TALLINN UNIVERSITY OF TECHNOLOGY
School of Business and Governance

Patrik Lahtinen

Underpricing of IPOs in Nasdaq Stockholm

Bachelor's thesis

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Supervisor: Pavlo Illiashenko, PhD

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I hereby declare that I have compiled the paper independently

and all works, important standpoints and data by other authors

have been properly referenced and the same paper

has not been previously presented for grading.

The document length is 8238 words from the introduction to the end of the conclusion.

Patrik Lahtinen ……

(date)

Student code: 201796TVTB

Student e-mail address: patrik.lahtinen00@gmail.com

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ABSTRACT

This thesis addresses the issue of underpricing of IPOs in Nasdaq Stockholm by examining a sample of 51 companies collected from the Small Cap and Mid Cap venues. The time period of the IPOs in the sample spans from March 2010 to December 2021. With the assistance of source-based reasoning and linear regression, the thesis contains two hypotheses that relate to the data presented in the thesis. Additionally, Pearson's correlation is utilized in treating with one of the hypotheses. Furthermore, t test for two individual samples, along with source-based reasoning, is used with the third hypothesis. The two hypotheses utilizing the linear regression include the market capitalization and performance of stocks, and the one hypothesis used in respect to the t test covers the venues. According to the sample, IPOs in Nasdaq Stockholm experienced underpricing of 4.44 percentages in the given period. It was found that the amount of market capitalization of performance of an individual stock do not correlate with underpricing of IPOs. Furthermore, it was apparent that company belonging to the so-called non-traditional industries as well as company listed in the Small Cap venue yields a higher underpricing.

Keywords: underpricing, IPO, initial public offering, Nasdaq Stockholm, Small Cap, Mid Cap, bachelor's thesis

INTRODUCTION

An initial public offering (IPO) refers to a process, in which a previously unlisted company is listed on a stock exchange, thus enabling public trading of the company's shares (Ibbotson et al. 1995). Reasons for this kind of activity may include the enabled access public equity capital as well as diverse ways of funding the operations and investments of the company, that may result in lowered costs (Ljungqvist 2007). For shareholders, the listing of a company on the stock exchange means a more effortless exchange of the company's shares, which attracts the company to go public. By going public, companies are also capable of carrying out a stock-financed acquisitions (Ritter 2011).

One remarkably relevant concept related to initial public offerings is the underpricing of initial public offerings. When companies go public, an initial offer price, with the amount based on several factors, is determined for the company. The initial offer price is then compared to the closing price of the first day of the stock. Underpricing is apparent, when the closing price is determined to be higher than the initial offer price (Ljungqvist 2007).

In the context of motivation, I was driven by my personal interest and deep desire to more comprehensively learn about the ways of financing a corporate. Having a strong background in coursework, this topic will help to deepen my understanding of the issue. In addition, my past experience with participating in initial public offerings functioned as further motivation for my topic. The aim of this research is to understand if underpricing has occurred in Nasdaq Stockholm in the given time period as well as the crucial factors related to underpricing. It is also necessary to understand the scale of underpricing when various factors affecting are considered.

Considering the research questions, they do have a close connection with the aims of this study. To be more specific, the research questions intended for this research are "what factors contribute to the underpricing" and "has there been underpricing". To answer these questions, it is required to search for companies listed on the Nasdaq Stockholm, and to calculate the required figures to understand whether there has been underpricing. The factors contributing to the underpricing can be specified by using a regression model, with the support of Pearson correlation and t test for individual samples.

This thesis addresses three main hypotheses in order to answer the research questions. The hypotheses, in a respective order, try to determine the following matters:

1) The correlation between market capitalization and underpricing of IPO.
2) The correlation between performance and underpricing of IPO.
3) The difference between the two venues.

In order to figure out the above-mentioned matters, this thesis used readily available data as well as data, that has been conducted with calculations. The data used in this study was conducted using the services of Nyemissioner and Nordnet, from which Nyemissioner offered the data for initial offer prices and the specific listing days. When gathering the data for the stock price in the stock exchange, Nordnet ended up being a rather useful tool. The sample consists of 51 companies operating in the Nasdaq Stockholm stock exchange.

The thesis can be divided into three different main sections. The first section covers the necessary theorical and empirical frameworks of the topic including the methodology. In the theoretical framework, the general overview of the topic as well as several theories on the reasons behind the phenomenon are introduced. The second part deals with the data and essential calculations related to the hypotheses. Finally, the thesis moves forward to the conclusions and discussions.

1. LITERATURE REVIEW

1.1. Initial Public Offering

An essential part of the underpricing of IPOs is the initial public offering itself. Initial public offering as a concept is tightly in relation to the companies "going public". "Going public" essentially means a process, in which a company is listed to a stock exchange for the first time. In practise, this means that the shares of the company will be open for public. Therefore, initial public offering refers to the process, in which the company offers its shares to the public for the first time (Ibbotson et al. 1995).

1.2. IPO Underpricing

It is argued that a systematic underpricing exists among initial public offerings. In other words, there are claims that IPOs are constantly undervalued. This leads to a concept known as IPO underpricing. In IPO underpricing, the initial offer price, the price of the stock in the initial public offering process, is lower compared to the first day closing price, the price of the stock at the end of its first trading day (Ljungqvist 2007). Therefore, underpricing of IPOs basically reflect the return, in percentage, an investor can expect from the first trading day, assuming the investor participated in the IPO. Moreover, if the IPO were overpriced, the initial offer price would exceed the first day closing price of the IPO stock, gaining the investor negative returns, or in other words, loss.

Winner's Curse

Being one of the most well-known theories for underpriced IPOs, the winner's curse focuses on uneven distribution of information between relevant parties (Ljungqvist 2007). According to the theory, investors can be divided into two groups. Some investors regarding the IPO are perfectly informed, thus having immaculate information about the true value of the IPO. These investors only invest in IPOs, that seem attractive. Other investors, on the other hand, are lacking

information, that would have an impact on forming the estimation of the true value of the IPO. Therefore, they often tend to invest indiscriminately (Rock 1986).

