The Degree of Underpricing in the Swedish Market

An analysis of the most relevant factors influencing IPO underpricing between main and secondary markets

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Abstract

Underwriters evaluate the optimum price of IPO issued shares and conduct underpricing based on a higher degree of risk and information asymmetry. These are calculated under a series of determined risk proxies that adjust the most suitable offering and opening price of IPOs in both main and second tier markets.

Quantitative results are obtained by regression analysis and t-test. It is verified that the degree of underpricing differs between main and second tier markets and this difference influences the risk proxies and the underwriters differently when evaluating the optimum price of IPOs.

This study performs a comparison of eight risk proxies; market volatility, age of the firm, leverage book value, earnings per share, bank prestige, leverage and IPO activity between the OMX as representative of the main market and Aktietorget as representative of the second tier market. The comparison reveals how these risk proxies influence the underpricing of an IPO in different Swedish stock markets.

A theoretical analysis, backed by 101 observations of several newly listed IPOs during the period from 2003 to 2013 indicates that IPOs in the secondary tier market are more underpriced than IPOs listed in the primary market. Regarding the influences from the variables, book value and market volatilities seem to have a strong influence on the degree of underpricing, in addition to the finding that there is no relation between the independent variables and underpricing of IPOs listed in the Aktietorget, it suggests that further research must be conducted in this area.

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Xiaofan Hu & Lars Andreas Sundberg

1. Introduction

Once a start-up begins to generate enough capitalisation, it has two options: be sold or join the public market. Joining the public market can help a company to grow quickly and can also provide the current investors and founders with an opportunity to "cash out" (Latham and Braun 2010, p. 666). Most companies decide to conduct an Initial Public Offering (IPO), which is the first issue of that company's shares to the public market. Once a company conducts an IPO, it has access to more potential investors. For IPO issuers, such access to a large number of investors increases their opportunities to obtain sufficient funds to expand their future financial operations. Meanwhile, investors have an opportunity to generate substantial gains if the IPO grows properly. IPOs present a higher degree of risk compared with normal stocks due to uncertainties and a lack of previous financial information. The risk associated with an IPO's valuation is determined by conducting a financial study. For this type of study, a specialised institution called an underwriter determines the optimum price by considering the actual value of the IPO company by evaluating its available information. If underwriters cannot verify or develop a thorough financial valuation, they will minimise any uncertainty by reducing the price associated with the IPO's shares; this process is called "underpricing".

Although, the IPO firm can decide to list in several markets to suit and support its financial needs better, according to Vismara, Paleari and Ritter (2012, p. 354-356), public markets are segmented into main and second-tier markets, and they differ in a variety of areas. One therefore questions how the degree of underpricing behaves or differs in those markets.

In this study, we are primarily concerned with the perceived degree of risk and further underpricing of an IPO in the Swedish market. According to a Swedish Central Bank report (2013, p. 8-9), risk management is undertaken by financial institutions as intermediaries that protect companies and individuals by different risk proxies. Liu and Ritter (2011, p. 579-580) refer to these institutions as underwriters, which typify the degree of risk by underpricing an IPO. The price of an IPO provides information about a company in terms of its financial performance, sector, and its needs and goals to be achieved in the public market. As intermediaries, the underwriters rely on this information and determine a price at which to offer the shares to investors. However, the amount of information provided and the amount of information required generates information asymmetry between issuers, investors and the underwriters themselves. From the Swedish Central Bank report (2013, p. 7), the financial regulations proposed in the main market are meant to reduce the degree of information asymmetry and minimise the degree of underpricing.

Underpricing therefore minimises risk and ensures a profitable deal for both issuers and underwriters. Even if strong market regulations can limit information asymmetry, there is always a degree of information asymmetry in order to obtain financial gains or compensation. In this sense, we consider issuers, underwriters and investors as human beings with their own personal interests, which may lead to a lack of transparency and different actions that may impair their integrity. As a result, this research will provide us with a better understanding of how underwriters develop their financial valuations and how IPOs behave in both the main and secondary markets.

1.1. Background

The following chapters will introduce the role of the Swedish financial market, the characteristics of Initial Public Offerings (IPOs), and the main actors involved in the pricing process. Our consideration of the pricing process will be focused on price variation during the first day of trading.

1.1.1. Nordic Stock Market

The most well-known Swedish stock market for public trading is NASDAQ OMX Nordic. This market offers a trading place for stock and options across Sweden, Denmark, Finland and Iceland. As postulated by Trading Technologies International, Inc (2013, p. 1), NASDAQ Nordic is one of the more liquid equity and derivatives markets compared to other European market places. NASDAQ OMX consists of over 38 different interconnected markets and provides technology that enables a rapid flow of information. It is an attractive platform for investors to conduct trading activities on. "OMX pushing Nordic convergence" (2005) – a specialised business article about new trends of futures, options and derivatives – revealed that the consolidation of the NASDAQ OMX marketplace raised the market's transparency and efficiency by standardising regulations among the participating countries. The consolidation of all of the Nordic countries makes OMX Nordic an open window between Nordic countries and a point of reference for international trading.

1.1.2. A General Overview of the Swedish Market

There are many different aspects to the Swedish stock market that make it interesting and dynamic for investors. Jorion and Goetzmann (1999, p. 960-961), after studying 39 different markets including major markets in different regions, revealed that the Swedish market displayed real returns (geometric returns compounded annually) at a high level of 4.29%, which is quite close to the 4.32% obtained by the US stock market between the years 1921 and 1996 (Fig. 1). They also observed that high returns were partially accumulated in recent periods because the Swedish market avoided the major financial upheavals in that century. This identifies Sweden as one of the strongest financial powers in the world, making it very attractive for both domestic and foreign investors to obtain ownership over several Sweden-listed companies. There are currently 270 companies registered on NASDAQ Stockholm (Swedish Central Bank, 2013, p. 53-62). Despite its relatively small size compared with other major stock exchanges, the Swedish stock market has made numerous leading achievements during its lifetime – it was the first automated trading market in 1990 as well as the first market to integrate both a derivative and a clearing system in 1994 ("NASDAQ OMX", 2104).

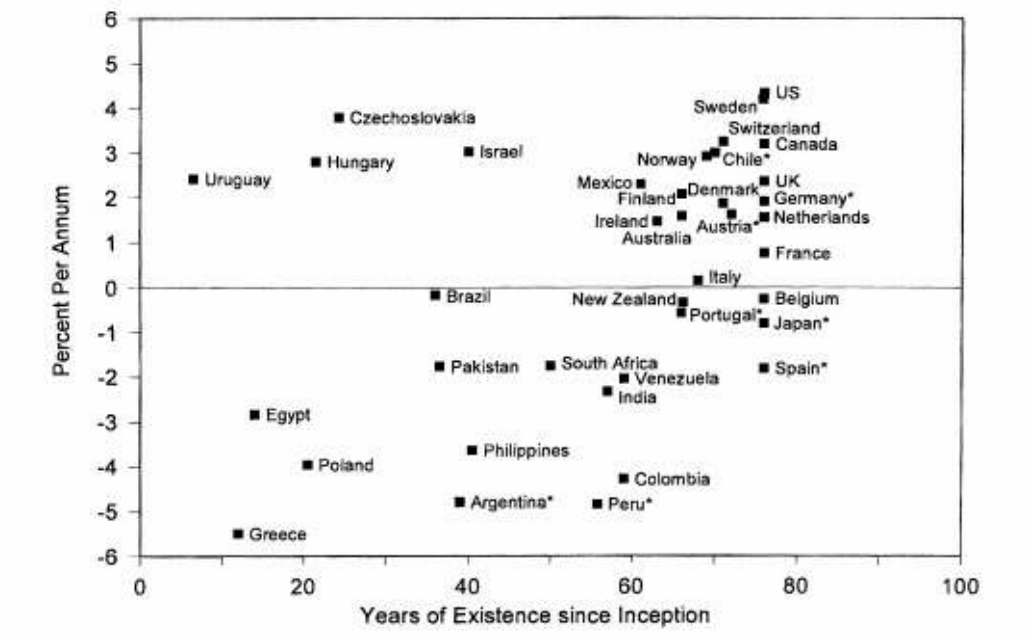

Fig. 1 Real Return per Annum vs Years of Existence (Jorion and Goetzmann 1999, pp. 960-961)

The Swedish marketplace has two differentiated categories – the main market and Multilateral Trading Facilities (MTFs) as a second-tier market. Companies that are listed within a first-tier market such as the NASDAQ OMX must comply with the Swedish legislation and requirements stated by the Swedish Financial Supervisory Authority (SFSA). These regulations demand a higher degree of external supervision and information transparency.

