual multiple regression for each year

In the second part of this examination we use multiple regressions to evaluate each year individually, essentially conducting regressions using the data for year one, two and three separately. The individual regressions are the main analysis of the examination as it generates results indicating both if investor attention has a positive correlation with firm value, but also

[25] C. Brooks, *Econometrics for Finance Second Edition*, Cambridge University Press, New York, 2008.
[26] A. Colin Cameron, K. Trivedi, *K Microeconometrics Methods and Applications*, Cambridge University Press, New York, 2005
C. Brooks, Op. Cit., P. 78-105

in the case of a correlation being confirmed, when it arises. The regression will give rise to results indicating if investor attention has an impact on firm value year one, two and/or three after the IPO controlling for firm size, age and if the company have been venture capital backed before the IPO.

5.2.3 Underlying assumptions of the standard OLS regression

There are several assumptions that have to hold in order to properly apply a standard OLS regression to a dataset. Firstly, the relationship between the independent and dependent variables is assumed to be linear in nature. Further, normality of errors is assumed to persist. This assumption states that all error terms are assumed to be normally distributed. No or little multicollinearity is the third assumption made in order to conduct a standard OLS regression. Multicollinearity is a scenario where two or more predictor variables in a multiple regression model are highly correlated. Lastly, the homoscedasticity assumption states that the variance of the error terms along the regression line is constant. If this is not the case, the data is considered heteroscedastic. Moreover, when conducting the pooled regression an additional assumption has to hold, the assumption of no auto-correlation as the analysis implicitly includes a time dimension. Autocorrelation occurs when the residuals are not independent from each other, in other words when the value of independent variable one year is not independent from the value of pervious year[27].

When carrying out the pooled OLS regression, the assumptions of normality of errors, no or little multicollinearity, homoscedasticity and no autocorrelation were tested in order to improve the validity of our results. The most notable finding when conducting the tests for underlying assumptions of the OLS regression is that we fail to reject the null hypothesis that the data is heteroscedastic (Table A.2). The presence of heteroscedasticity can invalidate the statistical tests of significance since the model is based on the assumption that the variance of modeling errors is constant. As this is considered problematic for the examination, a GLS regression analysis is conducted in order to present results that are adjusted for the heteroscedasticity. The results of the tests for remaining assumptions relating to both the pooled sample and the samples of each year are presented in Table A.3 - A.6.
Further, when conducting the individual regressions each year, the assumptions of normality of errors, no or little multicollinearity and homoscedasticity tested in order to confirm that the

[27] P. Newbold, W. Carlson and B. Thorne, Op. Cit., P.582-591

standard OLS regression is a suitable model for data and to increase the validity of the results. The results of these tests can be found in Table A.4 – A.6 and we conclude that the data samples year two and three are heteroscedastic. To address this issue, a robust regression is conducted year two and three.

Lastly, we want to point out that the hypothesis of the error terms being normally distributed was rejected. In accordance, this assumption is violated. The implications of not having normally distributed errors are discussed further in the appendix (Table A.4).

5.3 Models adjusting for heteroscedasticity

5.3.1 Generalized Least Squared regression

The multiple GLS regression allows for our data to be heteroscedastic, in other words it allows for the variance of the error terms to be non-constant[28]. The application of GLS estimation when analyzing a time-series dimension is widely used, as it is generally implausible to assume that errors are independent. In a GLS regression, a technique that minimizes a weighted sum of squared residuals is applied. Observations expected to have error terms with large variances are given a smaller weight than observations expected to have error with small variances. The logic of this technique is that observations with the smallest error variances will provide the most accurate information of the true regression line[29]. The main benefit of conducting an additional a multiple GLS regression complementing the pooled OLS regression is that if explanatory power is confirmed in both of these analyses, the robustness of our results will increase considerably.