In practise, underpricing in asymmetric information models is a conscious choice. In the case of attractive IPOs, informed investors often overcrowd the issues. This leads to uninformed investors investing more often in unattractive IPOs. Unattractive in this case means the IPO is overvalued (Rock 1986) (Keloharju 1993). In other words, the expected return on IPOs for uninformed investors is negative. As a result, uninformed investors would consider IPOs unprofitable, thus withdrawing from the market. To tackle this issue, investment banks often set their IPOs underpriced, leading to uninformed investors to earn normal returns.

Institutional Explanations

Among institutional explanations, there are three general theories that exist to explain the underpricing of IPOs. The lawsuit hypothesis states that companies intentionally sell their stocks at discount to prevent future lawsuits from investors, who are disappointed with the performance of the IPO stock (Logue 1973). However, according to Ljungqvist (2007), this theory is often considered country specific. Price stabilization as a theory focuses on the moderate changes in the stock price. According to Ljungqvist (2007), in price stabilization, the goal is to reduce the downward change in the price of the stock during its initial moments in the stock exchange. Ljungqvist (2007) describes this kind of practise as “price manipulation”, even though it is completely legal in many countries. The third theory among institutional explanations is related to the structures of how different income categories are taxed. In the case of Sweden, before 1990, capital gains were marginally taxed much lighter than income. Naturally, this tempted employers to pay their employers with assets categorized to capital gains, such as underpriced stock instead of salary (Rydqvist 1997). However, it is often debated whether tax structure alone can explain the underpricing in IPOs (Ljungqvist 2007).

Control Considerations

Although initial public offerings are often related to seeking funding for the company, another essential aspect related to the issue is the sharing of ownership. The pricing of IPOs plays a crucial role in this matter, as the right kind of pricing is able to determine how much ownership shall be allocated to each investor (Ljungqvist 2007). Furthermore, according to Brennan and Franks (1997), it is possible for managers to maintain their private benefits in the company by allocating

the shares of the company to a large number of investors. As a result, none of the new investors have excessive authority over the company's operations.

Prospect Theory

Being one of the most prominent theories among behavioural explanations to underpriced IPOs, prospect theory focuses on investors' sensitivity to various expected returns. According to Kahneman et al. (1979), investors tend to focus more on the assets lost in investments rather than the winnings, even though the amounts won and lost would equal in the end. In the case of underpriced IPOs, the rationale behind investors locating their assets in such issues is the fact that they consider missing out from the investing opportunity to be a greater loss compared to the achievable return in the IPO (Loughran et al. 2002).

1.2.1 General understandings of IPOs

Throughout its history, the underpricing of IPOs has been the subject of great scrutiny, and the first concrete example of it was found in a study organized by the U.S. Securities and Exchange Commission (SEC) back in 1963. Several related publications have been made since then, and the unifying factor is that the underpricing of IPOs is a genuine and continuous phenomenon.

Swedish IPOs' underpricing has been particularly studied by Rydqvist (1997) and Schuster (2003). Rydqvist's (1997) research found a one particular feature unique to the Swedish IPO market related to marginal taxation. As already explained in the institutional explanations for underpriced IPOs the employers were tempted to pay their employees with underpriced stock instead of ordinary salary, due to the lighter taxation of marginal capital gains. Studies of Rydqvist (1997) and Schuster (2003) concluded that during the year 1970-1991, the average underpricing reached 39 percent. A total of 224 newly listed companies and 84 equity carve-outs were included in this very study. Another study by Bodnaruk et al. (2008) found out that the average underpricing of IPOs in Sweden was 14.2% between the years 1995-2001. Overall, there were 124 IPOs during that time.

The following table represents underpricing of IPOs in 52 countries. Perhaps the most notable observation based on the table is that underpricing of IPOs occurred in every country that was selected. Based on the table the countries with the most underpricing were Saudi Arabia, China, and Jordan with 179.2%, 162.2%, and 149.0%, respectively. On the other hand, the countries with

the least amount of underpricing of IPOs were Russia, Argentina, and Austria, with the percentages being 3.3%, 5.7%, and 6.2%, respectively.

Table 1: Underpricing of IPOs in 52 countries

Country	Sample size	Time period	Avg. initial return	Country	Sample size	Time period	Avg. initial return
Argentina	30	1991-2018	5.7%	Mauritius	40	1989-2005	15.2%
Australia	2,377	1976-2021	20.5%	Mexico	149	1987-2017	9.9%
Austria	106	1971-2018	6.2%	Morocco	33	2000-2011	33.3%
Belgium	154	1984-2017	11.0%	Netherlands	245	1983-2021	12.0%
Brazil	310	1979-2019	29.6%	New Zealand	277	1979-2022	15.5%
Bulgaria	9	2004-2007	36.5%	Nigeria	125	1989-2017	12.8%
Canada	811	1971-2021	6.8%	Norway	368	1984-2021	10.3%
Chile	88	1982-2019	6.8%	Pakistan	80	2000-2013	22.1%
China	4,983	1990-2022	162.2%	Philippines	173	1987-2018	17.3%
Cyprus	73	1997-2012	20.3%	Poland	359	1991-2022	12.4%
Denmark	190	1984-2021	7.6%	Portugal	33	1992-2017	11.5%
Egypt	74	1990-2017	9.4%	Russia	64	1999-2013	3.3%
Finland	244	1971-2021	14.5%	Saudi Arabia	126	2003-2021	179.2%
France	904	1983-2021	9.4%	Singapore	722	1973-2021	24.7%
Germany	840	1978-2020	21.8%	South Africa	342	1980-2018	17.2%
Greece	373	1976-2013	50.8%	South Korea	2,246	1980-2021	52.7%
Hong Kong	2,301	1980-2021	40.5%	Spain	204	1986-2021	9.5%
India	3,202	1990-2020	84.0%	Sri Lanka	134	1987-2018	28.9%
Indonesia	697	1990-2020	56.0%	Sweden	442	1980-2021	28.2%
Iran	279	1991-2004	22.4%	Switzerland	173	1983-2021	24.6%
Ireland	38	1991-2013	21.6%	Taiwan	1,974	1980-2021	37.6%
Israel	348	1990-2006	13.8%	Thailand	785	1987-2021	39.8%
Italy	413	1985-2018	13.1%	Tunisia	38	2001-2014	21.7%
Japan	4,065	1970-2022	49.0%	Turkey	529	1990-2022	13.0%
Jordan	53	1990-2008	149.0%	UK	5,309	1959-2020	15.7%
Malaysia	571	1980-2019	50.3%	USA	13,757	1960-2022	17.5%

Source: Loughran et al. (2024)

Loughran et al. (2024) explain in their research, that the transition of East Asian countries to less regulated IPO markets is one of the explanatory factors for the differences between the countries. In other words, the more open the country's IPO market, the more moderate the underpricing of IPOs. Loughran et al. (2024) further suggest that companies themselves are also able to influence their IPO value by accurately timing their offerings in a situation when valuations overall are rocketing. Furthermore, asymmetric information, a situation where different parties involved have a different amount of critical information, has been proposed as one the essential explanations for the differences between the countries. In practise, this means that the higher the asymmetric

information level, the higher the underpricing of an IPO. In other words, an even distribution of information to investors would result in a lower underpricing of an IPO (Banerjee et al. 2010).