On the other hand, second-tier markets tend to be less regulated, which leads to lower entry costs and requirements (Vismara et al., 2012, p. 377). It is therefore a suitable option for newer and smaller companies to be listed on these markets. Some of the Swedish second-tier markets are First North, Nordic MTF, Burgundy and Aktietorget.

The differences in the valuation of companies on the main market and the second-tier markets are due to the degree of integration of the respective market. The second-tier market is less integrated than the main market in terms of the limited accessibility of liquidity and smaller investor base. In places like China, investors tend to pay a higher initial price for IPOs that are listed in the less integrated market, which results in a higher initial return. On the other hand, long-run IPO performance in second-tier markets in Europe is poorer than that of the main markets (Vismara, Paleari and Ritter, 2012, p. 382-383). This implies that investors tend to be very sceptical about IPO firms that are listed on a relatively less regulated market in the long run (Vismara, Paleari and Ritter, 2012, p. 382-383). In this study, we will investigate IPO initial return characteristics on the main and second-tier market.

1.1.3. Motivation for IPO

According to Myers and Majluf (1984, p. 219-220), companies have different incentives to prioritise their sources of financing. Companies' decision to go public most often begins with a need for financial support to expand their market share or fund a profitable project. In this particular sense, all listed companies require an efficient issue of new shares to attract investors and gain momentum. The main challenge for many companies planning to go public is to convince investors to be fully committed and participate in their IPO, despite any uncertainty and a lack of available previous financial records or published information (Sahoo and Rajib, 2011, p. 38). However, the lack of previously recorded information adds a new dimension of risk that is directly reflected in the underpricing of IPO shares, which

compensates investors with a higher initial return (Benveniste, Erdal and Wilhelm, 1998, p. 745).

Regarding the decision to bring an IPO to the market, Zingales (1995, p. 426-427) stated that firms stand to benefit in an acquisition scenario if they are publicly traded rather than sold outright. This is due to the continuous valuation and media coverage of a publicly traded company, which increases public awareness and its own liquidity. An IPO also provides venture capitalists with an exit strategy to sell their shares in a liquid market place in order to cash out (Ritter and Welch 2000, p. 5). Furthermore, Chemmanur and Fulgheri (1999, p. 272-273) argued that current shareholders from the issuing firm have a strong need to diversify their portfolio. Therefore, they need to gain access to a large number of investors to improve the diversification of the firm's equity. Chemmanur and Fulgheri (1999, p. 250) revealed that an IPO allows more dispersion of share ownership compared to keeping the company private. Diversification plays an important role in the degree of IPO return achieved in the short run. The pre/current IPO shareholder, whose portfolio is undiversified due to their exposure to a single firm, is unlikely to pay a higher price than the public investors who are already diversified. Therefore, in order to bring more capital to a firm, gaining access to diversified shareholders is good. However, small firms still in the earlier stages of development are less optimal to go public than larger firms (Chemmanur and Fulgheri, 1999, p. 250).

1.1.4. IPO Underpricing in the Swedish market

Information asymmetry is an important indicator for IPO underpricing. In an environment where high information asymmetry exists, the offering price is usually lower (Cheung and Krinsky, 1994, p. 745). Regarding uncertainty and information asymmetry, previous studies mentioned that the issuer has superior knowledge of its own operations compared to uninformed investors (Chemmanur and Fulghieri, 1999, p. 252-253). During the process of setting an offering price, the issuer automatically takes the behaviour of informed investors into account. Therefore, by observing the offering price, uninformed investors could infer the demand-supply equilibrium between the issuers and the informed investors. Jain and Kini (1994, p. 1700) stated that information asymmetry could also be the main reason for a decline in performance in post-IPO periods. Greater information asymmetry drives higher underpricing, and a high degree of underpricing can become problematic for issuers if the IPO fails to deliver sufficient financing for the floated company to keep growing, which would have a negative impact on investors.

1.1.5. How Investors Operate in the Swedish market

According to the Swedish Central Bank (2013, p. 54-55), investors in the Swedish stock market are very active and widespread. The total capitalisation of the Swedish stock market is SEK 3.9 trillion. Foreign investors have been a big player in the Swedish marketplace since 1996, accounting for 40% of the total SEK 3900 trillion. On the other hand, the total share ownership by direct investing (not investment banks) from Swedish households is less than 11%. This big disparity suggests that NASDAQ OMX Stockholm is an attractive destination for foreign investors.

Furthermore, previous studies regarding the Swedish stock market revealed particular traits about how Swedish investors operate and hold the higher percentage of shares. Abrahamson, de Ridder and Råsbrant (2011, p. 10) stated that there is a clear difference in the initial return between institutional and individual investors. Institutional investors seem able to identify firms with a higher degree of initial return. This suggests that these investors are better

informed than individual investors, indicating the existence of information asymmetry between these two groups.

Rydqvist, (1997, p. 305) in a study looking at the Swedish market before and after 1990, revealed that 42% of IPO issuers tend to favour certain investors, with most of them tending to reserve quotas accounting for an average 65% of the entire IPO. The study revealed that most of the targeted investors establish the IPO as a private placement by the connection sharing between the issuer and the investment bank. As Abrahamsson, de Ridder and Råsbrant (2011, p. 10) and Rydqvist (1997, p. 305) stated, higher initial return followed by a higher degree of underpricing suggests some sort of compensation.

1.2. Problems and Discussions

The IPO's first trading period usually carries higher returns than the market average. During the process of bringing an IPO to market, Ritter and Welch (2002, p. 1803) discussed the difficulty of explaining the abnormal average of first-day return using the fundamental asset-pricing model. The high variation between returns on the first market day and the second is the reason why such returns are unlikely to be linked to a company's fundamental factors because fundamentals do not change that rapidly.

Ritter and Welch (2002, p. 1810) argued that there is a tendency to maximise buy-side profit by underpricing the issue, which is a practice named by underwriters as 'money left on the table'. Such practices not only favour buy-side clients, who receive large compensation, but are also used to compensate executives from other prospective IPOs in a process known as 'spinning'. Therefore, underpricing becomes a tool for providing a mutual benefit in terms of financial gains between underwriters and investors for pooling their investments. This kind of practice is controversial due to its unethical approach. Ritter and Welch (2002, p. 1810) refer to the practice of underpricing, where compensation for bringing an IPO to the market becomes the main objective for some investors, as unethical behaviour. Underpricing is more common and frequent when IPOs are perceived as high risk. Substantial gains can be derived from such issues (Sahoo and Rajib, 2011, p. 42).

Underwriters' inability to determine the exact risk of prospective IPO companies leads them to search for other informaion to determine the first opening-trading price. Ritter and Welch (2002, p. 1803), Sashadev and Rajib (2011, p. 41) and Ritter and Liu (2011, p. 598) revealed that IPOs with higher underpricing, as a result of higher expected risk, generate higher returns during the first trading day on the behalf of informed investors. From the literature, information asymmetry means the issuer and/or underwriter has more information than the investor regarding an IPO firm's financial performance and a higher degree of flexibility in setting the price of the company's shares. As a result, IPO firms want an issuer who can deliver their shares to target investors and ensure rapid market penetration. In return, by larger underpricing of the IPO, the issuer provides a premium as compensation to investors who are willing to purchase shares with higher expected risk attached to their IPO.

Nonetheless, an underwriter's reputation is crucial in terms of pre-market underwriter activities, which are also related to the issue-date return. Michaely and Shaw (1995, p. 28) suggested that IPOs are perceived as less risky if due diligence[1] is performed by more prestigious underwriters as their track record and previous performance carrying out other

[1] Reinoller (2013, p. 55) discusses the process of due diligence as the disclosure of the real valuation of a company, which can be the fundamental factor to influence decisions over future investments.

