STOCKHOLM SCHOOL OF ECONOMICS
Department of finance
Bachelor thesis in finance
Spring 2017

Pre-issue attention and the performance of an IPO

Dag Tuvberger (23395)[1] & Klas Vestergren (23367)[2]

May 2017

ABSTRACT: This study looks at IPOs on Swedish stock exchanges between the years 2000 and 2017. It aims to investigate if a relationship exists between investor attention for a company before its IPO and the subsequent returns of its stock in the early trading after the IPO. The study builds on research by Barber and Odean (2008) which showed that investors use attention-grabbing factors such as news coverage to satisfy a need of information to select investments. Consequently, data on news coverage is used as a proxy for investor attention in our model. We find that a significant relationship exists between the number of times a company is mentioned in the media six months prior to its IPO, and the returns for its stock the first day of trading after its IPO. Our results contribute to earlier research conducted on the North American markets and show that the relationship holds on the Swedish market and even though a ten-fold increase in publicity has been seen since.

Keywords: behavioral finance, IPO, noise traders, investor attention, publicity

Tutor: Cristian Huse, Assistant Professor

ACKNOWLEDGEMENTS: We would like to extend our sincerest gratitude to our tutor Cristian Huse for valuable support and advise during the process of writing this thesis and to the Swedish House of Finance for allowing us access to data that made our research possible.

[1] 23395@student.hhs.se
[2] 23367@student.hhs.se

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1. INTRODUCTION

Just as a company turn to an investment bank when going public, more and more also hire a public relations firm to handle the publicity issues. The amount and quality of publicity a company receives before its initial public offering seems to be something companies are increasingly concerned about.

From a traditional finance scholar stand-point, the concern for amount and quality of publicity before an initial public offering (IPO) seems irrelevant. The efficient market hypothesis (EMH) states that, in a liquid market, assets prices fully reflect all available information and as a consequence all assets should be at fair value. Repetition of information, or how it is presented, should not matter.

However, finance scholars have been struggling to explain certain phenomena in an EMH perspective. If, for instance, an investor would be best off holding the market portfolio - why does she choose a less beneficial investment? If it was random, such irrational behavior would not be a problem in an EMH perspective. When it is systematic and spread however, asset pricing will be affected. To explain such systematic phenomena, which affect the market, behavioral finance has arisen as a prominent research field.

What is central in behavioral finance is to explain why investors are making irrational, systematic decisions and driving them away from fundamentals. Behavioral finance also describes how you make take advantage of such errors.

Some enticing situations described empirically where the irrational behaviors of investors become apparent are that stock returns tend to be higher when the weather is sunny in the location of the stock exchange, the fact that riskier investments are preferred in the spring rather than in the autumn, and that the demand for stocks which draw attention, such as having been featured in the news recently, is greater.

An anecdote from the Swedish stock market about irrational investor behavior and news coverage, is the IPOs of the so called *welfare companies*, namely Academedia and Internationella Engelska Skolan. As a heated debate existed regarding the companies' business models and their morality and legality, both companies were widely featured in the news prior to going public. Both companies also experienced tremendously high first day trading returns. Drawing from this, it is interesting to examine whether IPO stock behaviors are part of a systematic pattern where company publicity is being associated with higher investor attention

and in turn with higher first day trading returns, or if the cases of Academedia and Internationella Engelska Skolan are nothing more than anecdotes.

IPOs in particular are interesting when examining the relationship between publicity, attention and returns as they help relieve the model of causality issues. As often no widespread trading of a company's stock has occurred before its IPO, one can be reasonably certain that it is not the market movements that affect the publicity.

1.1 PURPOSE OF STUDY

This thesis aims to investigate if a relationship exists between the amount of attention a company receives prior to its IPO and the initial returns of its stock in the first trading day. The amount of attention a company receives will be estimated by analyzing the amount of news coverage it sees prior to going public. Hence, the study sets out to answer the following research question:

Is the amount of publicity for an IPO-company prior to its IPO associated with the subsequent returns in the trading of its stock on the first trading day?

In practice, this is done through a study of Swedish initial public offerings (IPOs) from the year 2000 up to and including 2017. An ordinary least squares regression of the amount of mentions of a company in print and web media six months prior to its IPO, and the initial return (a relation between the closing price of its stock on the first trading day and the IPO offer price) is carried out to estimate the relationship.

1.2 PREVIOUS RESEARCH AND NOVELTY OF OUR CONTRIBUTION

The effect of publicity and other attention-grabbing factors on investor behavior has been studied in several papers. Grullon et al. (2004) found that a relationship exists between a firm's overall visibility and the liquidity of its stock. The study defined overall visibility in a different sense than news coverage - by looking at its product marketing. Seasholes (2007) looked at stocks on the Shanghai stock exchange and found that stocks that hit upper price limits commonly exhibited three features, among which one was high news coverage. Barber and Odean (2008) confirmed a hypothesis of attention-driven buying among investors, simply meaning that investors will buy stocks which draw attention and that news coverage is a factor

that helps draw attention. More specifically on IPOs, Cook et al. (2006) studied the effects of pre-IPO publicity on first day trading returns on a sample of American IPOs from 1993 through 2000 and found that pre-IPO publicity (divided into headline and article mentions in media for a company) was positively correlated with both the number of retail investors (individual investors) trading in the stock and its returns during the first day of trading. To our knowledge, however, no similar study has been made on Swedish or Nordic IPOs. It is therefore interesting to see if the same relationship holds in the Swedish market. Furthermore, there has been significant changes to the media landscape since the Cook et al. study, primarily in the sense that the amount of publicity has increased. This new landscape may seriously question the conclusions of the Cook et al. study, as most IPOs are now much more featured in the news resulting in more 'noise' to investors. To put this in real figures: in our dataset, the average number of full text articles per IPO was approximately 268 while Cook et al. reports approximately 25 articles per IPO (see table A.6. in appendix). While the hypothesis is that publicity still has some significant effect on first day trading returns, this almost ten-fold increase makes this more uncertain. The effect seen in the Cook et al. study could be smaller, given the larger amount of 'noise' in the market which may 'blur' the image for retail investors, or larger if investors are now increasingly led in their investment decisions by publicity.

In summary, it is interesting to investigate the relationship between publicity of an IPO company and the subsequent first trading day returns of its stock in a more recent setting (with a larger amount of publicity) and on a market outside of North America.

1.3 HYPOTHESIS OF OUR STUDY

Drawing from the previous research, especially Cook et al., we expect to see a positive correlation between the amount of publicity for an IPO company and the subsequent initial return of its stock in the first trading day. We also expect this correlation to be stronger for headline mentions than for article mentions.