5.3.2 Robust regression

As with the GLS regression, a robust regression model allows for our data to be heteroscedastic. The techniques are similar, as the robust regression firstly assigns each point is equal weight and model coefficients are estimated using ordinary least squares. Then, weights are recomputed so that points farther from model predictions in the previous

[28] P. Newbold, W. Carlson and B. Thorne, Op. Cit., P.419-420
[29] J. Nelder and R. Wedderburn 'General Linear Models', *Journal of the Royal Statistical Society*, vol.135/no.3, 1972, P.370-384

modeling are given lower weight. The assumption of homoscedasticity is hence relaxed[30]. As mentioned earlier, the robust regression is carried out year two and three in order to present results adjusted for heteroscedasticity.

[30] P. Newbold, W. Carlson and B. Thorne, Op. Cit., P.577-581

6. Results

In this section we initially present the results of the pooled OLS regression followed by the results of the GLS regression adjusting for heteroscedasticity. Both models of regression present results suggesting a positive correlation between pre-IPO investor attention and post-IPO firm value. These findings are in accordance with our hypothesis. Furthermore, we present the results of the individual regressions each year. As the samples of year two and three are subject for heteroscedasticity, robust regression results are presented for each year respectively. The results of both year two and three does not support our hypothesis, while the first year regression confirms that pre-IPO investor attention has explanatory power in terms of post-IPO firm value. Lastly, we lay out potential alternative explanations for our results along with possible biases affecting the results.

6.1 Pooled multiple regression

Table 3 presents the results of the pooled regression. The first row in the first column presents the coefficient of media coverage controlling for size, age and the venture capital backed variables. We can conclude that the results indicate that media coverage has significant positive correlation with the price-sales multiple, which is consistent with Merton´s investor recognition model and in line with our hypothesis.

The t-statistic and P>|t|-value of 2.99 and 0.0015[31] respectively, confirm statistical significance of the correlation between media coverage and price-sales multiple within a 99% confidence interval. As previous research provides evidence of a positive correlation and our hypothesis clearly states a direction of the coefficient, a one-tailed test is applicable for all regression models in the examination[32]. In accordance, the media coverage coefficient is significant on a 0.15% level. Moreover, the results suggest a negative correlation between the price-sales multiple and size. A similar negative relationship consists between price-sales and age. The negative relationships of size and age are quite intuitive as a more mature company in general has a lower valuation multiple. The price-sales multiple in specific is most likely negatively affected by increasing size and/or age due to the fact that it implies less growth opportunities and generally a stable and quite high sales value compared

[31] P>|t|-value of one-tailed test
[32] P. Edlund, Associate Professor Stockholm School of Economics, Tutoring meeting, 31 March 2015
P. Newbold, W. Carlson and B. Thorne, Op. Cit., P.554-565

to younger and/or smaller companies. Further, no explanatory power of the venture capital backed variable can be established.

The model predicts a coefficient of determination, R^2, of 10.58%, which essentially declares that 10.58% of the variation in the price-sales multiple is explained by our model. As the R^2 describes the strength of the linear relationship between the independent variables and the dependent variable, 10.58% might appear low[33]. However, the amount of variables affecting the price-sales multiple is a substantially higher than the amount of control variables included in this examination.[34]

When turning to the interpretations of the coefficient of media coverage, the analysis becomes slightly more complex as the variable is log-transformed. The log-transformation provides a scale of media coverage ranging from 0 to 3.47. The model predicts that an increase of one on this scale would increase the price-sales multiple 13.07 units. Nevertheless, this interpretation may be difficult to comprehend. Another way of interpreting the magnitude of the coefficient 13.07 is that for each percentage increase in media coverage, we expect the price-sales multiple to increase by 0.1307. By the same logic, one percentage increase in size would imply a decrease in the price multiple by 0.0715 and so on. Below, the predicted regression line is presented:

$$\mathrm{PS_i} = 49.65 + 13.07 * \log(\mathrm{Media_i}) - 7.15 * \log(\mathrm{Size_i}) - 17.33 * \log(\mathrm{Age_i}) + 8.62 * \mathrm{VC_i} + \varepsilon_i$$

In conclusion, the results of the pooled regression suggest that investor attention is significantly positively correlated with post-IPO firm value. The findings are in line with Merton´s investor recognition model and support our hypothesis. Yet there is an overall risk of biased results due to the fact that the data was concluded heteroscedastic. To further investigate the validity of the results presented in the pooled regression, the result of the GLS regression is presented in the next section.