IPOs can be considered. Historical performance information can be used to deduce how well a future IPO will perform on the initial trading day. Richard et al. (2002, p. 213) suggest that the proper IPO valuation considerations should take the underwriter's reputation and pre-market activities into account.

In recent years, we have seen many Swedish companies, such as Spotify and King, strive to be registered on larger stock exchanges. This could be because liquidity in the main market is usually better than that in the secondary market (Vismara, Paleari and Ritter, 2012, p. 367-370) but the degree of underpricing is usually lower in the secondary market compared to the first-tier (Vismara, Paleari and Ritter, 2012, p. 361). Larger and older companies usually choose to be listed on the main market where liquidity is better (Vismara, Paleari and Ritter, 2012, p. 361). This may also be the underlying factor for the Nordic market harmonisation that took place in 2006 to attract better quality firms. There are usually differences in regulatory requirements between first- and second-tier markets. According to Vismara, Paleari and Ritter, (2012, p. 367-370), 16.3% of all companies that are listed on second-tier markets expect fewer regulations. Furthermore, another 20.3% expect greater flexibility, 31.7% aim for lower costs, and 6% expect greater possible growth. However, since the requirements, cost and regulations are lower in the second-tier market than in the more established marketplace, it promotes smaller firms to accumulate finance. When a company can gather capital to fund its profitable projects, we would expect higher growth. Vismara, Paleari and Ritter (2012, p. 370) found that market transfer is very common in the second-tier market whereas successful companies will eventually strive to be listed on the main market. Nevertheless, 30.9% of all companies pursue market listing for merging and acquisition reasons. When a company's equity becomes more liquid through public trading, it is more attractive for potential investors. Discussing the differences between the main market and the second-tier market leads to an interesting question concerning the differences in IPO performance between two major Swedish markets: Aktietorget and Nasdaq OMX Nordic[2].

However, as previously discussed, the Swedish financial markets have two different market categories that have different degrees of regulation, cost and flexibility. Few studies have examined whether the degree of underpricing in the main market is higher or lower than in the secondary markets due to the differences in information asymmetry. Therefore, the study of the underpricing phenomenon within both the OMX Nordic and the rest of the Swedish market is of particular interest.

1.3. Research Question

What are the most important factors influencing IPO underpricing in the main and second-tier markets in Sweden?

1.4. Purpose

A dual analysis of two different markets that operate within the same environment will initially provide a better understanding of how high disclosure and high regulations can affect

[2] Vismara, Paleari and Ritter (2012, p. 367) reveal newly listed IPO performance to be dramatically lower in new markets than in the main market. Also the degree of underpricing seems to be higher in second-tier markets, which can be the result of less regulation and monitoring. In this sense, since Aktietorget is one of the less regulated markets in comparison to the NASDAQ OMX Nordic, it may suggest that the degree of underpricing and information asymmetry is higher.

the degree of underpricing in newly listed IPOs. To evaluate the degree of underpricing, we will use risk proxies to see if a difference between the main and second-tier markets exists. Also, as previously discussed, establishing the differences between the main and second-tier markets provides a better insight to assess the variables that reduce information asymmetry.

1.5. Delimitations

First, the study only analyses underpricing practices and its influential factors within the Swedish market. These results may not apply to other markets due to different regulations, actual market environment, and underwriter-investor relations based on cultural inferences and overall experience. However, this study may be a good reference point for further studies on the markets similar to the Swedish market, such as other Nordic markets and, more specifically, most Western countries.

Second, the approach that this paper takes towards analysing underpricing incorporates a limited number of factors from the theoretical framework; the findings therefore do not give a complete representation of all of the possible indicators that may influence both processes. Also, other minor indicators that differ between the main and second-tier markets have been viewed as inessential for the current study and therefore omitted. Since the study is based on comparing financial performance and underpricing activities between both markets, common indicators would provide more realistic figures, which may limit errors and deviations in the subsequent results. However, the study will be a close representation of a study using all the possible indicators.

Regarding time constraints, data for the research analysis has been taken from a period of ten years: 2003 to 2013. The decision to limit the study to a ten-year period was due to information accessibility and to limit errors. However, the 2007–2008 financial crisis, which had a catastrophic impact on the global financial system, has been taken into account. The study will also tackle the underpricing phenomenon by using recent data, which gives us the latest updates about Swedish underpricing behavior, which may not have been largely researched before. At the same time, from an investor perspective, we will have a better understanding of the profit that is inherent in Swedish IPOs both in the main and the second-tier markets.

1.6 Contribution

Underpricing is a very common phenomenon that happens in IPOs (Liu and Ritter 2011, p. 579-580). This study will analyse the main reasons behind underpricing, the main factors that influence it, and the differences between the first- and second-tier markets. Through collecting and analysing Swedish market data, we will study the level of underpricing in the market, which may give guidance for issuers and investors and provide a reference for further research in the Swedish stock market.

Investors behave differently in different market environments. Holm and Rikhardsson (2006, p.38) suggested that enviromental effects have the potential to influence investors' investment allocation decisions. Prior to this study, few studies had investigated IPO underpricing in the Swedish market. Compared with North American markets, such as the US stock market, the Swedish market has its own unique features. Therefore the research findings for the US, Asian and other markets cannot be directly applied to the Swedish model.

Throughout the literature review, we find a significant relationship between signaling effects and IPO underpricing. Various theories have strived to understand IPO underpricing. Most of

them have accept the signaling effect as the main explaination for the phenomenon (Karlis, 2000, p.81). Although, compare to the empirical evidence in the other countries we found that the signaling effects could not sufficiently explain the underpricing phenomenon in the Swedish market place. However, this study initially establishes a better understanding of the underpricing mechanism through the theoretical explanations that have been well defined in other major financial markets. effects in the Swedish market has its own feature, and the variables that was adopted in Furthermore, from an investor's point of view, it also discusses the relationship between risk and return and builds a foundation for an investment strategy which may help investors to better achieve their financial goals. More importantly, through better understanding of the behaviour and mechanism of IPOs, this paper may help to enhance market efficiency and reduce information asymmetry among market participants.

2. Literature Review

This chapter highlights the factors that may influence underpricing. We will first clarify the pricing process and how to determine the degree of underpricing. Furthermore, we will explain the relationship between underpricing and information asymmetry. We will finish by providing the hypothesis of this study.

2.1 Pricing Process

To understand the incentive of underpricing, we start with the fundamental concept of how IPOs are priced. We will then describe some common approaches to pricing an IPO.

IPO pricing must rely on several factors due to the lack of public market performance and standardised financial data. Therefore, pricing an IPO is complicated and requires prudently revising the legal and economic aspects of the company in order to identify the risk factors. Such a process is also known as due diligence. Due diligence is performed by specialised accountants who make sure all historical financial data are correct in order to support the price valuation while diminishing the risk of overvaluation. All risk factors must be disclosed in the prospectus (D'Agostino, Hellgren and Fröderberg 2007, p. 12).

The process was further described by D'Agostino, Hellgren and Fröderberg (2007, p. 12) who suggest that the pricing decisions are made by the underwriter using several approaches. The goal is to settle a final price that best reflects a fair valuation. One way is to compare the company with an identical listed company, which is engaged in the same business sector and has the identical intrinsic value or cash flow. Ritter and Welch (2002, p. 1816) argue that the offer price can be hardly explained by the fundamental valuation approaches. One of the most common fundamental approaches is to compare firms with similar products and operations. However, there are problems incorporating price multiples from a comparable candidate that is traded publicly. The multiples are often partly based on the book value and, more importantly, based on the expectations and forecasts of that particular company.

D'Agostino, Hellgren and Fröderberg (2007, p. 17) state that book-building is a conventional way to settle the price for bigger IPOs. In order to have more pricing flexibility, the underwriter settles a price interval. Later on, institutional investors have to participate in a price auction to acquire share allocation. It is the underwriter's job to sell the shares in the most profitable manner.