Efforts have also been made to explain the countries' differences through block holders. Block holders are investors of a company that hold a particularly large share of the company's stock, usually at least 5 percent. It is stated that companies intentionally underprice their initial public offerings in order to attract block holders, as block holders often are able to provide better monitoring, thus increasing the company's value. The issuing firm, on the other hand, carries the costs caused by the underpricing. Countries where the investors favour domestic stocks, meaning home bias exists, the expenses to lure block holders is lower compared to countries with low home bias. Therefore, countries with high home bias tend to have IPOs that are moderately underpriced (Banerjee et al. 2010).

1.3. IPO From Company's Perspective

The road from a private company to a listed one is considered to be rather complicated, as it involves complex legal, financial, and practical matters. For the company representatives, this kind of material is often completely new, and these rules are often subject to changes. Depending on how well the company is prepared, the IPO is expected to take 3-6 months. (Albemark 2016). Companies that aim their shares to be traded on a stock exchange, are required to complete a listing process, that ensures that the management of the company is able to meet the requirements for integrity and that the company has the required capabilities to manage its finances and information spread. Additionally, requirements for sincere and efficient trading of the company's shares are to be fulfilled. Therefore, accounting documents three years prior to the listing should have been published according to IFRS/IAS standards. Also, for companies intending to list to Nasdaq Stockholm, the total market value of the shares is required to be at least EUR 1 million (Albemark 2016). As early as 9-6 months prior to the actual planned listing, the company should consider appointing an advisor, whose responsibility is to assist with the listing process. A financial advisor, such as an investment bank or fund commissioner, and a legal advisor are usually involved. Depending on the situation, the company also receives help from a PR agency. The purpose of these advisors is to ensure that the company's listing is executed in the right way (Albemark 2016).

An essential part of the IPO process is the prospectus. Prospectus contains necessary information about the company as well as securities that are relevant for the listing. The main purpose of the

prospectus is to present investors with essential figures and facts related to the company, such as the company's assets and liabilities. In addition, the prospectus shows the essential risk factors of the company, the presentation of the operations, as well as major owners and board members of the company (Albemark 2016). One major part of the IPO process to keep in mind is the pricing and timing of the stock. The appointed financial advisor attempts to clarify the value for the company, through which the relevant figures related to the financing of the company, such as the stock price, can be determined. Usually there is a price range in which the stock price is placed. After the essential figures have been completed, a registration period begins, during which investors can subscribe to the company's shares (Albemark 2016).

1.4. Overview of Nasdaq Stockholm

Nasdaq Stockholm, also known as Stockholm Stock Exchange, is one of two regulated securities markets in Sweden among with Nordic Growth Market Equity (Nordic Growth Market 2023). Nasdaq Stockholm dominates the Nordic stock exchanges in terms of trading volume. Trading volume refers to the number of exchanged shares. For example, in February 2023, the number of traded shares in the Nasdaq Stockholm equalled approximately 511 thousand, whereas in other Nordic stock exchanges such as in Helsinki or Copenhagen the numbers were approximately 115 and 128 thousand, respectively (NASDAQ 2023).

Nasdaq Stockholm can further be divided into two venues. The main market practically concentrates on companies, that seek visibility on the stock exchange (Nasdaq 2023). Traditionally, companies in the main market are also united by their larger size. The other venue, Nasdaq First North Growth Market Stockholm, on the other hand, is considered to be more suitable for companies whose size may not be large enough to operate efficiently in the main market. Additionally, companies in this very venue benefit from the less restrictive requirements (Baker McKenzie 2023).

2. DATA AND METHODOLOGY

The section of empirical background represents the chosen methodology for this research. The empirical research presented is based on available data, from which the numerical part has been conducted utilizing the services of Nyemissioner and Nordnet. The empirical part also uses scientific research and concepts, which have been collected using reliable resources. Furthermore, suitable statistical instruments are applied when needed. By utilizing the concepts mentioned above, the empirical part aims to seek the relevant factors related to underpricing in the period focused on this research.

2.1. Determination of Underpricing

To understand whether underpricing occurs in Nasdaq Stockholm, it is essential to calculate the necessary figures. In the case of underpriced IPOs, the mandatory terms consist of the initial offer price of the stock as well as the price of the stock at the end of its first trading day. The amount of underpricing is received by the difference between the initial offer price and the price of the stock at the end of the trading day. Equation (1) compacts the explanation in an equation as follows:

$$Underpricing = \frac{P_{FTD} - P_{IO}}{P_{IO}} \quad (1)$$

where

P_{IO} – initial offer price,
P_{FTD} – closing price of the IPO stock after the first day.

The very same equation (1) can also be expressed verbally, following the example of Samarakoon (2011):

$$Underpricing = \frac{First\ Day\ Close - Offer\ Price}{Offer\ Price} \quad (2)$$

2.2. Linear Regression Model

Linear regression is a tool in statistics, which tries to model the relationship between two variables, dependant variable y, also known as the scalar variable, and the independent, or explanatory, variable x. As the research only uses one explanatory variable, the kind of linear regression is referred as simple linear regression. This research utilizes linear regression model to understand, whether the market capitalization affects to the underpricing of an IPO. In economics, market capitalization, or market cap, refers to the total value of the outstanding shares of a company, and it is calculated by multiplying the market price of a share by the number of shares, therefore giving a good estimate of the size of a company (Nasdaq 2023). This research uses the market prices of shares given in figures 3 and 4. The linear regression is presented in a formula in equation (3) as follows:

$$Y_u = \beta_0 + \beta_M x_M + \varepsilon \quad (3)$$

where

β_0 = indicates the intercept,
β_M = indicates the slope,
y = indicated the independent variable (regressand),
x = indicates the independent variable (regressor),
ε = indicates the error term, meaning all the other factors that have an influence on the dependant factor y_i, that are not explained by the independent variable x_i (Gross et al. 2003).