1.4 BRIEF RESULTS AND IMPLICATIONS

Controlling for various factors, we find a significant relationship between the number of articles about an IPO company and the subsequent initial return of its IPO on the Swedish market. We cannot, however, establish a significant relationship between the number of mentions in the headline of an article about an IPO-company and the subsequent initial return of its IPO. This implies that our hypothesis can only partly be confirmed. A reason behind this can be that a rather large number of companies on the Swedish market never receive any headline publicity at all in the time six months prior to their IPO.

With previous research in mind, our results imply two important points about publicity and returns. First, it is likely so that, as only limited trading in a stock exists before an IPO, it is not the prior market returns that affect publicity. Secondly, as the relationship between publicity and initial returns holds for all types of publicity (positive as well as negative), it is likely not company-specific circumstances (such as pre-IPO financial performance) that affect publicity and returns. Had this been the case, a negative relationship should arise between the amount of negative publicity and initial returns, offsetting any positive relationship between positive publicity and initial returns. Rather, it looks like the amount of publicity in itself (the visibility of a company) may affect returns.

Our results have possible implications on several stock market participants acting on the Swedish stock market. If publicity matter for returns, taking it into concern could be important for investment bankers, market analysts, and investors, to name a few.

2 THEORETICAL FRAMEWORK AND PREVIOUS RESEARCH

2.1 THE EFFICIENT MARKET HYPOTHESIS

The Efficient Market Hypothesis (EMH) described by Eugene Fama in 1970 states that the price of an asset fully reflects all the information available and that stocks therefore always trade at their fair value (Berk and DeMarzo, 2014). It would then be impossible to beat the market since the market prices only reacts to changes in discount rates or new information.

A requirement of the EMH is that all agents operating in the market, in aggregate, have rational expectations on the information they possess (i.e. that the use the information they do have in the optimal way) and when new information is revealed they adjust their expectations accordingly. An implied assumption of the EMH is also that investors only care about risk and return in their decision making, something known as the utility theory (see Kahneman and

Tversky, 1979). The EMH hold even though some agents will deviate from the above, for instance overreact or underreact to information, since what is required is that their reactions are random and follow a normal distribution, so that abnormal profits cannot be exploited. Implications from this is that investors must systematically depart from this requirement to violate the EMH.

The efficient market hypothesis is commonly stated in three different forms, weak form efficiency, semi-strong form efficiency and strong form efficiency.

- In the weak form, it should not be possible to profit from information available in historical prices
- In the semi-strong form, market prices reflect all public information and react to any new public information very rapidly making it impossible to profit from public information
- In the strong form, prices reflect all information, both public and private and it is impossible to earn excess returns

2.2 BEHAVIORAL FINANCE

There are however substantial criticism and empirical claims against the EMH. An example is the 1995 paper by Dreman and Berry, where the authors observed that stocks with a low price-to-earnings multiple ("value stocks") saw greater returns than stocks with a high price-to-earnings multiple ("growth stocks"). According to an earlier paper by Dreman, a higher beta of the value stocks could not explain the difference.

To attempt to explain some of these deviations from the EMH, behavioral finance has arisen as a research field. In a well-cited paper by Nobel laureate Kahneman and his colleague Tversky (1979), the utility theory, which in an EMH perspective is thought to explain how investors make decisions under risk, is criticized. The authors instead provide their own descriptive model on how individuals makes decisions under uncertainty and risk, called the prospect theory. The theory states that people tend to evaluate outcomes relative to a reference point, for instance the sales price of a stock is compared to its purchase price. Furthermore, the model predicts that people tend to be risk averse in the case of sure gains, and risk seeking to avoid sure losses. Kahneman and Tversky's model has been tested empirically in many studies, e.g. Barber et al. (2007) which found that investors were twice as likely to realize gains in

stocks as they were to realize losses, a result that supports the prospect theory idea that investors are more likely to take risks in the face of losses than in gains.

Other than the above, there are more than a couple of more bizarre examples of clear irrational behavior in the market, possibly violating the utility theory of the EMH. For instance, studies by D. Hirshleifer and T. Shumway (2003) and A. Edmans et al. (2007) showed that the return was higher if it was a sunny day at the location of the stock exchange. The same effect could be seen at the occasion of major sport events. The investors own experience is also of importance according to Malmendier and Nagel (2011). If an individual grew up during a time when the stock market performed well, he is more likely to invest in stocks than people who grew up during a time when stock markets performed worse.

2.2.1 HERD BEHAVIOR

Another explanation model to why investors are making correlated trading error is because of so called herd behavior. Herd behavior is characterized by a lack of individual decision-making and instead investors follow the behavior of other investors.

There are several possible explanations to herd behavior. According to Avery and Zemsky (1998), investors may believe that other investors possess superior information than they themselves do. This is known as the information cascade effect, where investors ignore the information they have themselves to profit from the information of others.

DeMarzo et al. (2008) argue that due to relative wealth concerns investors benchmark the performance of their investments to those of their peers, and copies the investments of the same peers out of fear of being relative underperformers. The copying would then create herd behavior.

Even institutional investment managers may suffer from a herding instinct. Scharfstein and Stein (1990) states that since institutional investors' reputations may be at risk if their investments depart too far from those of their peers, they may be unwilling to do so, leading to a herd-like behavior.

The concept of herd behavior, and the psychological explanations to why it appears are crucial to understand why publicity and the actions taken by a company to attract attention to its IPO could affect investor behavior. If all investors where acting rationally, publicity and the company's actions should have no effect. But if one views this issue in the light of herd behavior, where investors copy their peers, publicity could indeed have an effect since it

mimics the herd mechanism by exposing an investor to a certain company repeatedly, possibly making the investor feel as all his peers are indeed evaluating an investment in the company.

2.2.2 VISIBILITY EFFECTS ON INVESTORS

Far from every investor is a full time trader and those that are not often have limited time to spend on gathering important information for their investments and analyzing it. Research from Grullon et al. (2004) showed that a firm's overall visibility to investors, measured by its product advertising, has a positive correlation with the liquidity of its stock and the number of both institutional and individual investors trading in the stock. In addition, Frieder and Subrahmanyam (2005) showed that individual investors are more likely to hold stocks in highly visible firms with easily recognized products.

More specifically on publicity, Seasholes and Wu (2007) showed how stocks on the Shanghai stock exchange that hit upper price limits typically had three characteristics, of which news coverage was one. Alanyali (2007) found that a greater number of mentions in the Financial Times at any given morning corresponded to a greater volume of trading and a greater change in the price of the stock mentioned.