Fixed valuation is intended to carry higher underpricing while book-building seems to show a lesser degree of underpricing (Sahoo and Rajib 2011, p. 40). Sahoo and Rajib (2012, p.76-77) found that all other things are equal, the higher the market average price over earnings ratio (P/E), the higher the price premium that can be added to the IPO initial offering price. This is possible because of the high-risk appetite in the market. They also discover that book-building involves close contact with potential investors. IPOs are especially more aggressive when priced by the book-building method during a period of high invesetor expectations. Sahoo and Rajib (2012, p. 75-79) revealed that firms are valued higher during periods with higher IPO activity. In this study, IPO activity will be one of the indicators taken into consideration.

2.2 Information Asymmetry

Information asymmetry is an important factor behind IPO underpricing because the whole

idea of underpricing is more or less based on the asymmetry of information that creates fluctuations in the price at the initial trading period. Information asymmetry has many dimensions. To better understand the incentive for underpricing, we have to tackle the problem from various angles.

The existence of information asymmetry is one of the reasons for IPO underpricing. It starts with the assumption given by Ritter and Welch (2002, p. 11) describing that under normal conditions the issuer has more available information related to its internal projects and that investors, on the other hand, are more informed about the demand on the general market regarding the firm being issued. Information asymmetry can play a determinant role to ensure financial gains over informed investors. High information friction or asymmetry could cause larger underpricing (Sahoo and Rajib 2011, p. 41). Welch and Ritter (2002, p. 11) described that under the assumption of the issuer being more informed than investors, the investors tend to believe that only low quality issuers are willing to sell their shares at the average price. That is why issuers tend to differentiate themselves by underpricing – it indirectly prohibits imitation by lower quality issuers.

Asymmetric information could be beneficial. Both underwriter and investor have an incentive to conceal "relevant" information in order to benefit themselves. (Benveniste and Spindt, 1989, p. 344). Although the issuing firm and its underwriter usually have more information than individual investors on the market, they do not know more than all investors from the market combined (Rock 1982, p. 190). However, Loughran and Ritter (2004, p. 8-9) described that the management of information asymmetry and its influence allows underwriters to manipulate share allocation that favours targeted investors. Rock (1982) developed a model to measure the pricing and the share allocation relationship between informed and uninformed investors. He claimed that those uninformed and informed investors are competing for shares that are selling at less than their intrinsic value. In situations like this, the underwriter practises quantity-rationing. On the other hand, informed investors have no desire to participate in IPOs that are priced above their intrinsic values. Therefore, only uninformed investors would be interested in participating. Consequently, all shares are allocated to the uninformed investor at a discount. The amount of discount depends on the uncertainty about the firm. Uninformed investors have to be compensated for the cost which they spend gathering their information (Ritter, 1984, p. 220). Karlis (2000, p. 83) stated that uninformed investors are more likely to be facing overvalued IPOs as a result of the competitive advantage given to informed investors to crowd out the uninformed investors in undervalued IPOs. Benveniste, Erdal and Wilhelm (1998, p. 745) argue that to ensure participation in overvalued IPOs and balance out the "unfairness" toward uninformed investors, uninformed investors receive a small allocation at larger discount in profitable IPOs.

2.2.1. Information Asymmetry Between Issuers and Investors

Sahoo and Rajib (2012, p. 61-62) discussed how information asymmetry could cause investors to react by the signalling effect to make decisions about the companies in which they should invest. Signal effects are associated with the information available during the period before and after listing. For example, one of most essential signals could be ownership retained by pre-IPO shareholders. Higher retained ownership of pre-IPO shareholders sends a signal that the IPO is of higher value. Signalling effect is therefore one of the theories used to explain IPO underpricing. The assumption of the theory starts with the issuer having perfect information about its own value and the investors being relatively uninformed compared to the issuers. These signaling effects can be motivated by several factors. First, if pre-IPO shareowners retain their shares after the company's share is traded on the public market, this

behaviour would logically signal a higher value to outsiders, which will lead to an opportunity for them to sell their shares at a higher price at a later stage. Second, an IPO can intentionally underprice its shares to gain publicity and media attention which simultaneously provides value to investors. This signaling effect is more frequent on smaller IPOs who need to draw investor attention and offset uncertainty. There are also signal effects that are reflected in the book, such as the carrying value of the debt and equity. Sahoo and Rajib (2012, p.78) stated that IPOs with high leverage (D/E) are more underpriced because they are perceived as being more risky. Latham and Braun (2010, p. 672) higher leveraged IPOs being associated with a lack of resources to finance their own operations, which can be detrimental to the IPO taking long-term performance into account. Higher leverage may cause the IPO to default if the issuing company is unable to cover its liabilities. Therefore, investors require a higher risk premium to invest in a firm with higher leverage.

Another type of signaling effect is the use of prestigious underwriters. An investor will be more willing to invest in an IPO whose statements are accurately analysed. Therefore, an IPO that relies on prestigious or highly reputable underwriters will be more attractive to investors due to positive perceptions of the company (Karlis, 2000, p. 84). The existence of information asymmetry allows the issuer to establish a price consensus towards the uninformed parties and to generate signal effects or to make the company more attractive (Sahoo and Rajib, 2012, p. 62). Since we know how to measure the degree of underpricing, the next stage of this study will be to use variables that have signal effects to determine the relationship between the various variables and the degree of underpricing that results.

2.3 Underpricing Process

The purpose of this section is to clarify underwriters' incentives to underprice IPOs and how to identify the degree of underpricing by the degree initial return. The foundation given to IPO underpricing in this study starts with the definition given by Saunders (1990, p. 3) who stated that *"the prices of firms offered to the public for the first time are, on average, set below the prices investors appear willing to pay when the stocks start trading in the secondary market"*. This phenomenon is related to the concept of money left on the table; it is the first inference between opening and closing price during the first trading period.

Baron (1982, p. 955-975) claimed that underwriters' function will be influenced by the total amount of information obtained by the issuer. In this assumption, the underwriter, as a bank entity, can perform three different activities such as underwriting, advising and distribution. When the issuer possesses equal amounts of information as its underwriter, then the underwriter limits its activities towards distribution. However, if the issuer is less informed, the offer price decision is more controlled by underwriters. Thus, by setting the price based on "superior" information, the optimal price is less than the first assumption. If the issuer is not sufficiently informed then moral hazard could arise due to the unobservable distribution process. Moral hazard is often involved in contractual relations between two parties when one party strives for profits at the cost of dealing with another party dishonestly. An uninformed issuer may receive dishonest information from its underwriter due to the incentive of greater compensation that could be obtained by an underwriter in terms of bid-ask spread.

When an underwriter undertakes the task of selling the new shares, they bear a certain risk depending on the degree of commitment between two different kinds of contracts. The selections of the contracts depend on the effort that has to be made by the underwriter. The first type of contract is called *firm commitment.* As discussed by Benveniste and Spindt (1989, p. 345), for this type of contract, the underwriters are responsible for any share that is unsold. It creates the incentive towards the underwriter to pre-sell the whole offering because of the

uncertainty of the firm's individual risk. As a result of the pressure to sell the whole offering, the higher degree of individual risk is associated with a greater degree of underpricing.

For the second contract, the underwriter is less contingent to purchase any unsold shares at the end of the offering period. Dunbar (1998, p. 1) described this as *best-effort* contracts where the underwriter only makes its "best effort" to sell a range of the shares. Therefore, the underwriter is not contingent on purchasing any unsold shares at the end of the offering period. The underwriter therefore has less incentive to pre-sell the whole issue but they do have to consider passing a minimum number of shares sold threshold under the "minimum-sales-constraint clause" (Benveniste and Spindt, 1989, p. 357). This method is less time-consuming for the underwriter because in the case of firm commitment, the price is often settled between the underwriter and the investors before the final pricing. However, when it comes to the best efforts, the underwriter generally does not solicit any indication of interest before final pricing. Therefore, the initial price could be far higher due to expectations rather than the lowest price that the investors are willing to pay (Dunbar 1998, p. 4).