2.2.1. Hypothesis for linear regression model

To understand, whether the market capitalization affects underpricing of IPOs, this research intends to use null and alternative hypotheses as a tool. When forming hypothesis, null and alternative hypotheses are highly used methods. In the hypothesis testing, null hypothesis (H_0) is used to denote the fact, that the chosen sample represent the population, from which the sample was taken, rather accurately. If the null hypothesis is proven to be false, the choice is directed to alternative hypothesis (H_1). Therefore, alternative hypothesis represents the result, in which the chosen sample does not resemble the population accurately enough (Dean et al. 2014). The same can be applied when attempting to find out the correlation between the underpricing of IPO stock and the performance of that very same stock. This research utilizes a one-year timeline for stock performance. In other words, this study compares the percentages of the underpricing of IPO and the percentage change of the duration of the first day closing price over a year in the Stockholm stock exchange.

The hypothesis related to market capitalization seeks to find out, whether there is a notable correlation between the market cap and the underpricing of an IPO. Therefore, in the case of market capitalization, the hypotheses can be formed as:

H_0: There is no correlation between market capitalization and underpricing of IPO.

H_1: There is a correlation between market capitalization and underpricing of IPO.

In the case of stock performance, the hypothesis seeks to find out, whether there is a noticeable correlation between the performance of the stock and the underpricing of an IPO, both in percentages. Furthermore, the hypothesis can be set up as:

H_0: There is no correlation between performance of stock and underpricing of IPO.

H_1: There is a correlation between performance of stock and underpricing of IPO.

2.3. Pearson correlation

An alternative way to understand the linear correlation between two variables is by utilizing the Pearson correlation. In this research the correlations of market capitalization and underpricing as well as performance and underpricing are the subject of analysis. The correlation between two variables is received by using the Pearson correlation coefficient, which ranges from 1 to -1. If the coefficient gains a value close to 1 or -1, it can be concluded that the correlation of the variables is extremely strong, with correlation close to 1 meaning the changes in variables occur in the same direction, thus having a positive correlation, and correlation close to -1 meaning the changes in variables occur in different directions, thus having a negative correlation (Turney 2022). The Pearson correlation coefficient r can be calculated by using the following equation (4):

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)}} \quad (4)$$

The Pearson correlation coefficient can further be used to calculate the required t value, which is then compared to the t critical value. The Equation (5) for calculating the t value is as follows:

$$t = \frac{r}{\sqrt{\frac{1-r^2}{n-2}}} \quad (5)$$

If the absolute value t value computed above is greater than the t critical value, it can be concluded that the correlation between the variables presented in hypothesis is statistically significant. Therefore, there is evidence to reject the null hypothesis and choose the alternative hypothesis.

2.4. T test

In statistics, the t test is one of the most widely spread tests. It is a tool used to understand the differences between two samples, utilizing the average figures of each sample. Traditionally, t tests are divided into two groups, t tests using independent samples and t tests using dependent samples (Kim 2015). As the samples in this study are not dependent on each other, this research uses the t test for independent samples. The object of this study, in the perspective of the t test, is to understand whether the venue has an effect on the underpricing of the IPOs. In other words, this research focuses to seek the underpricing-affecting differences between the Low Cap and Mid Cap lists.

In this study, the t test is used by calculating the correlation of two independent samples. Therefore, the equation shall be as following as shown in equation (6):

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad (6)$$

The hypothesis related to the two venues, Low Cap and Mid Cap, seeks to find out, whether there is a noticeable difference between the two venues. Therefore, the hypotheses are as follows:

H_0: There is no significant difference between the two venues.

H_1: There is a significant difference between the two venues.

2.5. Data and Sampling

The data for this research was collected from the Nasdaq Stockholm Small Cap and Nasdaq Stockholm Mid Cap lists. More specifically, the data includes companies that, at the time of this research, are included in the aforementioned lists. The selection of Nasdaq Stockholm Small Cap and Mid Cap lists are largely based on the fact, that the companies' listings on the stock exchange are relatively new compared to companies in the list of Nasdaq Stockholm Large Cap, as

companies in Large Cap list have established their place on the stock exchange over a long period of time. In other words, an effort has been made to keep the company's listing as fresh as possible to ensure the availability of data.

As already mentioned, the sample focuses only on companies from the Small Cap and Mid Cap lists at the time of this research. This means that the company may have initially been listed on the stock exchange on another list, but which by the time of this study has moved to either of the lists covered in this research. In addition, companies with more than one series of shares on the aforementioned lists have been removed from the sample. This facilitates the comparability of the samples with other elements present in this research. For this particular study, IPOs have been selected from March 2010 to December 2021 (24.03.2010-09.12.2021). In total, Nasdaq Stockholm Small Cap contains 96 stocks. From these, 33 stock are either series A or series B stocks, and therefore they are excluded from this study. In addition, in some stocks, the lack of data led to the stock being excluded from the sample. In total, there were a total of 41 such shares. This leaves the shares used in the study, which there were 22 in total.

The data used in this research is based on primary data, unless stated otherwise. For initial offer prices, as well as specific listing days, Nyemissioner was used. Nyemissioner is a Swedish site focused on corporate finance, that describes itself as a leading source of information on new stock market listings specifically in the Swedish market (Nyemissioner 2023). The share price in the stock exchange was gathered using the services of Nordnet. Nordnet is a Swedish stock and fund broker, that offers its customers, in addition to stock and fund trading, information on listed companies in its included lists (Nordnet 2023).

Table 2: Sample selection

	All
Total number of companies included in Nasdaq Stockholm Small Cap and Mid Cap	239
Less: Observations with too little data	108
Result	131
Less: Observations with more than one series of stock	80
Final result	51

Source: Nyemissioner (2023), Nordnet (2023)

The tables A1 and A2 present the stocks selected for the sample in more detail. As seen from the tables, there are a total of 52 stocks, that ended up being selected for the final sample based on table conducted above. In addition, the table below reveals the initial offer price of each share as well as the price of the share after the first trading day. It should be noted that in both cases the prices are stated in Swedish kroner. Furthermore, the shares are listed in the table according to their listing date, starting from the earliest. For each company, the industry is also mentioned.