Further Barber and Odean (2008) argue that individual investors solve the information-gathering problem it would mean to be well informed by choosing to invest only in stocks that have recently caught their attention, with news coverage as a factor that increase the attention of a stock. They show that individual investors have an attention-driven buying behavior and that they are overrepresented on days with high trading volume and when stocks are in the news. They also show that attention-based trades by many investors temporarily inflate the price of a stock. Barber & Odean's research provides an explanation to why publicity would have a causal effect on investor sentiment and in turn on trading volume and returns, something they also verify empirically. Consequently, one can conclude from their research that a reverse causality argument regarding publicity and investor sentiment – that it is in fact investor sentiment that determines publicity – is without merit.

Interesting concerning publicity is the effect on individual decision-making after being exposed to repetitive information. DeMarzo et al. (2003) describes what they call the *persuasion bias* to refer to the fact that people fail to adjust properly to information that they receive repeatedly. An example from outside the world of finance is that people, when repeatedly reading a newspaper with a well-known political agenda, fail to adjust properly for this agenda. The persuasion bias could have an effect in the world of behavioral finance in the

sense that repetitive information that an investor receives through publicity could sway this investor's judgment, and change his or her expectations of the stock's value away from its intrinsic value.

To conclude, within the field of behavioral finance, attention-grabbing factors in general and publicity in particular have an impact on the trading and pricing of stocks, perhaps because they are used by individual investors to relieve themselves of a tiresome information search.

2.3 IPO PRICING AND THE ROLE OF NEWS

In this next section, the institutional background on IPOs and what role publicity plays in them, will be examined. In an EMH perspective, investors are treated as if they have access to the same information about a security and have rational expectations about this information, or should they not have access to the same information – it is assumed they at least treat the information they do have access to in an optimal way. This gives rise to the notion that investors have homogenous expectations about a security. In the case of IPOs, this would mean that the closing price of the first trading day is the unbiased estimate of the security's value. Ofek and Richardson (2003) showed however, that relaxing the so often prevalent short sale constraints of an IPO had tremendous effects on its price. The paper built on the research of Miller (1977), which stood in contrast to the EMH perspective by saying that investor expectations in an IPO could in fact be heterogeneous, given that an IPO is associated with much value uncertainty, and that the short sale constraints biases this value uncertainty upwards, making the price of the IPO stock an upwards-biased estimate of its true price. This upwards bias would then, consequently, be higher if more investors had more optimistic expectations of an IPO stock. In a behavioral finance perspective then, the effects of attention-grabbing factors (such as publicity) on investor attention and consequently on investor expectations are interesting to study because they imply effects on returns.

Reese (2003) argues that investor interest, measured by the number of citations in newspapers, is crucial if an IPO experience high initial returns. He argues that the offer price, set by underwriters is highly correlated with the investor interest, and stocks with high investor interest tend to be underpriced while stocks with low investor interest tend to be more at fair value or overpriced. He further argues that the degree of oversubscription in a new issue, which is a function of the level of underpricing and investor attention, directly influences the initial trading volume and its initial return.

A question that can be posed when discussing investor attention and IPO initial returns is if not the offer price of an IPO would simply be revised upwards if increased investor attention was seen (leading the investment banker to think that the market's valuation of the IPO being biased upwards). This is a point made by Benviniste and Spindt (1989), but is refuted by Derrien (2005) and Ljungqvist et al. (2006), as well as by Cook et al. (2006).

Derrien and Ljungqvist et al., as well as Cook et al. all argue that there is a certain category of investor to which most of the optimistic expectations can be attributed, and that category should consequently be responsible for the price run-up in IPOs. This is the retail investor, also known as the sentiment or noise investor, contrasted by the institutional or regular investor. In Derrien's model for instance, institutional or regular investors are thought of as valuing the company at its 'intrinsic' value, while the retail investors or noise traders have more optimistic expectations. Cook et al. argue that pre-issue publicity attracts retail investors and that consequently (as they have more optimistic expectations) the initial return of the IPO will be higher. In their research they use a sample of IPOs in the U.S between 1993 and 2000 and use average traded volume on the first trading day as a proxy for the presence of retail investors. They find a significant relationship between the pre-issue publicity and their proxy for the number of retail investors, between the amount of publicity and the initial return, and between their proxy for the number of retail investors and the initial return.

3 DATA AND METHODOLOGY

3.1 DATA

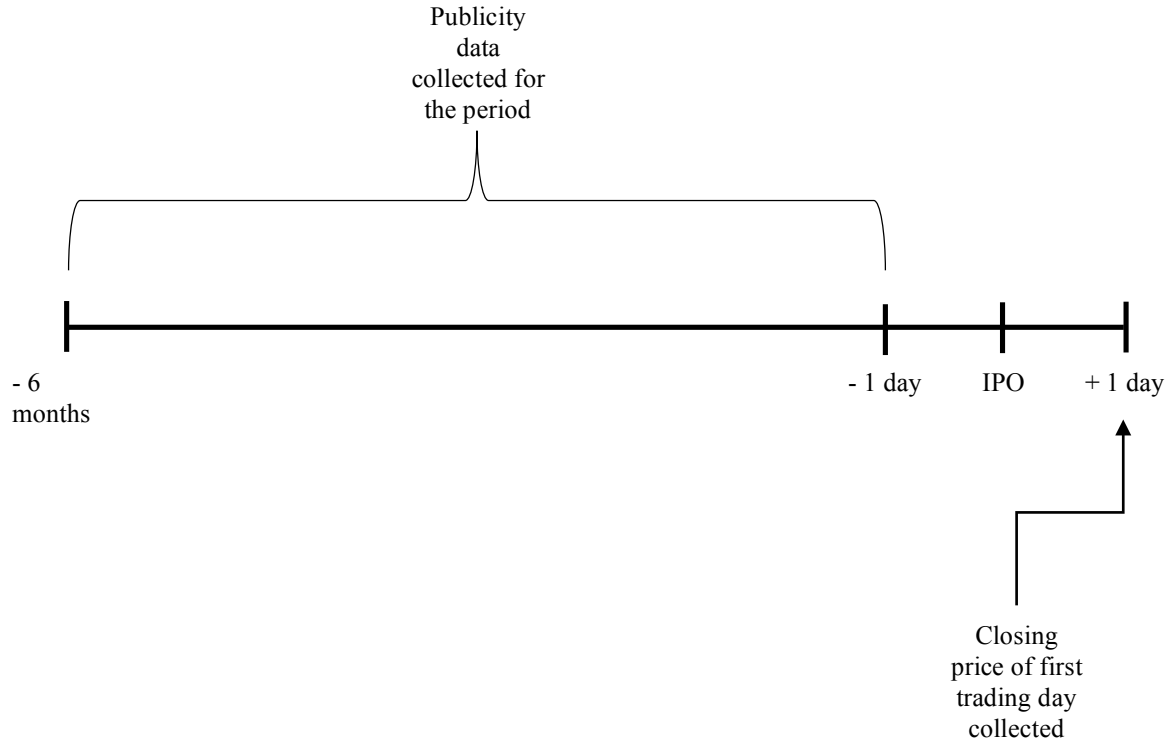
In this section the data collection process, and the final data set, will be described in detail. Furthermore, the applied econometric methodologies are laid out.