Part of the underwriter's profit is based on the underwriter's spread, which is the difference between the bid price (the amount of newly issued shares offered by the underwriter to the firm to purchase) and the offer price (the amount offered by the underwriter to investors who want to participate in the IPO) plus fees and commissions. It could be called the "direct cost" of the IPO. However, it is the "indirect cost" that determines the underpricing, which is the difference between the first day close price and the open price, plus the amount between the offering price and open price (Saunders, 1990, p. 3-4).

$R = [(CP - OP) / OP] * 100$
R = Initial return of the stock
OP = Refers to the offering price the underwriter offers to investors
CP = Refers to the closing price at the end of the first trading day

A positive (negative) return will justify an underpriced (overpriced) value of the share. Moreover, the open price is inserted between the offering price and the close price (Saunders, 1990, p. 4).

According to Ghosh et al. (2012, p. 3), initial return is highly influenced by the market index prior to the offer day. Therefore, the general market returns during the trading period when the IPO is listed have to be excluded. Saunders (1990, p. 5) suggested that the general normal market return should be excluded during the same period when the IPO is being offered and listed, and the amount of underpricing in the "market adjusted return" should be expressed. There is usually a lag between the dates of the offering price being settled and the date of the actual opening price releases. Therefore, the stock market as a whole during this period has to be taken into account and be excluded from the degree of underpricing (Saunders, 1990, p. 5). However, since we have excluded the offering price from our consideration, the general market return over the initial listed day is relevant for us.

$RM= [(I_1 - I_0) / I_0] * 100$
RM = General Market return
I_1 = Level of the general market share index at the end of the first listing day.
I_0 = Level of the market share index at the time the share price is listed.

The general return of the market in this equation shows a positive (negative) return that justifies an upward (contrarian) trend during the time between the offering and the listing. The

adjusted return can be calculated as a result of *R* - RM. According to Sahoo and Rajib (2011, p. 46-49), the aftermarket price range could statistically explain uncertainty or risks about an IPO. There is a strong correlation between the average one month H/L (High price to low price ratio for an IPO based on the initial month of trading) and underpricing. Besides the H/L ratio, they also found that other risk proxies influence underpricing, such as investment bank prestige and the age of the issuing firm. Data gathered by Ritter et al. (2004) revealed historical data about IPOs' average initial return (raw return) in Sweden, which was 27.2% during the period 1980 to 2011. To put this into perspective, the market geometric mean return of the corresponding period was around 9%. This huge gap between the general market return on the market and the average return of IPOs begs the question: Why are IPOs underpriced?

Underpricing could generate financial gains from an issuer's perspective. Rydqvist (1997, p. 296) mentioned that the practice of underpricing has a lucrative element in the generation of financial gains in terms of compensation and as a wage supplementation. This is due to the IPO rationing devices, which is an discretionary option and is frequently chosen by the issuer. Therefore, the issuer could easily target the allocation to their employees.

Ghosh et al. (2012, p. 2) also explain the dilemma for issuers to leave the money on the table. It is costly for issuers to sell their underpriced shares because they will receive less funding than the expected potential amount. At the same time, however, they are satisfied with the appreciation of the share price after trading. Issuers are happy to accept a certain degree of underpricing if they retain a sufficient amount of shares after IPO, which could result in larger gains from capital appreciation than the amount lost due to underpricing. Ritter and Loughran (2002, p. 22) found that higher underpricing was very common among prestigious underwriters during the bubble years of the 1990s. Issuers during that period had a tendency to hire underwriters with a history of underpricing to gain a high initial return by leaving the money on the table.

On the other hand, underpricing is lucrative for investors. Investors could have superior information, which is not obtained by the issuing party. This information could be obtained by investors from the issuing firm or competitors regarding the quality of the firm's management – an aspect that cannot be objectively measurable by the firm itself. Underwriters collect information from the market to support the pricing process but investors who obtain superior positive information about the IPO have no incentive to reveal it before the IPO trading date. They could benefit themselves by paying a lower initial price and pushing up the price by disclosing the information after purchasing the stock. In order to compensate investors for revealing positive information, compensation must be provided by the underwriters in the form of underpricing. It is an expected profit for investors who hide the information which can decide the degree of underpricing. Investors who suppress the offering price by hiding positive information have a dilemma in that they will not risk their share allocation by supporting a low bid but must be seen to support it in order to reap later gains (Benveniste and Spindt, 1989, p. 344).

Busaba and Wilhelm (2002, p. 77) argue that firms that are subject to a particular industry could be controlled by a relatively small number of underwriters. Consequently, the underwriters could use this monopolistic position to force a second IPO issuer to share the costs incurred in the first IPO. This could be possible because both issuing firms share a similar investor pool and the costs to bring both firms to the market are not mutually exclusive, which means they could be used in conjunction. Liu and Ritter (2011, p. 581-582) discussed that the issuer accepts underpricing as long as it satisfies certain conditions:

underwriter's quality, industry expertise, bank-loan tie-ins, side payments and research analyst coverage. These are non-price dimensions that are meant to secure the sale of shares and gain the attention of influential institutional investors that can drive up the value of the company in the short run. Therefore, the issuer will go against its objectives to maximise the value associated with the offering price since the underwriter has more access to information about market activities. Under this situation, the practice of underpricing is acceptable by the issuing party.

2.4. Market Cycle

According to Dimovski and Brooks (2003, p. 279), market sentiment determines the degree of underpricing, and the amount of money left on the table is determined by the sentiment towards equity investment. There are two existing periods characterised as "cold" and "hot", both of which are crucial for companies to decide when to launch their IPOs. Hot IPO markets appear during the peak of market expansion and cold IPO markets are associated with market contraction. Henry and Gregoriou (2013, p. 2) revealed that fewer IPOs emerge during colder periods than in hotter periods.

Further, Ljungqvist, Nanda and Singh (2006, p. 1691) discussed the feeling of optimism that pushes companies to go public during hot market periods. Alti (2005, p. 1107) presented two types of issuers in the IPO market: pioneers and followers. Pioneers are most likely to obtain high initial required return (IRR) investment probabilities. Followers, on the other hand, are characterised as companies that do not necessarily have profitable investment opportunities but are more flexible to decide when to conduct an IPO. However, during hot market periods, low quality IPOs are attractive for opportunistic reasons and may cause the average quality of the IPO market to decline (Alti 2005, p. 1132). The cost to evaluate market uncertainty is high for the issuer and it varies from time to time depending on the market condition. Information asymmetry contributes to the high cost of evaluating uncertainty for issuers. Therefore, simply conducting the IPO by following the high return realisation of the pioneers is less costly for the followers than measuring the uncertainty themselves. Hence the followers contribute to an increase in IPO volume during a hot market period (Alti 2005, p. 1107).

Many venture capital companies depend on hot IPO market periods for their exit strategies. According to Vismara, Paleari and Ritter (2012, p. 385), venture capital companies are institutional shareholders that focus on start-up financing. However, Block and Sandner (2009, p. 1-7) discussed that during cold market periods, large institutional investors are less likely to invest in venture capital-funded IPOs because they are considered as a less attractive option. Therefore, it is more favourable to conduct IPO investments during hot market periods. However, we will take the market cycle variables into consideration and examine how these are associated with underpricing.

2.5. Underwriter Reputation

Underwriter reputation is an important factor that has been found to manage risk and influence the degree of underpricing in an IPO. Lewelen (2006, p. 615) suggested that larger underwriters have a higher capacity to absorb risky inventories and that they should therefore be less concerned about risky IPOs. As previously discussed, one of the main goals for an underwriter is to minimise the risk or uncertainty that is associated with newly issued shares and to reduce the impact of information asymmetry. Therefore, high absorption capacity leads to higher support for overpricing. Information from a reputable underwriter could be considered with higher credibility. Chen, Chi and Xu (2013, p. 648) proposed that underwriters have a fiduciary duty to provide trustful transparency and disclose information

and have a legal bond with issuers. If a false statement is unfolded, the underwriter may face legal charges as well as damage to their integrity. Richard et al. (1998, p. 300) found that IPOs that are generally associated with highly reputable underwriters tend to have a lower degree of underpricing.