Based on the initial offer price and the closing price of stock after the first trading day, the table for underpricing can be conducted by using the stock underpricing formula presented earlier. Additionally, the estimated average of the underpricing for each of the venues as well as for the entire sample is conducted by using the median. By using a median, it is possible to exclude outliers that might have a significant effect when calculating the average, therefore giving a more realistic result.

The tables A3 and A4 represent the percentage of performance of individual stocks in Small Cap and Mid Cap venues in the Nasdaq Stockholm stock exchange. In the tables, performance is measured by the percentage difference between the first day closing price of stock and the closing price of the stock a year after the stock's release in the stock exchange. The first day closing price is gathered using the tables A1 and A2 and the closing price a year after the stock's release was received using the services of Nordnet. The data is separated into Small Cap and Mid Cap tables to further understand, if there is a difference in performance between the venues.

As the tables A3 and A4 represent, the performance median for Small Cap venue equals minus 17.76%, whereas the corresponding median for Mid Cap is 13.58%. In practise, this means that the Small Cap venue stocks, in average, yield a negative return over a period of one year. Mid Cap stocks, on the other hand, on average, yield positive return over the same period of time. Therefore, it can be observed that one group produces a positive return and the other group a negative result. Naturally, it should be noted that the relatively small sizes of the samples may have an effect on the outcome, that yields such results. Additionally, the stock's performance only takes into account the stock's first full year on the public stock market, so more than one year performance is completely excluded.

Engelen et al. (2010) suggest that the reason might also be due to external factors. The economic conditions could very well influence individual industries, therefore heavily affecting the stock price. As seen from the tables A1 and A2, the Small Cap list is more intensely represented by one industry group compared to Mid Cap list. This means that a change in that specific industry is able

to influence many individual stocks, therefore deforming the results. Engelen et al. (2010) continue by stating that the drastic results can also be affected by asymmetric information. This means that there are investors who have an unbalanced amount of information, that may be relevant to the development of the stock price. It is possible that smaller companies, or companies listed in the Small Cap list, have more asymmetric information, that may have been caused by, for example, lack of resources, as a result of which the yield of the share price since listing to the stock exchange has been, on average, negative.

3. EMPIRICAL RESULTS

This part covers the results, that are formed utilizing the appropriate sample and research methodologies. The assessment of underpricing will begin this part, followed by the other relevant results based on the already presented data. The other results include the evaluation of results of market capitalization and performance by using linear regression as well as venue and industry by using t test for independent samples, respectively.

3. 1. Underpricing

As seen from the tables A5 and A6, the median for underpriced stock in Small Cap list is 7.33 percentages, whereas the corresponding figure from the Mid Cap list equals 2.44 percentages. If the combine the lists, the median would be 4.44 percentages. In the Small Cap list, 12 out of 21 stocks could be considered underpriced. Mid Cap list, on the other hand, had 16 underpriced IPO stocks out of 30. Furthermore, one stock in the Mid Cap list was perfectly priced, meaning the initial offer price and closing price of the stock were equal. Out of all the stocks, IRRAS was the most overpriced (-71.64 percentages), and ITAB Shop Concept was the most underpriced (148.53 percentages). In the case of ITAB Shop Concept, the price of the stock was rather low, which indicates that small changes in the price can have a major effect on the percentage in change.

3. 2. Market capitalization

As mentioned, market capitalization, or market cap, refers to the total value of outstanding shares in a company, and it is calculated by multiplying the number of outstanding shares of a company by the value of an individual stock. Therefore, it can give a good estimate of the size of a company. In this research, the value of an individual stock is received from the first day closing price of each stock. The aim in this part is to test, whether the market cap has a correlation with underpricing. The hypotheses related to market cap presented earlier are as follows:

H_0: There is no correlation between market capitalization and underpricing of IPO.

H_1: There is a correlation between market capitalization and underpricing of IPO.

Furthermore, this part uses linear regression as well as Pearson correlation to further support the evidence. As for the linear regression, the table of coefficients is computed as follows:

Table 3: Coefficients, Market cap

	Coefficients	Standard error	t Stat	P value
Intercept	0.05	0.08	0.68	0.50
Market cap	5.24E-12	1.69E-11	0.31	0.76

Source: Nyemissioner (2023), Nordnet (2023)

After the necessary statistics, it can also be concluded that the multiple R equalled approximately 0.04, which in turn means, that the R square is approximately 0.002. R square essentially tells the amount of variance which the dependent variable, underpricing in this case, can be explained by examining the independent variable, or market capitalization (Miles 2005). This means that approximately 0.2% of the variation in underpricing can be explained by market cap. By using the coefficients presented above, it is possible to form the equation (7) of the regression line as follows:

$$Y = 0.00x + 0.05 \quad (7)$$

What this equation essentially tells is that the slope is nearly non-existent. In practise, this means that an increase in market cap has a minimal effect on the change of underpricing. What is also evident based on table 3 is that the p values are larger compared to the utilized alpha of 0.05. Therefore, it can be concluded that there is no observable correlation between market capitalization and underpricing of IPOs. This in turn results in accepting the null hypothesis H_0.

3. 3. Performance of stocks

For the performance of stocks, a similar test can be carried out. The aim in this part is to understand whether a significant correlation between performance of stocks and underpricing of IPOs exist. The hypotheses related to performance of stocks are as follows:

H_0: There is no correlation between performance of stock and underpricing of IPO.

H_1: There is a correlation between performance of stock and underpricing of IPO.

As in the previous part, linear regression and Pearson correlation are mutually utilized to support the evidence. For the linear regression coefficients, the table is constructed as follows:

Table 4: Coefficients, Performance of stocks

	Coefficients	Standard error	t Stat	P value
Intercept	0.07	0.05	1.47	0.15
Performance	-0.02	0.05	-0.28	0.78

Source: Nyemissioner (2023), Nordnet (2023)

After the statistics are completed, it is evident that the multiple R equals approximately 0.04. Therefore, it can be concluded that R square is 0.002. Therefore approximately 0.2% of the variation of underpricing can be explained by performance of stocks. With the coefficients, the equation (8) can be formed as follows:

$$Y = -0.02x + 0.07 \quad (8)$$

The equation reveals that the slope is slightly negative, meaning there exists a negative correlation between the performance of stocks and underpricing of IPOs. However, the slope still is quite horizontal. Another notable matter in the table are the p values that exceed the alpha of 0.05 used in this research. This means that correlation between the two variables do not exist, which results in accepting the null hypothesis H_0.