6.2 GLS Regression

Table 3 presents the result of the GLS regression. The t-statistic and P>|t| value confirm a significant positive correlation between media coverage and the price-sales multiple adjusting

[33] P. Newbold, W. Carlson
B. Thorne, Op. Cit., P.419-422
[34] Ibid., P.492

for heteroscedasticity. By the same logic presented in the previous section, a one-tailed test is justifiable and we can hence conclude that the media coverage coefficient is significant on a 2.3% level.

The magnitude of the coefficient is somewhat lower, yet the implications of the coefficient are similar. For each percentage increase in media coverage, we expect the price-sales multiple to increase by 0.1162. The directions of the coefficients of control variables are the same as in the pooled regression results and the r^2 is on approximately the same level. The venture capital backed variable is still not statistically significant. The predicted regression line after adjusting for heteroscedasticity is presented below:

$$PS_i = 43.57 + 11.62 * \log(Media_i) - 5.97 * \log(Size_i) - 15.55 * \log(Age_i) + 9.01 * VC_i + \varepsilon_i$$

In summary, we can confirm the conclusions established in the pooled regression by presenting a significant positive correlation between pre-IPO media coverage and post-IPO firm value using the GLS regression framework. The coefficient of media coverage is slightly lower than the coefficient estimated in the pooled regression, however ignoring the magnitude difference; the implications of the results are the same as in the pooled regression for all variables. The evidence collected from the GLS regression support our hypothesis and is in line with Merton´s investor recognition model.

Table 3 Results of Pooled OLS and GLS regression

Variables	Pooled OLS regression	GLS Regression
Media	13.07*** (4.37)	11.62** (5.84)
Size	-7.14*** (2.55)	-5.97** (2.95)
Age	-17.33*** (5.54)	-15.55** (7.76)
VC	8.62 (6.05)	9.01 (8.71)
N	222	222
R^2	0.1058	0.1053

*** p<0.01, ** p<0.05, *p<0.1

Table 3 provides an overview of pooled OLS regression and GLS regression with random effects carried out in the examination. For each variable, the coefficient is presented along with the standard errors are in parentheses. We also provide number of observations (N) and coefficient of determination (R^2) for each regression.

6.3 Individual regressions each year

6.3.1 OLS regression year one

Having established a significant correlation between the media coverage variable and price-sales variable through the pooled regression and GLS regression model, we turn to analyzing the potential correlation between media coverage and post-IPO firm value individually each year. Starting with the year one, the results of the standard OLS regression are presented in Table 4.

When examining the results of the standard OLS regression year one, we can once again conclude that there is a significant correlation between pre-IPO media coverage and the price-sales multiple. The significance is confirmed by the t-statistic and P>|t| value and the one-tailed test result of the media coverage variable is significant on a 1.35% level. A significant negative relationship between age and the price-sales multiple is concluded by the results, but the coefficient is notably higher than in the pooled and GLS regressions.

Nonetheless, the negative relationship between size and the price-sales multiple is not statistically significant. Further, the venture capital backed variable is not significant.

The coefficient of determination rises with the individual regression and the model explains 15.28% of the variance in the price-sale multiple. In addition, the coefficient of media coverage rises, proposing that impact of media coverage is higher than concluded by the previous models. A one-percentage change in media coverage would in this case predict a 0.1674 increase in the price-sales multiple. The predicted regression line year one is presented below:

$$PS_i = 45.64 + 16.74 * \log(Media_i) - 5.89 * \log(Size_i) - 22.76 * \log(Age_i) + 11.11 * VC_i + \varepsilon_i$$

We also want to point out a noticeable increase in standard deviation of the media coverage variable compared to results gained in the pooled OLS and GLS regressions stating that the variance of observations year one is higher. However, this may be a consequence of conducting a regression on a smaller sample than in the pooled and OLS regressions[35].