On the other hand, Kirkulak and Davis (2005, p. 452) suggested the underwriter's behaviour may have changed during the latter half of the 1990s'. The relationship between underpricing and underwriter reputation could be positive during certain economic conditions. During the high-tech boom, IPOs related to high-tech issues received a high degree of underpricing from reputable underwriters. Lewellen (2006, p. 638) argued that a large number of underwriters suffered a severe impact on their market share due to mispricing on overpriced shares. Therefore, to secure their reputation, underwriters sometimes maximise the degree of underpricing. However, to study one of the determinants of underpricing, we will identify the reputation of underwriters and examine the relationship between underwriters reputation and the degree of underpricing in the Swedish market.

2.6. Risk association

Pre-IPO firms are sometimes uncertain about the general market perception of their securities. The degree of underpricing could then be based on the degree of uncertainty toward the market demand for the securities (Baron 1982, p. 975). Underwriters could benefit from these uncertainties and a larger bid-ask spread. Sahoo and Rajib (2011, p. 42) found a positive relationship between risk and underpricing, and that investors need to be motivated to participate in a risky IPO, which is achieved through underpricing the initial offering price. The risk is offset by a higher rate of discounts, which compensates investors by producing a higher initial return.

To estimate the degree of underpricing in an IPO, we have to determine the risk that is associated with the uncertainty of the firm. Although this is difficult, one method is to measure the IPO firm's risk by examining how "established" the firm is. This could be done using several indicators such as the age of the firm, annual sales, the carrying value of the firm, etc. (Ritter, 1984, p. 223). Lewellen (2006, p. 615) suggested that lower gross spread and larger issue signature are less risky. The magnitudes of risk from well-established firms are smaller than the risk level of firms during the start-up phase. Therefore, investors have to dig deeper into the firm's information, which could result in higher costs (Ritter, 1984, p. 223).

2.7. First-Tier Market Versus Second-Tier Market

According to Vismara, Paleari and Ritter (2012, p. 367-370), 16.3% of all companies that are listed on second-tier markets expect minor regulations. There are another 20.3% that expect flexibility; 31.7% aiming for lower costs; and 6% for the possibility to grow. Companies that choose to be listed in a more regulated market expect stricter rules, which lead to better governance or higher disclosure. Stricter regulation could prevent personal benefit by increasing monitoring and protection for investors. For controlling shareholders, it is a trade-off between personal benefit and better financing opportunities (Vismara, Paleari and Ritter 2012, p. 381).

Market valuation can differ between the first- and second-tier markets. The issuing firm would want to be listed on the market where its valuation is highest because more funds could therefore be raised. The main market is usually more integrated than the second-tier market,

where integration means how easily investors in another country or continent can access the shares. On the other hand, the second-tier market could provide a higher valuation because it is less integrated, like abovementioned second-tier market in Chima (Vismara, Paleari and Ritter, 2012, p. 367-370).

However, since the requirements, costs and regulations of the second-tier market are lower than the more established marketplace, it promotes smaller firms to raise funds. Furthermore, it is also recognised that IPO firms in the main market are usually larger and older compared to the second-tier market. This could have contributed to the higher delisting rates in the secondary market. Many companies that are listed in the secondary market eventually transfer themselves to the main market if they manage to expand their business. Other companies simply fail to achieve any benefits for their shareholders and consequently delist (Vismara, Paleari and Ritter, 2012, p. 367-370).

Providing liquidity to support the shares of IPO companies is an important incentive for a company to go public. In general, there is often less liquidity in the secondary market compared to the main market (Vismara, Paleari and Ritter, 2012, p. 367-370). Low liquidity could be problematic when shareholders want to sell their shares as there may not be enough buyers in the market, resulting in downward pressure on the share price due to excessive supply of the shares in the market. Comparing the bid-ask spread of IPOs in the main and second-tier markets enables us to measure the liquidity that is provided to new issues.

IPO performance can differ due to the different characteristics of IPO firms in both markets. Vismara, Paleari and Ritter (2012, p. 367) studied the long-term average three-year buy-and-hold abnormal return among European IPOs between the first- and second-tier markets. They found that the main market could achieve a higher abnormal return than the second-tier market. They also showed that companies that are listed in the secondary market are associated with higher initial abnormal return or a higher degree of underpricing (Vismara, Paleari and Ritter, 2012, p. 361). However, this assumption leads to our core question in this thesis: What are the different features of underpricing between the first and second tier markets? Hence our first hypothesis is:

H1a: The degree of underpricing is higher in the second-tier market compared with the first-tier market.

2.8. Selection of Variables

We take Sahoo and Rajib's (2012) approach to support our study on the degree of underpricing within the Swedish market. We have taken different variables into account to measure the effect of risk proxies that are associated with the degree of underpricing. We stated our dependent variable as U (real adjusted return/underpricing) and the difference between the high and low price (H/L) as an explanatory variable for the degree of underpricing. Independent variables are separated by risk, market cycle and reputation under four categories. For variables associated with risk, we chose the age of the firm (AGE), book-value (BV), and leverage (LV). For our market cycle variables, we chose market volatility (VOLA), earnings per share (EPS) and IPO activity (ACTIVITY). Lastly, underwriter reputation will be associated with an adjusted measurement of bank prestige (IBP).

2.8.1 Market Risk

The variable H/L has been discussed by Sahoo and Rajib (2011, p. 42-49) where underpricing

and uncertainty are higher when the spread between the highest and lowest prices is wider. The highest and lowest prices are in the daily price fluctuations over a specific period of time. A higher spread between the highest and lowest prices can increase the return of an investment if investors are able to identify the period when the share is at a relatively low price. H/L represents the fluctuation over the price for issued shares, which is related to the uncertainty over IPO valuation. Therefore, we hypothesise:

H_1: The H/L ratio at the time of the IPO is positively associated with the degree of underpricing.

Regarding volatility, Sahoo and Rajib (2012, p. 66) suggested market volatility as a suitable proxy for market risk. Volatility determines the risk in the general market. Higher volatility makes it harder to assess an optimum price for an IPO during its first trading day. This assumption is also given by Gleason Johnston and Madura (2008, p. 1107) who associated higher risk with higher market volatility. Higher levels of market volatility or market dispersion make it harder to determine which IPO can generate financial gains. In this sense, higher volatility will be followed by a higher degree of underpricing. Market volatility is associated with the quality of the market. Therefore, we hypothesise:

H2: The degree of volatility in the market at the time of the IPO is positively associated with the degree of underpricing.

In relation to the previous variables, the ACTIVITY variable highlights and records IPO activities. Overall, IPO market activities increase when a feeling of optimism spreads among investors. As stated by Sahoo and Rajib (2012, pp. 75-79), IPOs are valued higher during periods with higher IPO activities. Underwriters also typically feel more positive underwriting lower quality IPOs in these periods, since both the market and the optimistic perception from investors can adjust the IPOs once they are listed. Ljungqvist, Nanda and Singh (2006, p. 1691) discussed how the quality of the market diminishes the listing of "followers" who seek an opportunity for capital gains. Such followers may damage the quality of the market, which in turn will damage financial performance on the overall IPO market and minimise investment returns. One particular aspect of higher IPO activities is the attempt to obtain financial gains by overvaluing IPOs. In this sense, IPO activities have a negative influence on the degree of underpricing in an IPO. Therefore, we hypothesise:

H_3: The quantity of IPO activities in the market at the time of an IPO will be negatively associated with the degree of underpricing.

2.8.2 IPO firm risk

Company age is tightly associated with risk, as argued by Sahoo and Rajib (2012, p. 65) who state that an IPO company's lack of previous financial data can be offset by how long it has operated before being listed publicly. IPO firms with a short financial history are hard to analyse; therefore, investors must be provided with a holistic picture of such a company to determine whether its incorporation with the public market will reveal a positive performance or not. Moreover, the lack of financial history makes it harder for the underwriter to perform a full evaluation of the new shares. Therefore, the age variable (AGE) can be a determinant factor in estimating the degree of underpricing in an IPO. As discussed, an IPO company's longer financial history reduces the amount of uncertainty regarding how it will perform. Therefore, we hypothesise:

H_4: The age of the IPO firm is negatively associated with the degree of underpricing.