An alternative way to support the evidence is by using the Pearson correlation. As for the Pearson correlation, the formula for Pearson correlation coefficient is initially used, in which the Pearson coefficient, or r, equals approximately -0.04. This figure means that there barely is any correlation between the variables. When the Pearson coefficient is plugged into the t value formula, a value of -0.28 is received. As the t critical is again 2.0111, it can be concluded that, as the t critical is greater, null hypothesis shall be accepted.

3. 4. Venue

To further understand factors affecting underpricing, this research also aims to evaluate the venue's contribution. As stated before, this research consists of data from two venues, Small Cap and Mid Cap. By utilizing the t test, it is possible to examine how the venues correlate with each

other. Furthermore, the venues' role in terms of correlation with underpricing can be tested (Kim 2015).

This study uses two independent samples, Small Cap and Mid Cap venues, which have the median underpricings of 7.33% and 2.44%, respectively. By calculating the test statistics required to understand the possible correlation, the standard deviations of each sample are also computed (Kim 2015). For Small Cap, the sample standard deviation equals 0.26795, whereas the corresponding figure for Mid Cap equals 0.37682. With all the required information, the correlation table can be conducted as follows:

Table 5: T test for venues

Venue	Number of stocks	Underpricing in percentage
Small Cap	21	7.33%
Mid Cap	30	2.44%
T test	-	0.541

Source: Nyemissioner (2023), Nordnet (2023)

As seen from the table 5, the t test resulted in 0.541. To examine this figure, it must be compared with the t critical value. When calculating t critical, degrees of freedom is needed. That can easily be calculated by deducting 2 from the entire sample size, resulting in 49. With the significance of 0.05, and the test being two tailed, the t critical equals 2.010. As the result from t test sets to be smaller than t critical, it can be concluded that the two venues do not differ significantly.

3. 5. Industry

In the data, companies were divided into 10 industry groups. Companies' industries for this research have been conducted using the services of Nyemissioner (2023). For clarity, some companies were given broad industries to simplify the division. However, the companies still represent their assigned industry sufficiently well in this study. In the table 6, each industry is given the amount of underpricing in median percentage as well as the number of companies in each industry.

Table 6: Average underpricing in different industries

Industry	Number of companies	Underpricing in percentage
Medicine	18	4.81%
Services	10	-3.38%
Manufacturing	7	7.33%
IT	4	0.44%
Real estate	3	14.44%
Retail	2	14.45%
Media	2	4.84%
Energy	2	-12.64%
Durable goods	2	87.90%
Finance	1	17.24%

Source: Nyemissioner (2023), Nordnet (2023)

The table 6 reveals that the industry with the highest amount of underpricing is durable goods. However, as seen from the number of companies, only two existed, from which the other company, ITAB Shop Concept, had a staggering 148.53% of underpricing. As the sample sizes in most of the industries are particularly low, the results give an unreal image of the situation. Also, as seen from the table, only two industries overall were overpriced, from which the energy industry was more overpriced.

If the division between industries is further processed to reduce the amount of variation between them, industries can be divided into two groups to so called traditional and non-traditional industries. The following table represents underpricing in each of the industry groups, with underpricing measured as the median amount of underpricing in percentage, with 25 companies belonging in traditional industries and 26 companies in non-traditional industries.

Table 7: Average underpricing in traditional and non-traditional industries

Industry	Number of companies	Underpricing in percentage
Traditional	25	-0.53%
Non-traditional	26	4.81%

Source: Nyemissioner (2023), Nordnet (2023)

What the table above reveals is that, on average, the companies classified as operating in traditional industries had a slight overpricing of 0.53 percentages. However, underpricing in the so-called non-traditional industries amounted to 4.81 percentages.

3. 6. Discussion

As mentioned, there has been an average underpricing of 4.44 percentages in Nasdaq Stockholm over the selected time period. Compared to the results from the article conducted by Loughran et al. (2024), where the time period for IPOs spanned from 1980 to 2021, the result of this thesis is significantly lower. In the study, the amount of underpricing resulted in 28.2 percentages. However, it is evident that the study used several different venues, where the returns might differ significantly, for example due to different characteristics of companies in different venues. For example, some venues might emphasize growth-oriented companies, where the variance of returns are expected to be significantly more volatile. In addition, the regulations for IPOs especially in the earlier ones might cause the investors not to receive information in the level as in later IPOs, making the first day closing price differ from the IPO price in a notable manner.

Furthermore, these results can be considered quite low compared to so-called “hot” market situations when the pricing in the market in general is relatively high. A good example of this is the dot.com boom, where initial returns, on average, reached up to 72 percentages in 1999 (Adams et al. 2008). During these times, it is argued that pricing of IPOs can be explained by market changes in the structure of pre-IPO ownership as well as insider selling behaviour (Ljungqvist 2002). Ljungqvist (2002) continues by stating that the companies at that time were significantly riskier and less transparent, which encouraged higher initial returns. Similarities about the uncertainty can be found from the recent COVID-19 crisis. During the pandemic, in 2020, initial returns were observed to be close to 9.30 percentages higher than in the previous 40 years (Mazumder et al. 2021). Therefore, a vague statement regarding the results in this thesis can be made, that no radical phenomena in the market was present in the majority of the timeline in the IPOs covered in this thesis.

According to the t test, there was a slight difference between the venues. One influencing factor for the 5-percentage point difference might be the timing of the IPOs. As seen from tables A1 and A2, the IPOs in the Mid Cap venue are more heavily focused in the recent years, whereas the majority of IPOs occurred in the Small Cap venue are concentrated a few years further back. It is therefore possible that asymmetric information among investors has been significantly larger for Small Cap venue, as investors may not have had as developed tools for gathering relevant information compared to the very case of Mid Cap venue. As it has been stated, asymmetric

information is an essential factor in IPO underpricing, since investors with different views may find it difficult to find the true valuation of the IPO (Rock 1986).