The results confirm a significant positive correlation between pre-IPO investor attention and post-IPO firm value at the end of same calendar year the IPO occurs. The findings support our hypothesis, and are in line with Merton´s investor recognition model.

6.3.2 Robust regression year two

Table 4 also presents the results of a robust regression year two. The t-statistic and P>|t| value of the one-tailed test implies a significance level of 12.35%, which clearly is below level of statistical significance. Accordingly, we cannot confirm a significant correlation between media coverage and the price-sales multiple year two. These results contradict our hypothesis and are not in line with Merton´s investor recognition model.

6.3.3 Robust regression year three

Turning to year three, the results of the robust regression are presented in Table 4. While a standard OLS regression confirmed a significant correlation between media coverage and the

[35] P. Newbold, W. Carlson
B. Thorne, Op. Cit., P.435-455

price-sales multiple (Table A.7), the robust alternative adjusting for heteroscedasticity does not provide statistically significant results within a 95% confidence interval. As in the case of year two, we cannot conclude that media coverage has explanatory power in terms of the price-sales multiple year three.

The results from the one-tailed test suggests that the media coverage coefficient is significance on a 5,8% level. Yet the magnitude of the media coverage coefficient indicates that the correlation would be higher year three than any other of the years examined. Worth noticing is also the fact that the only variable with significant explanatory power year three is age.

In conclusion, the coefficient of media coverage is insignificant and hence a positive correlation between pre-IPO investor attention and post-API firm value cannot be confirmed year three. However, we want to point out that the coefficient of media coverage is significant within a 90% confidence interval without drawing any further conclusions of the statement itself. The results year three does not support our hypothesis and is not in line with Merton's investor recognition model.

Table 4 Results of regressions each year

Variables	OLS regression Year 1	Robust regression Year 2	Robust regression Year 3
Media	16.74**	7.27	19.05*
	(7.40)	(6.23)	(11.96)
Size	-5.87	-7.93	-11.28
	(4.40)	(6.16)	(9.21)
Age	-22.76***	-8.53*	-20.16***
	(8.03)	(4.73)	(8.56)
VC	-11.11	31.96	5.57
	(10.01)	(22.83)	(15.34)
N	74	74	74
R^2	0.1528	0.1828	0.1341

*** p<0.01, ** p<0.05, *p<0.1

Table 4 provides an overview of the regressions carried out each individual year. For each variable, the coefficient is presented along with the standard errors in the parentheses. We also provide number of observations (N) and coefficient of determination (R^2) for each regression.

6.4 Alternative explanations and potential biases affecting results

6.4.1 Implications of a truncated sample

One issue that may affect the validity of our results is the fact that our sample is truncated. Having a truncated sample essentially means that exclusions of observations based on characteristics of the dependent variable have been made[36]. In our case, these exclusions were based of the criteria that the companies had to be listed for more than two years and the sales values to be higher than zero. All observations not fulfilling these criteria or lacking complete observations were omitted. Further explanations of exclusions are described in section 4.1. The presence of truncated data opens up for the possibility of biased results. Yet, when briefly analyzing the excluded observations in isolation they are in line with a potential positive correlation between investor attention and firm value. For example, nine companies were excluded due to the fact that they had a sales value one or more years equaling zero. A sales value of zero generally indicates a rather bad performance. Seven out of the companies with a sales value of zero had a media coverage variable below the median. These findings are in line with our hypothesis, as the majority of bad performing companies excluded had low media coverage prior to their IPO.

6.4.2 Implications of a small sample size

As our sample of 74 completed IPOs is rather small comparing to the samples of previous research relating to the U.S market, there is a risk that the results may be significant even though the correlation does not exist, or vice versa. A larger sample increases the chance of getting significant results as it more reliably reflects the population mean[37]. One has to keep in mind that there is a risk that the results generated in this examination are not representable for the entire population. However, we have included the all completed IPOs made on Swedish markets 2000-2012 that were provided by the databases used, except some exclusions clarified in 3.1. In order to collect a larger sample, one would have to expand the geographically or collect data from an even greater time frame.