Before we go into the data collection process, it is necessary to provide an explanation to why it is publicity in particular that this study will look at. We are aware of the fact that publicity is only one of the parameters that may affect investor attention before an IPO. An underwriter or the company itself can use different methods to promote its company prior to the IPO, like advertising etc. Likewise, social media like blogs and microblogs could have an impact on investor attention. Publicity is however a very easy metric to look at accessibility-wise, unlike other metrics where data is often proprietary and hard to get by.

While previous research examined the relationship between first day trading returns and publicity for North American IPOs during the 1990s, our study sought to examine the same relationship but for Swedish IPOs and for a later time period, given the hypothesis that the media landscape has changed since with the increased adoption of the Internet. The time period chosen was the year 2000 up to and including the year 2017. The year 2000 was chosen as it was the end year in the data set of the Cook et al. study of 2006.

To conduct the study, three categories of data were needed. First and foremost, IPO data, which includes identifying the relevant IPOs to study and find their dates, offer prices and closing prices the first day of trading. Secondly, control data is needed to construct various control variables. This includes, among other items, sales data for the last fiscal year before the IPO of each company. Thirdly, and lastly, publicity data is needed to conduct the main regression. The collection of data for each category is reported upon below. In figure 1, an overview of the data collection process is given.

Figure 1. Timeline of data collection



3.1.1 IPO DATA

First, we identified all the realized Swedish IPOs between the years 2000 up to and including the year 2017. The definition "Swedish" was set to mean that the IPO was conducted on a Swedish securities exchange, while allowing for all countries of registration of the IPO-company. The IPOs to be included in our data set was identified using the database SDC Platinum from the company Thomson Reuters. From the same database we extracted the following information for each IPO; issue date, name of issuing company (the "IPO company"), the Standard Industry Classification Code ("SIC" Code), the country of registration of the IPO company, the ticker symbol of the IPO company, the primary securities exchange on which the IPO was conducted, the name of the industry corresponding to the SIC Code and the Offer Price of the IPO for each IPO Company. Data for the entire population between the

years 2000 and 2017 was extracted. IPO companies with an offer price of less than 10 Swedish Krona (SEK) per share were excluded from the dataset, a practice our study has in common with the Cook et al. study of the North American market which excluded companies with an offer price of less than one dollar per share. Additionally, extreme outliers (with extremely high initial returns) and companies for which we could not retrieve financial data for, were excluded. The final sample consists of 130 companies (this figure excludes the eight companies for which sales data could not be found as is reported on below).

As the method of the study is to regress the return of the first day of trading for each company with the amount of news coverage it has seen, the variable first trading day return ("Initial Return") must be constructed. The variable is defined as:

$$Initial\ return = \left(\frac{Closing\ Price\ of\ First\ Trading\ Day}{Offer\ Price\ of\ IPO} - 1\right)$$

While the offer price was extracted from the database SDC Platinum, the closing price of the first trading day was not completely covered in the same database. It was therefore extracted using the database Thomson Datastream. The variable extracted from Datastream was the unadjusted price ("UP"), which is unadjusted for stock splits etc, to ensure it corresponds to the offer price. After extracting the closing price of the first trading day, the variable Initial Return was constructed according to the equation above.

3.1.2 CONTROL DATA

While the fact that a company is receiving much publicity can be a predictor of the subsequent initial return of its IPO, it is also likely that the size of a company affects the amount of publicity it receives. With larger size it is reasonable to assume more employees and more interaction with stakeholders such as suppliers and customers. This could itself trigger publicity, possibly without affecting the initial return of an IPO. Drawing from this, a conclusion could be that it is necessary to control for the size of a company in the model. Previous research (Cook et al. from 2006) found that sales is a relevant proxy for the size of a company. To account for this effect, the IPO companies' sales at the time of the IPO were collected. For eight companies, sales figures could not be retrieved. The IPOs of these companies were excluded from the dataset.

Sales data was defined as the net sales the last fiscal year (LFY) before the IPO took place. The information was gathered from primarily the company's annual report (if accessible) or the prospectus of the IPO. For instance, if a company made an IPO in August of 2016 while closing its books in July of 2016, the figures from the annual report in July were used. In the prospectus, pro forma figures were used when applicable. A regression between the described sales figures and the number of article mentions of an IPO-company six months prior to its IPO is carried out in table A.1. in the appendix and shows a significant relationship between these two with sales explaining a considerable degree of the publicity a company receives. This regression supports controlling for sales in the model.

Finally, sales figures were then divided into groups according to their size, creating a variable called Sales Groups.

A company could also see higher initial returns in its IPO due to the industry it operates in being more popular with investors per se. The same effect possibly exists for the year of the IPO, if IPOs where generally more popular with investors in one year. In table A.3. in the appendix, descriptive statistics of initial returns for IPOs between different industries are shown. It is evident that for instance the services industry, including internet and 'welfare companies' (like AcadeMedia and Internationella Engelska Skolan described in the introduction), have outperformed other industries regarding initial returns. This motivates controlling for industry. In table A.4. in the appendix, the same statistics is shown for different years of IPOs in our sample. It is from this table apparent that IPOs in the years 2015 and 2016 outperformed earlier years, motivating controlling for the year of the IPO in the model. To control for these effects, the IPO companies' SIC Codes and the dates of their respective IPOs (both retrieved from the SDC Platinum database, as mentioned above) were used.

If the investor sentiment in the economy is generally more bullish at the time of the IPO, this could produce higher initial returns. To control for this, the returns of the OMXS30 index for the preceding 15-day period for each IPO was collected. Controlling for the general investor sentiment as opposite to the specific investor sentiment towards an IPO is important, as it is the effect of publicity of the specific sentiment that is interesting to investigate. This methodology is shared by our study with Cook et al. (2006).