As for the industries, it was evident that the so-called traditional industries were overpriced by 0.53 percentages, whereas the non-traditional ones were underpriced by 4.81 percentages. As the traditional companies have established their place in the stock exchange for a longer period, their pricing of the IPOs may be way easier than companies in the non-traditional industries, therefore giving a more correct valuation. Furthermore, it is possible that there might be some kind of an established standard to value the companies in the so-called traditional industries, as their types of operations are already known to some extent. As an additional note, it should be mentioned that among the traditional sectors there were companies whose price change of the offer price compared to first day closing price was heavily negative, therefore leading to overpriced IPO. For example, in the case of IRRAS, the IPO was 71.64 percentages overpriced. In this case, it should be noted that before the IPO, the company had had a growing negative net income for several years in a row, which might have affected the decisions made by investors (IRRAS 2023).

Going back to the market capitalization, the empirical results in this research revealed that correlation between market capitalization and underpricing does not exist by much. However, according to study conducted by Czapiewski et al. (2014), it was discovered that some kind of correlation between the company's size and amount of underpricing of IPO exists in Polish IPOs. The research concluded that smaller companies tend to have IPOs that are more underpriced compared to the larger ones. One reason behind this may be the limited amount of resources of smaller companies (Engelen et al. 2010). It should be noted, however, that the size of the company was measured in a different way. This theory is further supported by the analysis done for venues. As the results showed, the companies in Small Cap venue, the venue with companies that are generally smaller, had, on average, more underpricing compared to the ones in Mid Cap venue.

As this study only compared the performance of each stock in a one-year time frame, longer-time performance was completely excluded. In terms of long-term performance, Chan et al. (2001) suggest that a major determinant for firms' stock price long term lies in the operating performance of an individual firm. In practise, this means that the underpricing of an individual company's stock is significantly dissipated as a result of the company's performance. As some of the IPOs covered in this study were relatively fresh, it is quite challenging to do any comprehensive studies on long-term performance. However, by choosing already established companies in the stock market possibly from other markets also, this could be a rather interesting topic to study further.

One clear weakness in conducting this research was the relatively small size of the feasible sample, 51 in total. Due to the small size of the sample, it was possible for anomalous findings to have an unreasonably large impact on the results obtained. Additionally, the available data was relatively difficult or completely impossible to find, which significantly limited the implementation of the research, especially when forming the hypotheses. It was particularly difficult to find data from a longer period of time, as a result of which the period was forced to be kept quite moderate, as examining a longer time period would have made it more effortless to observe the effects of the economic cycles on the pricing of IPOs.

All in all, as the results yielded a relatively moderate underpricing, it can possibly be stated that the pricing of IPOs in Nasdaq Stockholm nowadays quite correctly correspond to the actual values of the companies being listed. It is therefore very possible that the markets in Sweden are transparent enough for investors to make their decisions based on correct and sufficient information.

CONCLUSION

The conclusion chapter presents and discusses the findings covered in the empirical part related to the research questions. As stated in the introduction part, the aim of this research was to understand if there has been underpricing in Nasdaq Stockholm in the given time period as well as the possible reasons behind those conclusions. This research sought to examine the underpricing of IPOs at a general level, thus excluding the possible company-specific factors influencing to the underpricing. In addition, this thesis also covered several theories on reasons for underpricing, and how they can be utilized when making decisions related to initial public offerings. The sample used in this thesis consisted of the initial public offerings of 51 companies listed in Nasdaq Stockholm Small Cap and Mid Cap venues during the period from March 2010 to September 2021.

The main research questions presented in this study were:

1) What factors contribute to the underpricing?
2) Has there been underpricing?

In order to answer the first research question, it is good to note that there can be quite many factors, that contribute to the underpricing of IPOs. It is therefore quite possible that some minor instances related to underpricing are not covered due to limitations. Based on the theoretical side of the study, it is rather evident that different markets average different amounts of underpricing. In conclusion, the openness of the market has a lot of influence on the underpricing amount. Furthermore, the markets that are considered to be more open tend to have more moderate amounts of underpricing. In other words, countries with more limited or asymmetric information have more underpricing. As Sweden as a market area can be considered quite open, the underpricing there is more towards the lower side.

Coming to the empirical results, it is clear that market capitalization, meaning the total value of all underlying shares of a company, has a minimal effect on the amount of underpricing. This means that the size of the company does not explain why underpricing occurs. This trend continues with the examination of the performance of stocks. After the comprehensive analysis both with t test and Pearson correlation, it was revealed that performance of stocks also did not contribute to the underpricing of IPOs to a great extent. When studying the venues, Small Cap and Mid Cap, there

were some differences. During the time period, Small Cap was underpriced 7.33 percentages, whereas the Mid Cap list was only 2.44 percentages underpriced. However, according to the t test, there was no significant difference among the venues. After the analysis, it was evident that, on average, Small Cap firms had a larger amount of underpricing compared to the ones in the Mid Cap venue. A vague conclusion, because of the rather small sample sizes, to this is that smaller companies, on average, yield a larger amount of underpricing. Other reason contributing to the underpricing might be the industry the company operates in. This study revealed that certain industries, especially the ones considered non-traditional, have, on average, more underpricing in their IPOs.

All in all, based on the selected time period from March 2010 to December 2021, the results concluded that, as a whole, there has been an average underpricing of 4.44 percentages in Nasdaq Stockholm. To answer the second research question, it can be concluded that, in fact, there has been underpricing.

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APPENDICES

Table A1: Small Cap company specific information

Listing date	Company	Initial offer price	Closing Price	Industry
01.05.2011	Moberg Pharma	29.00	21.60	Medicine
25.04.2014	Saniona	5.00	5.89	Medicine
01.06.2014	HANZA	29.00	25.49	Manufacturing
01.03.2015	Cantargia	7.60	9.894	Medicine
21.05.2015	Transtema Group	3.80	5.08	IT
30.11.2015	Immunovia	18.50	26.35	Medicine
10.12.2015	Vicore Pharma Holding	6.00	6.31	Medicine
25.07.2016	Maha Energy	4.75	3.592	Energy
25.11.2016	Alligator Bioscience	32.50	31.02	Medicine
24.02.2017	Oncopeptides	46.00	44.30	Medicine
11.04.2017	Actic Group	50.50	46.75	Services
28.09.2017	XSpray Pharma	22.00	33.00	Medicine
23.10.2017	Ferronordic Machines	150.00	161.00	Manufacturing
20.11.2017	IRRAS	45.00	12.76	Medicine
16.04.2018	Infrea	22.00	19.00	Manufacturing
11.12.2018	Q-Linea	68.00	67.39	Medicine
11.03.2019	Ascelia Pharma	25.00	27.86	Medicine
21.09.2020	Readly International	59.00	64.71	Media
30.03.2021	Pierce Group	64	72.00	Retail
27.05.2021	Arla Plast	46	58.00	Manufacturing
10.06.2021	Sleep Cycle	70	79.80	Medicine