[36] P. Edlund, Associate Professor Stockholm School of Economics, Tutoring meeting, 31 March 2015.
[37] C. Nelson, K. Myyung 'Predictable Stock Returns: The Role of Small Sample Bias' *The Journal of Finance,* vol.48/no.2, 1993, P.641-661

6.4.3 Macroeconomic fluctuations

There have been both upturns and downturns in the business cycle between 2000 and 2012. The dotcom bubble and financial crisis 2008 are two distinct examples of downturns. One could postulate that companies being listed during these years have a disadvantage in terms of post-IPO performance and will consequently have a lower firm value subsequent to their listing compared to companies being listed in economic upturns. This would in fact affect the validity of our results. However, one must keep in mind that the amount of IPOs follows economical cyclical patterns rather strictly. The amounts of listings following a recession are substantially less than in an economic upturn[38]. This pattern is clear when examining our sample. Our databases did not provide any listings 2003 and 2009, and only one listing was reported 2004. Correspondingly, the issue of macroeconomic fluctuations distorting the results of the examination is to some extent naturally adjusted for. In addition, the fact that we take the operational performance of each company into account by estimating firm value as a multiple also contributes as an adjustment for this problem.

6.4.4 Adjustments for industry averages

One must acknowledge the fact that the companies in the sample are from different industries. As different industries have different average valuation multiples, an industry adjusted price-sales multiple would increase the comparability between companies in the sample and essentially increase the accuracy of our findings. One way of handling this issue is the exclusion of closed-end funds, mutual funds, real estate companies, unit offers, demutualization of banks and insurance companies and reverse leverage buyouts as the problem of comparability becomes especially evident in these industries. Despite these adjustments, we still consider the lack of industry adjusted multiples as a drawback of the examination. Further, different industries are subject to different levels of media surveillance and this may have influenced the media coverage variable. In the case of a company getting more media coverage solely because of belonging to a certain industry, a similar adjustment for industry media surveillance would be desirable.

[38] T. Brailsford, R. Heaney and J.Shi 'Modelling the behaviour of the new issue market' *International Review of Financial Analysis*, vol.13/no.2, 2004, P. 119-132

6.4.5 General measurement concerns

Turning to general measurement concerns of the examination, one potential issue is that the time between the first observation and each company´s IPO varies. Some companies have been listed for nearly a full year before the first observation, while other only a few months depending on when the company was listed during the year. The effects of media coverage may then vary depending on the amount of time before the first observation. One approach to this problem is to categorize all IPOs during the last month of a certain year with the IPOs of the next year. By doing this, we make sure that there was at least a month between each company's IPO and the first observation. Yet we want to point out that this timing problem may affect the validity of our results.

Another measurement issue is the distortion in the media coverage variable by special news events. Special news are big happenings that attracts attention from regular news such events as wars, natural disasters, elections. If a company´s pre-IPO period collides with a special news event, the media coverage will most likely decrease due to the special news event as there are less media sources focusing on covering regular news. Also, when there are big events in the corporate finance industry like an attention grabbing international IPO or acquisition, the media coverage of a Swedish smaller IPO may be sidelined. The issue of special news events could potentially contribute to some misleading values of the media coverage variable.

Lastly, we want to point to the issue of not being able to isolate soft news when measuring the media coverage variable. As the Swedish markets do not have any equivalence to the U.S strict period regulations, the risk of the media variable being affected by the companies themselves increases.

7. Conclusion

It is quite clear that the evidence presented in this examination points in different directions. The initial pooled OLS and GLS regressions suggest that there is a positive correlation between pre-IPO investor attention and post-IPO firm value, which support our hypothesis. Yet one cannot ignore the risk for misleading and biased results not only due to the nature of these regression models, but also because of the reason mentioned in 6.4. In addition, when considering the individual regressions each year, our results suggest that there is a positive correlation between investor attention and post-IPO firm value the first calendar year ending subsequent to the IPO. Nevertheless, no correlation can be confirmed the second or third calendar year ending subsequent to the IPO.