3.1.3 PUBLICITY DATA

Publicity or news coverage data was examined using the media research database Retriever. An important consideration is to draw a line from how long back in time publicity is to be counted. Cook et al. (2006) used a six month prior-to-IPO window, with the motivation that firm marketing efforts often start around six months prior to the IPO. We found this motivation sufficient for our research and the same time frame was used in our data collection process. In practice this meant collecting publicity from the day six months before the IPO date as identified using the SDC Platinum database. Publicity was collected for the entire period up to and including the day before the IPO date. Care were exercised as to not include the actual IPO day, as this could result in the data containing reactive publicity reporting on the trading returns of the IPO stock.

When choosing what media to include there has a been balancing between including quality news and not excluding news that can be categorized as noise, since our hypothesis is that this as well may have an effect on investor attention. We have excluded press releases and articles from news bureaus, since they may have been initiated by the company itself and likely do not reach the public. If these news items do reach the public, it is likely in the form of news articles and they will be included in the publicity data as such. The media categories, according to how Retriever defines them, that have been included in the model are:

- Metropolitan press
- Prioritized local press
- Trade press
- Magazines
- Swedish television
- Swedish web

Care was also taken to, in the case that an IPO-company's name corresponded with the name of another subject receiving publicity, ensuring that data collected only contained publicity regarding the IPO-company.

Further analysis on mentions in specific newspapers and media, to see if they have a certain explanatory value, has not been done due to accessibility issues of such data. The decision is also made based on the previous research by Cook et al. (2006), which did not make such a granular analysis of specific media.

In our study, we have also not made any division between negative and positive news. This would require a manual analysis of each news since there are few reliable tools to use. Previous research of Cook et al. (2006) has also shown that in general news is descriptive, rather than biased in any direction. Also, consideration have not been taken to international media. One could argue that it should be included since some of the companies are registered in another country but still listed in Sweden. However, since our hypothesis is that it is retail investors that are responsible for the price run-ups in IPOs, it is less interesting to examine international media since the majority of retail investors likely trade on domestic stock exchanges. Adding international media could also contribute to more noise in the model, by adding publicity with less of explanatory value.

When collecting the publicity data, we have not set the number of article mentions relative to the total amount of publicity during the same period. It is a fact that publicity has increased during the time period we have researched, but there are reasons to not consider company-specific publicity as a proportion of the total publicity anyway. Setting it in relation to the total number of news articles would imply that the attention each mention generates, decreases by the same speed as the total number of news articles increases, something we have no evidence for.

The publicity data was collected by counting the number of mentions in print and web media for each IPO-company according to the specifications above. The mentions were divided into article mentions (the name was mentioned in an article) and headline mentions (the name was mentioned in the headline of an article).

Finally, the number of mentions in articles and headlines of articles for each IPO-company were logarithmized according to the following equation:

$$Ln\ Article\ Mentions = Ln\ (Article\ Mentions\ ) + 1$$

The notion of logarithmizing the publicity variable rests on a belief that the amount of publicity has a diminishing effect on initial returns. For instance, for a company with a high number of mentions, the effect of one additional mention would probably be small on investor attention. By logarithmizing, we account for this diminishing effect. This methodology is supported by the previous research by Cook et al. (2006).

3.1.4 DATA LIMITATIONS

Previous research suggests that a correlation between pre-IPO publicity and initial return for an IPO-company is largely due to the presence of retail investors in the market. While our study seeks to evaluate the overall relationship between publicity and initial returns for IPOs, it has not been possible to gain insight into investor distribution in IPOs due to limitations in what data has been available for the Swedish market.

Furthermore, previous research has used volatility in the initial trading of an IPO and the percentage of public float for an IPO-company as control variables as these variables likely help explain a significant amount of variance in initial returns. For our dataset, where several of the companies have ceased to exist, such data have not been available.

3.2 METHODOLOGY

3.2.1 STATISTICAL METHOD

To evaluate the relationship between publicity and initial return of an IPO, we have conducted a study where the initial returns of Swedish IPOs between the year 2000 and the year 2017 have been regressed to their pre-IPO publicity measures using an ordinary least squares multiple linear regression analysis.

3.2.2 REVERSE CAUSALITY

As earlier mentioned, studying publicity effects on IPOs in particular is interesting because in these cases, one can generally ensure oneself that it is not market movements that affect publicity (and thus implying opposite causality).

Even though one can be reasonably assured that market movements do not affect publicity in the case of an IPO, it is a natural thought that a company that performs well financially should receive both more publicity and a higher initial return in its IPO. This could imply difficulties in establishing a relationship between publicity and IPO returns respectively. However, for the following reasons we believe our methodology is robust against such biases. First, a company that performs well financially prior to its IPO would likely see a higher offer price or an upwards offer price revision in its IPO. As we study initial returns, we adjust for this by calculating how much the first trading day closing price deviates from the offer price. Secondly, a well-performing company would likely receive positive publicity whereas a worse-performing company would likely receive negative publicity. By performing this study on all publicity in an aggregate, we can be reasonably assured that should a positive relationship be

found between publicity and initial returns, it is publicity that drives investor attention and in turn initial returns, and they are not both simply a result of a company being well-performing. Should they both simply arise from a company's pre-IPO financial performance then it follows that lower initial returns should be correlated with a higher amount of publicity (of negative nature). Consequently, if a positive relationship is established between the sheer amount of publicity and initial returns, both these parameters are unlikely to arise simply as a response to a company's pre-IPO financial performance.

3.2.3 DEPENDENT VARIABLE

The dependent variable of all regressions have been the initial return of the IPO in question, described above.

3.2.4 INDEPENDENT VARIABLES

The independent variables are different publicity measures, also described above. Both headline and total article mentions have been used as independent variables in logarithmized form.

3.2.5 CONTROL VARIABLES

As has been discussed, the effects of an IPO company's sales on publicity, and the effects of its industry, year since IPO and the general investor sentiment on initial return could have a profound impact on the model as a whole. Accordingly, these variables have been included as control variables. Industry, year since IPO and sales groups were included in the model as fixed effects, by transforming them into dummy variables. The general investor sentiment (represented by the 15 day pre-IPO OMXS30 index return) was included as a control variable.