Source: Nyemissioner (2023), Nordnet (2023)

Table A2: Mid Cap company specific information

Listing date	Company	Initial offer price	Closing price	Industry
24.03.2010	Arise Windpower	55.00	54.00	Energy
12.06.2014	Besqab	73.00	65.84	Real estate
03.02.2015	XBrane Biopharma	42.5	31.66	Medicine
06.02.2015	Eltel	68.00	46.54	Services
13.02.2015	Dustin Group	50.00	58.20	Retail
25.03.2015	Hoist Finance	58.00	68.00	Finance
24.04.2015	Tobii	25.00	16.72	IT
16.06.2015	Coor Service Management	38.00	37.80	Services
30.11.2015	Attendo	50.00	72.00	Services
02.12.2015	Scandic Hotels Group	67.00	45.18	Services
03.12.2015	Camurus	57.00	61.34	Medicine
15.06.2016	AcadeMedia	40.00	52.86	Services
31.03.2017	Ambea	75.00	74.50	Services
21.06.2017	BONESUPPORT HOLDING	29.00	30.10	Medicine
21.06.2017	Sedana Medical	19.50	5.875	Medicine
23.03.2018	Green Landscaping Holding	21.00	19.72	Services
29.06.2018	Calliditas Therapeutics	45.00	47.00	Medicine
11.04.2019	Karnov Group	43.00	43.00	Media
05.06.2019	John Mattson	90.00	103.00	Real estate
30.06.2020	Genova Property Group	65.00	82.00	Real estate
22.10.2020	Nordic Paper Holding	43.00	42.00	Manufacturing
09.12.2020	Fasadgruppen	60.00	78.00	Manufacturing
21.05.2021	ITAB Shop Concept	7.50	18.64	Durable goods
28.05.2021	Linc	67.00	85.00	Medicine
04.06.2021	Mildef Group	36.50	36.90	IT
01.07.2021	Profoto Holding	66.00	84.00	Durable goods
24.09.2021	CTEK Holding	69.00	119.45	Manufacturing
15.10.2021	Netel Holding	48.00	47.90	IT
29.10.2021	Synsam	50.00	54.00	Services
09.12.2021	Norva24 Group	36.00	31.40	Services

Source: Nyemissioner (2023), Nordnet (2023)

Table A3: Performance of Small Cap venue stocks

Moberg Pharma	10.69%	Actic Group	-23.84%
Saniona	220.03%	Ferronordic Machines	-17.76%
HANZA	-62.69%	IRRAS	-9.72%
Cantargia	-29.36%	Infrea	34.74%
Transtema Group	380.31%	Q-Linea	-19.87%
Immunovia	188.80%	Ascelia Pharma	-36.47%
Vicore Pharma Holding	173.53%	Readly International	-52.12%
Maha Energy	61.47%	Pierce Group	-61.11%
Alligator Bioscience	-29.17%	Arla Plast	-25.86%
Oncopeptides	86.23%	Sleep Cycle	-47.43%
XSpray Pharma	188.48%		
Median			-17.76%

Source: Nyemissioner (2023), Nordnet (2023)

Table A4: Performance of Mid Cap venue stocks

Arise Windpower	-16.88%	Green Landscaping Holding	45.59%
Besqab	31.38%	Callidas Therapeutics	34.47%
XBrane Biopharma	19.77%	Karnov Group	32.79%
Eltel	4.49%	John Mattson	38.25%
Dustin Group	-9.67%	Genova Property Group	28.05%
Hoist Finance	16.91%	Nordic Paper Holding	-8.57%
Tobii	59.45%	Fasadgruppen	112.05%
Coor Service Management	9.79%	ITAB Shop Concept	-43.24%
Attendo	0.69%	Linc	-22.88%
Scandic Hotels Group	15.74%	Mildef Group	90.24%
Camurus	77.99%	Profoto Holding	25.48%
AcadeMedia	11.43%	CTEK Holding	-54.51%
Ambrea	-28.00%	Netel Holding	-35.80%
BONESUPPORT HOLDING	-66.64%	Synsam	-6.30%
Sedana Medical	246.38%	Norva24 Group	1.27%
Median			13.58%

Source: Nyemissioner (2023), Nordnet (2023)

Table A5: Underpricing by company in Small Cap list

Moberg Pharma	-25.52%	Actic Group	-7.43%
Saniona	17.80%	Ferronordic Machines	7.33%
HANZA	-12.10%	IRRAS	-71.64%
Cantargia	30.18%	Infrea	-13.64%
Transtema Group	33.68%	Q-Linea	-0.90%
Immunovia	42.43%	Ascelia Pharma	11.44%
Vicore Pharma Holding	5.17%	Readly International	9.68%
Maha Energy	-24.38%	Pierce Group	12.50%
Alligator Bioscience	-4.55%	Arla Plast	26.09%
Oncopeptides	-3.70%	Sleep Cycle	14.00%
XSpray Pharma	50.00%	–	–
Median			7.33%

Source: Nyemissioner (2023), Nordnet (2023)

Table A6: Underpricing by company in Mid Cap list

Arise Windpower	-0,91%	Green Landscaping Holding	-6.10%
Besqab	-9.81%	Callidas Therapeutics	4.44%
XBrane Biopharma	-25.51%	Karnov Group	0.00%
Eltel	-31.56%	John Mattson	14.44%
Dustin Group	16.40%	Genova Property Group	26.15%
Hoist Finance	17.24%	Nordic Paper Holding	-2.33%
Tobii	-33.12%	Fasadgruppen	30.00%
Coor Service Management	-0.53%	ITAB Shop Concept	148.53%
Attendo	44.00%	Linc	26.87%
Scandic Hotels Group	-32.57%	Mildef Group	1.10%
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