The book value variable (BV), as argued by Sahoo and Rajib (2012, p. 65), is one of the most influential factors in determining IPO pricing. Book value is associated with the fundamental value of a firm. Regarding this association, a higher book value per share leads to a lower firm asset replacement cost for investors. It is also an indicator of better financial support for future investment activities. On the other hand, higher book value per share shows lower expectations of future abnormal earnings based on the current market price level, due to the lower price to book ratio. Lower expectation also means lower risk. Since it minimises risk, higher book value diminishes the degree of underpricing. As a result, we hypothesise:

H_5: The book value of the IPO firm is negatively associated with the degree of underpricing.

IPO firm leverage (LV) has been thoroughly discussed by Sahoo and Rajib (2012, p. 78) who associate it with risk. A higher leveraged IPO firm carries a higher degree of risk because it indicates that a company may have a higher amount of liabilities in relation to its equity. Latham and Braun (2010, p. 672) stated that a highly leveraged IPO firm could discourage investors from investing as it may carry a higher level of financial risk. Higher financial risk may cause the IPO firm to default on its obligations or severely damage its growth in the future. Therefore, a more highly leveraged IPO firm can be associated with a higher degree of underpricing. We hypothesise:

H_6: The leverage ratio of the IPO firm is positively associated with the degree of underpricing.

Investors can minimise the degree of uncertainty by deducing information about the IPO firm's future performance. D'Agostino, Hellgren and Fröderberg (2007, p. 12) discussed the valuation of an IPO motivated by historical financial data. The decision to underprice comes from unverifiable financial data of the IPO. Moreover, Lewellen (2006, p. 615) argued that underwriters tend to associate themselves with less risky IPOs in order to protect their reputation. From an investor perspective, a risky IPO would be an IPO firm that may not grow or, in the worst case scenario, may stagnate. An IPO firm that does not grow can be reflected in its earnings. Similar to Sahoo and Rajib (2012, p. 67), we consider the variable EPS (earnings per share) as a good measure for an IPO firm's valuation to minimise the degree of uncertainty towards investors. Since our sample includes IPOs with short financial history, we will base our EPS data on the last yearly revision of a company's financial reports. Since high EPS can motivate a high IPO performance, we hypothesise:

H_7: The EPS of the IPO firm is negatively associated with the degree of underpricing.

2.8.3 Underwriter reputation

Lastly, the variable IBP interprets the adjusted measurement of an investment bank's prestige. Through the theory about the underwriter reputation, we revealed that investors and issuers feel safer relying on large banks to perform pricing. The reason why bank prestige influences the degree of underpricing can be identified within Chen, Chi and Xu's study (2013, p. 648), which states that the underwriter has a fiduciary duty to its investors and issuers. A good reputation becomes a pressure to perform a correct valuation. A misevaluation could cause the underwriter to lose market share. Generally, IPOs that are associated with high-reputation underwriters tend to have a lower degree of underpricing (Richard et al., 1998, p. 300). Contrarily, too much underpricing may damage the IPO firm's future operations. Because underpricing reduces the potential funds that an IPO firm could raise, it suggests that underwriters would try to reduce

the amount of underpricing. As explained by Ghosh et al. (2012, p. 2), it is costly for issuers to sell shares that are underpriced because they would receive less funding than they could otherwise potentially raise. Therefore, we hypothesise:

H8: Underwriter reputation is negatively associated with the degree of underpricing.

3. Methodology

This study is based on the assumption that the degree of underpricing in the Swedish market differs between the main and second tier markets. The OMX Nordic represents the main market and Aktietorget represents the second-tier market, and they represent different IPO environments. The factors that determine an underwriter to underprice an IPO may be different during the first trading period. How the study will be conducted through the analysis between those factors and the degree of underpricing will be explained later in this chapter. This chapter will also provide the research philosophy and origins of the data for performing further analysis.

3.1. Choice of Topic

The reason for choosing this topic for our study is based on the concerns raised by the global financial crisis and how this affected the IPO market. In 1991, the SFSA was created as an integrated financial supervisor to monitor and regulate the Swedish financial market as well as providing consumer protection. The SFSA ensures financial institutions are competent, efficient, and stable, in other words, to provide information transparency (Därvsäter, 2008, p. 83). The merging of the OMX Nordic market presented difficulties to the SFSA to fully monitor trades from all the financial institutions as stated by Gabriel Urwirz Segulah CEO and economic professor (Ekman, 2007, p. 1). The reason is the different market contexts that exist between the main and secondary markets within the Swedish financial market, due to differences in regulations.

The Swedish market includes two different kinds of market: the main and second tier markets. The main difference between them is the initial requirement for a company to be listed and the quantity of regulations incurred by financial institutions to monitor financial activities. There is no accessible information about the decision whether to bring an IPO to the main market or second market and it can be motivated by obtaining larger compensation, or the differences in the regulations could be influential.

From personal and academic experience, we are aware that the desire to perform any sort of investment in the financial market has to be accompanied by a desirable return on investment. It is hard to predict whether an investment would be liquidised positively into financial gains and more importantly in the case of IPOs. We found that investing in an IPO carries higher risk, but it may provide extremely high returns. Thus, we were attracted and curious to investigate how to obtain high financial gains. The education and training that we have both received seems insufficient to close the gap between making financial gains and losing all our capital. To close this gap, we submerged ourselves in the field to get a better understanding and reveal how the IPO market actually works. Overall, conducting this research not only gives us a better understanding of the whole IPO process, but also will provide a useful tool in future financial operations within the Swedish financial market.

The reason why we have chosen IPOs as our subject's study is based on our interpretation that IPOs share a common definition and most of them start with more or less similar characteristics. Generally, IPOs will be listed when they meet the minimum requirements to start issuing to the public. Therefore, they offer a good subject to evaluate the impact on the financial market once they are listed. Both of us have a strong ambition and plan to join promising companies, start up our own venture and perform substantial investments. Having a better understanding of how the IPO is valued and brought into the market will provide us with useful knowledge to foresee business opportunities.

3.2. Researchers' Perspective

Today, we are two Master's students sharing a common interest in the field of finance. Both of us have been enrolled at Umeå University studying Business Administration for the last 4 years. Although we have some differences, these helped us to gather a wider view of the topic for this research. One of us had a previous background as a mechanical engineer with a strong international experience from diverse universities in several countries; this provides us with a strong foundation of analytical and mathematical skills. The other has been studying and focusing on the financial field of Business Administration and has obtained the license of Chartered Financial Analyst (CFA); this strong financial background allows us to get a deep insight on the topic and allows us to perform an in-depth analysis in our research.

Our interest in conducting an IPO and the different impacts in both main and second-tier markets is driven by the desire to gain a deeper understanding of the overall function of the Swedish financial markets. Obtaining a deeper insight into how the Swedish financial market operates would benefit both our academic and professional careers, and will be a valuable asset in future ventures.

Developing a study that is associated with the same academic field as the authors gives the study a more accurate insight and provides a better development opportunity. Our knowledge and competence as both academics and researchers will support the outcome of this research and minimise misconceptions.

From Bryman & Bell (2011, p. 29-31), we have learned that personal values and preconceptions will influence the results of a study. Results can be subjected to personal values and life experiences in order to achieve both personal and professional goals. Our perspective in this study is to interpret and perceive the degree of underpricing both from the investors' side and/or the issuers' side. Our personal goal is to discover the main causes that drive IPOs to be underpriced in the Swedish market. Chok & Qian (2013, p. 2) argued the motivation for investors to invest in a public company is to secure financial growth. Also, they claimed that an investment would lead to continuous growth in order to be profitable. In this sense, from the perspective of investors, we consider underpricing can either be beneficial or harmful. Too much underpricing can lead the IPO to fail to support its financial operations; conversely, an overvalued IPO can lead to a harmful investment since the market will drive down its value. From our point of view, as investors, we must evaluate an optimum degree of underpricing that will not affect IPOs' subsequent performance and will ensure a continuous income.