3.3 MODELS

3.3.1 MODEL I

The first hypothesis to be tested was that the number of company-specific mentions in news articles six months prior to its IPO should be positively correlated with the initial return in the first trading day of its stock. The following model was evaluated to test this:

$$Yi = Ln\ Article\ Mentions\ +\ OMX + Industry\ Fixed\ Effects + Sales\ Grouping\ Fixed\ Effects + Year\ Since\ IPO\ Fixed\ Effects\ + \varepsilon$$

$\boldsymbol{Yi} = initial\ return\ of\ an\ IPO$
$\boldsymbol{Ln\ Article\ Mentions} = logarithmized\ number\ of\ company\ mentions\ in\ articles$
$\boldsymbol{OMX} = 15 - day\ pre\ IPO\ OMXS30\ index\ return$
$\boldsymbol{Industry\ Fixed\ Effects} = fixed\ effects\ of\ first - digit\ SIC\ code$
$\boldsymbol{Sales\ Grouping\ Fixed\ Effects} = fixed\ effects\ of\ sales\ groups\ according\ to\ table\ A2$
$\boldsymbol{Year\ Since\ IPO\ Fixed\ Effects} = fixed\ effects\ for\ IPO\ Year\ according\ to\ table\ A4$
$\boldsymbol{\varepsilon} = error\ term$

3.3.2 MODEL II

The second hypothesis to be tested was that the number of company-specific mentions in the headlines of news articles six months prior to its IPO should be positively correlated with the initial return in the first trading day of its stock and with a stronger relationship than seen in the case of company-specific mentions in articles.

$$Yi = Ln\ Headline\ Mentions\ +\ OMX + Industry\ Fixed\ effects + Sales\ Grouping\ Fixed\ Effects + IPO\ Year\ Fixed\ Effects\ + \varepsilon$$

$\boldsymbol{Ln\ Headline\ Mentions} = logarithmized\ number\ of\ company\ mentions\ in\ headlines$

3.3.3 ROBUSTNESS TEST AND TEST OF THE MODELS

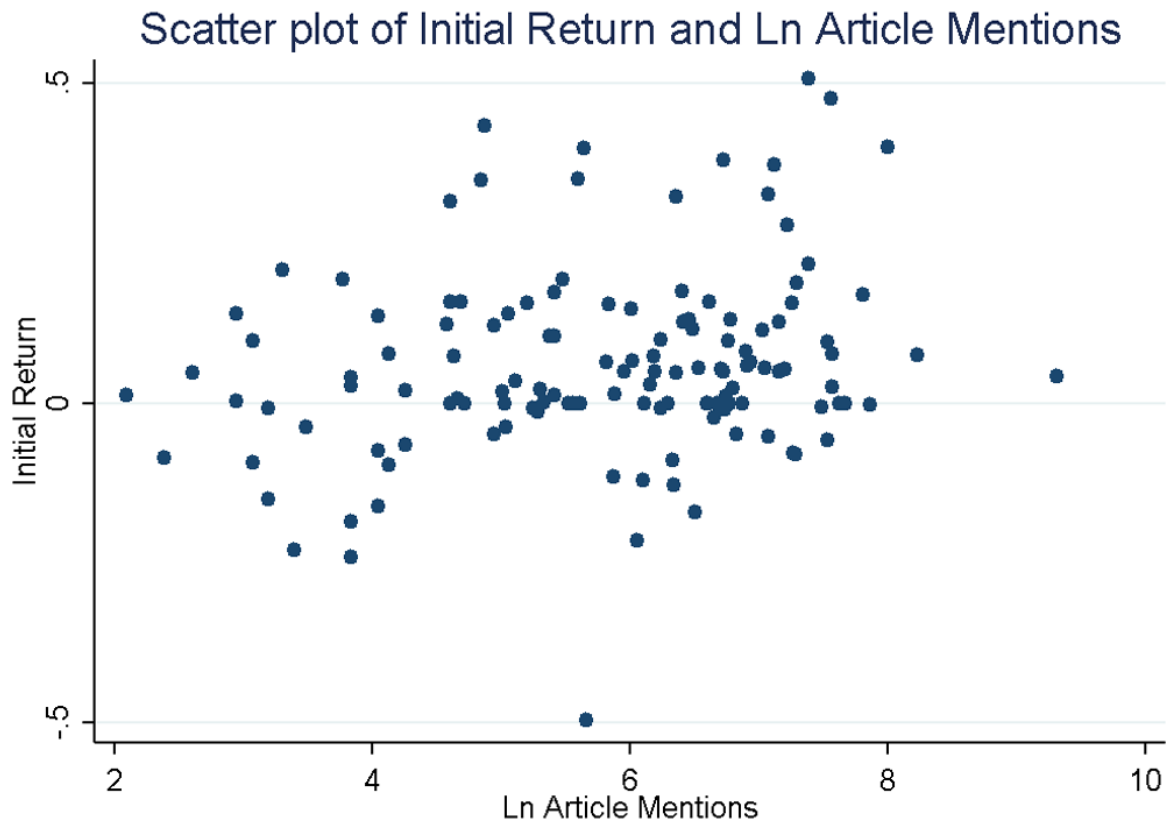
Risks for certain flaws in the model have been identified and these flaws have then been evaluated using established statistical methods. As explained in the data section of this paper, it is believed that the size of a company (measured in its sales figures) has a profound impact on the amount of publicity it generally receives. As sales are also controlled for in the model, a risk for multicollinearity arises, implying that the publicity coefficient could be biased. Multicollinearity has been evaluated using the variance inflation factor. To be assured that the model includes the appropriate control variables, a model specification test has been carried out. The Breusch-Pagan test for heteroscedasticity has also been conducted, although no specific suspicion for heteroscedasticity has arisen.

4 RESULTS

4.1 MODEL I

In our first model, we evaluated the relationship between the logarithmized value of the six months pre-IPO article mentions, represented by the variable *Ln Article Mentions*, and the initial return of the IPO.

Figure 2. Scatter of initial returns to logaritmized article mentions



A slight linear relationship is evident between the initial return and the logaritmized number of article mentions for an IPO-company

The scatter plot implies a linear relationship between the variables; i.e. that IPOs with higher initial returns in the first trading day generally has seen more publicity six months prior to their IPO. The large variance seen in the plot is partly explained by the fact that the plot is "simple", and utilizes no control variables. As has been said earlier, publicity may vary significantly between companies with respect to their size and the industry they operate in etc.

Table 1. Model I Regression.

VARIABLES	*Initial Return*
Ln Article Mentions	0.0226**
	(0.0105)
OMX	0.744**
	(0.329)
Constant	-0.217
	(0.156)
Observations	130

A significant relationship exists between the logarithmized number of pre-IPO article mentions of a company and its initial return in its IPO.

Evaluating the regression results in table 1, it is evident that the estimated coefficient of our six-month publicity variable, *Ln Article Mentions* is approximately 0.0226 and is significant at a 3.3 % level. This coefficient can be rather hard to interpret, as the publicity measure has been logarithmized, but essentially establishes a significant relationship on the Swedish market between the publicity an IPO-company receives six months prior to its IPO and the return of its stock the first trading day. A concern when conducting this research has been whether the general increase in publicity seen in society (as seen in table A.6. in the appendix, our sample had a mean of 268 articles per company compared to 25 articles per company in the study by Cook et al. of 2006) would have a diluting effect on publicity impact on investor attention and in turn on trading returns. This seems not to be the case – a significant relationship still exists. The coefficient is however smaller than in previous studies on the American market, but it is hard to draw conclusions if this difference is attributable to a dilution effect, or to differences in methodology or differences between the markets.