The postulation that the effect of media coverage would appear year one and then disappear is not in line with Merton's investor recognition model or other previous research for that matter. A more likely explanation would be that the regressions year two and three are affected by factors not taken into account in this examination such as biases, omitted variables or violations of underlying assumptions of the models. Another explanation would be that pre-IPO investor attention does not have explanatory power in terms of post-IPO firm value.

When turning to the second question investigated in this examination, the implications of our results are vague. Assuming that there is a correlation between pre-IPO attention and post-IPO firm value, one could claim that the effect of media coverage occurs at the first calendar year ending subsequent to the IPO. However, we do not consider our results evidence enough to make such statement, as we would have to assume that the effect of media coverage disappears by the next calendar year ending.

In conclusion, the results of the examination confirms a relationship between pre-IPO investor attention and post-IPO firm value at the first calendar year end subsequent to the IPO. However, due to the timing problem of the first year observations and further concerns mentioned in 6.4.5, we view the findings as an indication that there is a positive correlation between pre-IPO investor attention and post-IPO firm value, yet we do not consider the results evidence of a correlation between them two. As we cannot fully conclude explanatory power of media coverage, we cannot conclude when the effect occurs.

We consider the results of this examination good reason for future research in the subject matter. Suggestions for future research are to increase the sample size either geographically, by using another database or to choose a larger timeframe. We also consider

the adjustment for industry average multiples essential. Furthermore, when measuring media coverage one should consider the effects of industry media surveillance and special news events. Lastly, we would suggest an alternative way of handling the timing of observations in order to avoid the variation in time between the IPO-date and the first observation.

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9. Appendix

Table A.1 Summary of regressions

Variables	Pooled regression	GLS Regression	Year one	Year two	Year three
Media	13.07*** (4.37)	11.62** (5.84)	16.74** (7.40)	7.27 (6.23)	19.05* (11.96)
Size	-7.14*** (2.55)	-5.97** (2.95)	-5.87 (4.40)	-7.93 (6.16)	-11.28 (9.21)
Age	-17.33*** (5.54)	-15.55** (7.76)	-22.76*** (8.03)	-8.53* (4.73)	-20.16*** (8.56)
VC	8.62 (6.05)	9.01 (8.71)	-11.11 (10.01)	31.96 (22.83)	5.57 (15.34)
N	222	222	74	74	74
R^2	0.1058	0.1053	0.1528	0.1828	0.1341

*** p<0.01, ** p<0.05, *p<0.1

This table provides an overview of all regressions carried out in the examination. The same results are presented in the result sections 6.2 and 6.3.3. For each variable, the coefficient is presented along with the standard errors in parentheses.

Table A.2 Likelihood-ratio test for panel-level heteroscedasticity

Variables	P < |z|
Media	0.474
Size	0.000
Age	0.000
VC	0.000
N	222

Poi and Wiggins provides a likelihood-ratio test for panel-level heteroscedasticity[39]. A P<|z| value below 0.05 allows one to reject the null hypothesis that the data is heteroscedastic. As the P<|z| of Media is far above 0.05 we fail to reject the null hypothesis and conclude that the sample is heteroscedastic. Therefore, we also conclude that the assumption of the data being homoscedastic does not hold for the sample used in the pooled regression.

Table A.3 Wooldridge test for autocorrelation of panel data

	Pooled sample
F (1, 73)	0.032
Prob > F	0.8575

Wooldridge provides a test for autocorrelation in panel data. Further, the Wooldridge test generates reliable size and power properties in reasonably sized samples[40]. The null hypothesis states that there is no first-order autocorrelation between the variables. As the test provides a prob>F of 0.8575, we fail to reject the null hypothesis of no auto correlation and conclude that the data does not have a first-order autocorrelation. Hence the assumption of no or little autocorrelation holds.