To ensure that our regression is robust and not affected by any statistical bias, a number of tests have been carried out. A Breusch-Pagan test implies no concern of heteroscedasticity in our model, and a replication of the model with a robust regression in table A.5. in the appendix shows a significance of the publicity variable, *Ln Article Mentions*, at a 3.1 % level. As described earlier, publicity could be heavily correlated with a company's size, the industry

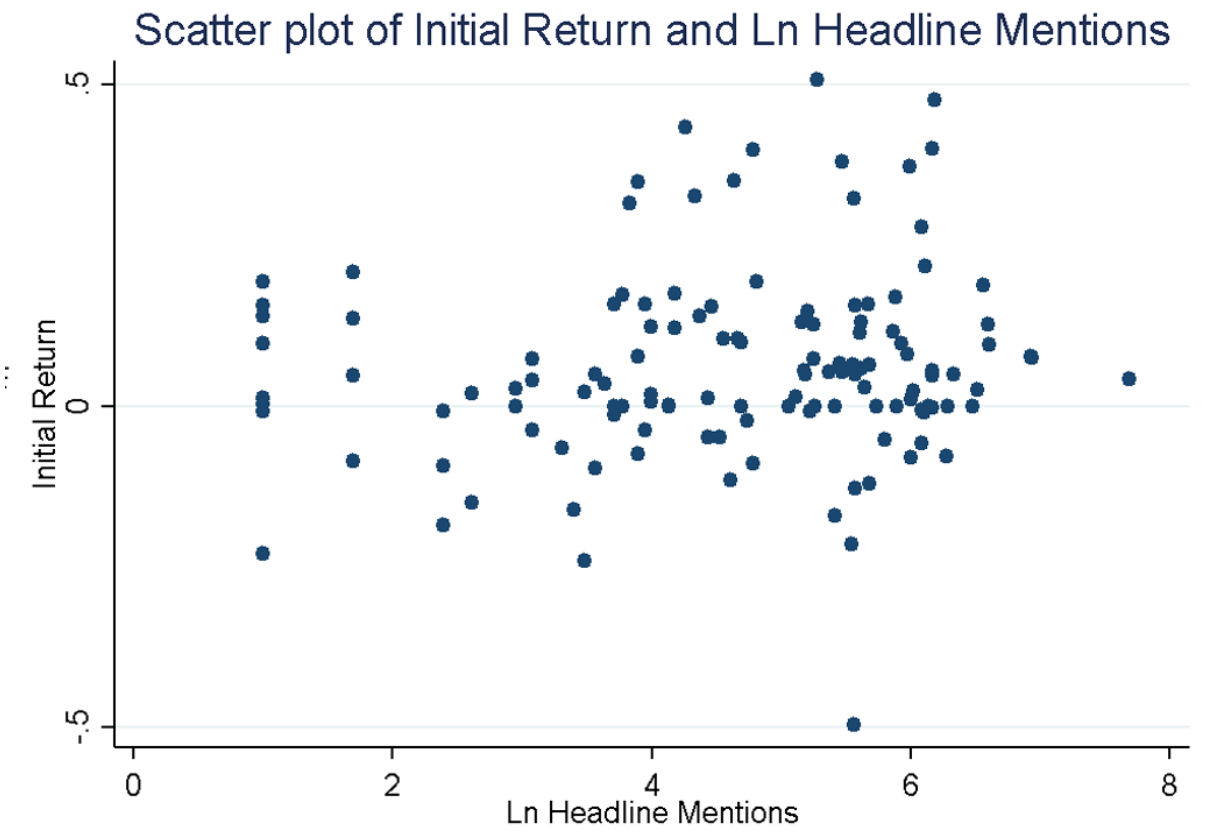
it operates etc. A concern for multicollinearity therefore arises. A variance inflation factor test stills this concern however, showing no multicollinearity for the main explanatory variable (the publicity variable). Lastly, a model specification test has been carried out to make sure that the appropriate control variables have been included in our model. No concern arises from this test either.

In summary, we can confirm our hypothesis that six months pre-IPO publicity measured in number of articles for an IPO-company should be positively correlated with the subsequent initial returns of its stock in the first day of trading.

4.2 MODEL II

In our second model, the relationship between the logarithmized value of the six months pre-IPO headline mentions, represented by the variable *Ln Headline Mentions*, and the initial return was evaluated for each IPO.

Figure 3. Scatter of initial returns to logarithmized headline mentions



A slight linear relationship between initial return and the logarithmized number of headline mentions is evident for companies receiving a higher amount of headline publicity, but not for companies with a lower amount of headline publicity or a lack thereof.

Analyzing the plot, it is easy to see that a number of companies never receive any headline publicity in the period sex months prior to their IPO (represented by the *Ln Headline Mentions* equal to 1, as 1 has been added to the logarithmized number of headline mentions), while still experiencing a wide variation in initial returns in the first trading day of their stock.

This would intuitively mean that it is hard to draw conclusions of a relationship, if a significant number of companies receive no headline publicity at all while still experiencing a

variance in initial return. This intuition is confirmed by our regression results, which indicate that the 6 months pre-IPO headline publicity variable is insignificant.

Table 2. Model II Regression.

VARIABLES	*Initial Return*
Ln Headline Mentions	0.0135
	(0.00928)
OMX	0.751**
	(0.333)
Constant	-0.146
	(0.152)
Observations	130

No significant relationship can be established between the number of headline mentions of an IPO-company prior to its IPO and the subsequent initial return

An interesting take-away from figure 3 is however that, for companies experiencing more headline publicity, a linear relationship seems to be present. Intuitively, this would mean that for larger companies (as a correlation between size and publicity exists), the relationship could still exist. This could explain why previous research on the North American market has found significant relationships between headline publicity and initial returns in IPO cases.

For the Swedish market however, no significant relationship is seen between the number of headline mentions a company receives six months prior to its IPO and the subsequent initial return of its IPO. In conclusion, our hypothesis that headline mentions should have a bigger impact on initial returns of IPOs than article mentions, is therefore rejected.