[39] StataCorp LP, 'How do I test for panel-level heteroskedasticity and autocorrelation?' June 2013, Viewed on 20 March 2015, http://www.stata.com/support/faqs/statistics/panel-level-heteroskedasticity-and-autocorrelation/

[40] StataCorp LP, 'How do I test for panel-level heteroskedasticity and autocorrelation?' June 2013, Viewed on 20 March 2015, http://www.stata.com/support/faqs/statistics/panel-level-heteroskedasticity-and-autocorrelation/
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Table A.4 Skewness/Kurtosis test for Normality of regression residuals

	Pooled sample	Year 1	Year 2	Year 3
Prob>chi2 (Residuals)	0.0000	0.0000	0.0000	0.0000
N	222	74	74	74

The Skewness/Kurtosis tests provide a Prob>chi2 value of the residuals that are clearly below 0.05 in all tests, therefore one can reject the null hypothesis of normality of errors for the pooled sample and the samples used in the individual regressions year one, two and three. This means that the assumption of normality or errors is violated in all the regressions made in the examination. The consequence of violating the normality of errors assumption is that the observations may be hard to fit in a linear model[41].

Table A.5 Variance inflation factors model

Variables	Pooled sample	Year 1	Year 2	Year 3
Media	1.79	2.10	1.64	1.79
Size	1.73	2.01	1.63	1.76
Age	1.03	1.02	1.03	1.05
VC	1.07	1.19	1.06	1.06
Mean VIF	1.40	1.58	1.34	1.42

In order to quantify the severity of multicollinearity in our regression analysis a variance inflation factors (VIF) model is used. The VIF-model measures how much the variance of the estimated regression coefficients are inflated compared to when the independent variables are not linearly related. If the VIF value is 1, no correlation exists between the independent variables. Correspondingly, if the VIF value is over 10 the variables are considered highly correlated[42]. The results of the VIF-test suggest that all samples tested have little multicollinearity. Hence, we conclude that the assumption of no or little multicollinearity holds for all regression models in the examination.

[41] P. Edlund, Associate Professor Stockholm School of Economics, Tutoring meeting, 31 March 2015

[42] StataCorp LP, 'St: Regression diagnostics after -xtreg-?' Nov 2012, Viewed on 20 March 2015, http://www.stata.com/statalist/archive/2012-11/msg00238.html

Table A.6 White's test for heteroscedasticity

	Year one	Year two	Year three
Prob>chi2	0.0644	0.0000	0.0275

White's test for heteroscedaticity is used to determine whether the assumption of homoscedasticity holds for the data used in the individual year regressions. The null hypothesis states that the data is homoscedastic. The prob>chi2 value implies that the null hypothesis can be rejected year two and three and we conclude the samples of year two and three are heteroscedastic. Turning to year one, we fail to reject the null hypothesis and the assumption of homoscedasticity holds.

Table A.7 OLS regressions year two and three

Variables	**Year two**	**Year three**
Media	7.27 (6.86)	19.05** (8.48)
Size	-7.93** (3.96)	-11.28** (5.04)
Age	-8.53 (9.18)	-20.16* (11.96)
VC	31.96*** (9.91)	5.57 (11.70)
N	74	74
R^2	0.1828	0.1341

*** p<0.01, ** p<0.05, *p<0.1

The table provides an overview of standard OLS regressions carried out year two and three. For each variable, the coefficient is presented along with the standard errors in the parentheses. We also provide the number of observations (N) and the coefficient of determination (R^2) for each regression The results year two do not suggest that there is significant correlation between pre-IPO media coverage and the price-sales multiple. Nevertheless, the results year three suggests that there is a positive correlation between media coverage and the price-sales multiple. The one tailed test would then suggest significance on a 1.4% level. However, as the data year two and three are subject to heteroscedasticity no further conclusions are made from these results as more reliable results are presented when carrying out a robust regressions year two and three.