4.3 REVERSE CAUSALITY

Recapping the discussion about reverse causality in the methodology section, it is evident that our results imply that no reverse causality is present. As a positive relationship is established between the sheer amount of publicity and the initial returns of an IPO, it is unlikely that the IPO-companies pre-IPO financial performance should be the explanation to both publicity and

initial returns. A worse-performing company should in that case receive negative publicity and lower initial returns. Had this been the case, negative publicity should be correlated with lower initial returns. This would imply a negative relationship between the sheer amount of publicity and initial returns if only considering the worse-performing companies (and for IPOs as a whole – inconclusive results – as the negative relationship for worse-performing companies should be offset by a positive relationship for well-performing companies). In our results however, a significant positive relationship exists. It follows that publicity and initial returns likely do not arise simply from a company's pre-IPO financial performance, but instead that publicity in itself may have an effect on initial returns.

With this said, one should be cautious to call the relationship between publicity and initial returns causal. There are still possibilities that worse-performing companies in general receive less publicity (that it would be more common for media to publish articles about "success stories" rather than the opposite). The idea that media reports on negative stories as frequently as they do on positive ones, if not more so, is as likely to be true, though.

5 CONCLUSIONS AND IMPLICATIONS

To tie the knot of this study, one can look back at the initial question posed. On the Swedish market, is pre-IPO publicity of a company associated with the subsequent returns of its stock in its first trading day? Looking at the results of this study in the light of past research, the answer seems undoubtedly to be yes. This relationship may be a causal one with a possible explanation being that publicity stimulates the attention of retail investors, who uses publicity as a tool to relieve themselves of a tiresome information search, and who start to trade in the stock. And, at the presence of short-sale constraints common in IPOs, the price of the stock rises. The number of articles is the relevant measure to look at to estimate the effect of publicity for IPOs as a whole, but for larger companies it may also be relevant to separate the number of those articles where the companies are mentioned in the headline.

In the introduction the question was raised whether the increase in publicity seen since other studies on publicity and IPOs (i.e. Cook et al. of 2006) would have diluted or otherwise changed the effect of publicity on investor attention and in turn on initial returns. Given that a significant relationship is found on the Swedish market, we can say that the increase in publicity has not completely diluted the effect it has on investor attention.

The implications of finding a relationship between the amount of publicity and initial returns is a rather fundamental one for finance research. It casts serious doubt over the efficient

market hypothesis in that it seems to matter not only *what* information is available to investors, but also *how much* of this information.

With this said, the effect described in this study is a rather weak one. Studying the plots of the main regressions, one can easily see that the variance of initial returns to publicity is high and merely slightly linear. This is not surprising. Looking at only the sheer number of articles published about a company prior to its IPO will likely produce very general and rough results.

An interesting topic for future research in the area of behavioral finance is to see if one can extend the general results of our study to predictive results, to aid an investor on how to exploit the systematic bias that publicity produces. The right path to walk is likely to dig down into publicity as a concept and analyze its different properties. Is publicity affecting investor sentiment positively or negatively? Further research utilizing sentiment analysis of publicity could tell, even though the vast majority of publicity likely is neutral and descriptive. The impact of one article might also differ from the impact of another, which would make it interesting to look at the impact properties of different articles and media – such as its circulation (readership) etc.

One can only get so far in looking at publicity though. To measure investor attention, it is likely interesting to go to the source – the investors. Studying social media would be an interesting way to do this.

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7 APPENDIX

Table A.1. Reg. of Sales and Publicity

VARIABLES	*Article mentions*
Sales	0.0289***
	(0.00368)
Constant	182.5***
	(32.83)
Observations	130
R-squared	0.328

The size of company measured as sales last fiscal year explains to a high extent the amount of publicity a company receives.

Table A.2. Grouping of IPO-companies by size of their sales

Approximated sales LFY in MSEK	Sales group
0	1
20	2
100	3
500	4
5 000	5
20 000	6

Sales is controlled for by dividing companies into different groups according to the table based on their net sales LFY.

Table A.3. Descriptive statistics of initial returns for different industries

Industry	*SIC*	*Mean., of Initial Return*	*Max., of Initial Return*	*Min. of Initial Return*	*Standard Dev. of Initial Return*
Natural Resources	1	.0657919	.13125	0	.0475235
Manufacturing	2	.0228628	.3723404	-.24	.1364814
Manufacturing	3	.0301496	.3972603	-.185	.1237602
Transportation, Communications, Electric, Gas, And Sanitary Services	4	-.0028981	.3474576	-.495	.233903
Wholesale Trade	5	.1047847	.50625	-.2289474	.1623823
Finance, Insurance, And Real Estate	6	.0310413	.1575342	-.15	.0833667
Services	7	.11730913	.4340659	-.2153846	.1629598
Services	8	.1241619	.475	-.0862069	.1922261

Industry is controlled for in the model as large differences in mean initial return is seen between industries.

Table A.4. Descriptive statistics for Year Since IPO (0= 2017, 17=2000)

Year	*Mean of Initial Return*	*Max. of Initial Return*	*Min. of Initial Return*	*Standard Dev. of Initial Return*
0	-0.652174	-0.652174	-0.652174	.
1	.1322334	.475	-.185	.1806285
2	.0821728	.50625	-.24	.1738271
3	.0905067	.3225806	-.1710526	.1100729
4	.0528302	.0528302	.0528302	.
5	.	.	.	.
6	.0035914	.0283019	-.0103448	.0145217
7	-.0926394	.0543478	-.495	.2022244
8	.	.	.	.
9	.0214286	.0214286	.0214286	.
10	.0368341	.1361111	-.0135135	.0472381
11	.0562158	.3723404	-.2153846	.1394636
12	.0745729	.1875	0	.0819688
13	.0732478	.2777778	-.08	.154472
14	.	.	.	.
15	.0107992	.0769231	-.0897436	.0766809
16	-.1131625	.0350877	-.2289474	.1124661
17	.0326841	.2083333	-.15	.0983434

The mean of initial returns differs significantly between IPO years and ‘Year Since IPO’ is therefore controlled for in the model.

Table A.5. Robust reg. of Model I.

VARIABLES	*Initial Return*
Ln Article Mentions	0.0226**
	(0.0104)
OMX	0.744**
	(0.329)
Constant	-0.217**
	(0.0894)
Observations	130

A significant relationship between the logarithmized number of pre-IPO article mentions of a company and its initial return in its IPO remains when conducting a robust OLS regression.

Table A.6. Descriptive statistics for publicity

	Article Mentions	*Headline Mentions*
Mean	268.2538	82.43077
Max	4067	800
Min	3	0
Standard Deviation	420.8625	100.2617

The mean number of article mentions per IPO was roughly 268, which supports the idea that the amount of publicity has increased since earlier studies (for instance Cook et al. where mean article mentions per IPO was roughly 25).