From the perspective of investors, we will conduct a study to identify the factors that lead to underpricing of IPO shares. Later, by determining how likely the factors are to generate an impact in both markets, we will identify how the IPOs are actually evaluated, if this will be an indicator to secure substantial gains and which market presents a higher opportunity for investment. From Benveniste, Erdal & Wilhelm (1998, p. 745), we identify underpricing as a mechanism for coping with the information asymmetry between issuers and investors. Our research will verify which market presents a higher degree of information asymmetry and represents a minimum risk to conduct future investments.

3.3. Researchers' Philosophy

The goal of this study is to determine the actual factors that lead underwriters to conduct underpricing activities in both the main and second-tier markets. To conduct this research, we rely on previous theories and research about IPO pricing methods, information asymmetry

between issuers and investors and IPO risk proxies for underpricing to build our assumptions. Such theories and research have validity within the Swedish context and leave the opportunity to further develop this topic.

Most of the current research has been conducted in other contexts and/or markets and there is no similar study applied in the Swedish market. In this sense, we are aiming to identify if this phenomenon can be detected and if there is a reasonable difference once an IPO decides to join a target market. To identify if the factors influence the degree of underpricing, we should be critical and objective and motivate our discussions with empirical results. For this reason, we base our epistemological philosophy as positivistic. Bryman & Bell (2011, p. 15-22) argued that positivism's position is adopted by researchers to avoid personally influencing the subject of study, as establishing the phenomena is a result of a natural process. As a natural process, the description of these phenomena falls aside the observer's point of view.

On the other hand, interpretivism as described by Bryman & Bell (2011, p. 17) and Saunders Lewis & Thornhill (2009, p. 116) emphasises that social entities should be differentiated from natural sciences. In this viewpoint, interpretivism explains, the researchers must gather a deep understanding between humans as social actors. Since our research stresses the participation of the IPO as a natural embodiment, we do not evaluate the social actors within them. The main purpose of the research does not focus on the different aspects of our social actors (investors, issuers and underwriters). Instead, our research goal is to identify whether underpricing would be higher or lower in Swedish second-tier markets. For this reason, we adopt a positivistic position since we would put the social factors that may influence underpricing out of our analysis.

To support the decision, we held a positivistic point of view based on previous theories that strive to seek a relationship between underpricing and its identified factors. We conducted a similar approach as Ghosh et al. (2012, p. 2), Sahoo & Rajib (2012, p. 61) and Liu & Ritter (2011, p. 102), who tested their studies by using a basic theoretical foundation test to see if there is empirical evidence that can verify a relationship between the stated factors.

The decision to adopt a positivistic view of the topic is motivated by the need to verify if previous interpretations of the effect of underpricing, across history and diverse financial markets can be applied in the Swedish market. Caldwell (2013, p. 759-760) argues the benefits of a positivistic viewpoint helps to minimise misinterpretations and/or misconceptions of factors and theories applied over a certain phenomenon.

Another reason to undergo this study under the positivistic view can be taken from Evensky (2013, p. 35-37) who states that newer researchers may benefit from influencing or changing investment strategies. In this sense, with our study, we contribute to providing investors with further cues for identifying the qualities and insights over underpricing in the Swedish markets.

Our ontological viewpoint – objectivism – verifies the relation between these factors and the degree of underpricing as empirical facts. Our research can strive to advance further theories in future studies. We base our objectivistic position, on Pendleburry (2011, p. 80-81), who described the relation between factors and the degree of underpricing as a matter of facts. Further interpretations of objectivism could lead to robust or stronger errors. In order to minimise such degrees of error, we base our approach on a broad literature review that covers the topic similarly in different markets in several periods to establish whether this relation exists.

Regarding constructivism, Bryman & Bell (2011, p. 22) and Saunders Lewis & Thornhill (2009, p. 111) consider social phenomena as a result of social interaction. This viewpoint emphasises the role of social actors who influence social changes. Despite our personal goals and attitudes, we do not have a further involvement in the analysis of results. Also, we do not interpret the relation between the degree of underpricing and relevant factors as a result of social interaction.

The results gathered from this study attempt to verify if theories and previous observations may be generalised into a wider context and/or to consider whether a newer theory is required.

3.4. Research Approach

We consider that the most suitable research approach to our study is a deductive one. According to Bryman & Bell (2011, p. 11) the deductive approach is best suited for developing hypotheses to test the validity of several theories. Since we base our study on previous observations of several markets as well as different periods, a test-hypothesis will be most suitable to verify whether such theories are applicable to establishing a relationship between our factors and the degree of underpricing. Contrarily, an inductive approach as described by Saunders Lewis & Thornhill (2009, p. 126) starts by building up observations that leads the researcher to develop theories and abstract generalisations. The goal of our study is to test whether those theories applied in other markets can be applied in the Swedish market. Therefore an inductive approach does not suit our purposes for this research.

Also, as discussed by Saunders, Lewis & Thornhill (2009, p. 124-125), a deductive approach starts with a proposition about the relationship of two or more concepts. Thus, our proposition states that the degree of underpricing comes from several fronts where the underwriter may have specific views towards the IPO and the market perception regarding IPO performance. This proposition assumes that all the factors involved may have a direct impact based on similar studies and such relationships must be tested (Saunders, Lewis & Thornhill 2009, p. 124). Based on our research philosophy and research approach, previous theories and research in the same field give us enough theoretical material to build our hypothesis concerning IPO underpricing in the Swedish market. As a result, our methodological approach will be presented as follows.

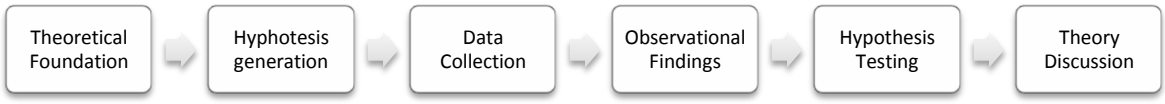

Fig. 2 **Deductive research process, Retrieved from Bryman & Bell (2011, p. 11)**

Moreover, we make a clear difference between the main and second-tier market environments that may influence underwriters to underprice an IPO. In this sense, we assume the factors influencing underwriter's decisions may not be similar, or they may be motivated by other reasons. Therefore, we have developed a list of factors based on previous research to test if each market represents a different context to perform IPO investments. From Bryman & Bell (2011, p. 11) a hypothesis test will allow us to reject or accept the proposed hypothesis and make a further revision of our chosen theories As a result, a deductive approach seems to be most appropriate to conduct this research.

3.5. Research Design

From our literature review, we revealed some factors that unfold and influence the degree of

underpricing for new listed IPOs. We gathered our literature review using search engines provided by the University library such as EBSCO database. From this database we searched for research within the topic of IPO underpricing, risk proxies on pricing IPOs and information asymmetry between issuers, investors and underwriters. We gathered peer-reviewed articles to minimise errors and misconceptions of the topic and especially in order to identify the factors that influence the degree of underpricing. Our concern is if such factors can be applied and/or associated to other markets, which can force investors to be influenced in their investments.

This research presents a unique approach to reveal if such factors exist as a continuous presence in several markets. The existence of any difference regarding the underpricing process may also lead to different perspectives and perceptions of underwriters. As discussed in our literature review, information asymmetry generates uncertainty and influences the decision of whether to list an IPO in the public market. If each market presents different levels of information asymmetry, underwriters may not consider all the factors or they may use other ones. Therefore a comparative design is most suitable to identify how big the impact is on the degree of underpricing between the main and second-tier markets

According to Bryman & Bell (2011, p. 63), a comparative design is based on the comparison of two cases or contexts under similar assumptions. We assume that the influence exerted by those factors over the degree of underpricing may not have similar effects on both the main and secondary markets. Our decision to conduct a comparative design study is motivated by Evensky (2013, p. 35-37), who stated that most theories and studies applied over certain economic assumptions may not be applicable on present markets or most appropriate to market perception.

As a result, a comparative design allows us to verify if such theories can be generalised from other markets similar to the Swedish financial market. To conduct our comparative design, we will conduct a regression analysis in our model to verify the relation between underpricing and our targeted factors within both the main and secondary markets. Moreover, in this chapter, we will undertake a regression analysis.

3.6. Data Collection

The sample used in our study includes the listed IPOs from 2003 to 2013 in both OMX Nordic and Aktietorget financial markets. The data collected comes from secondary sources to gather all the information relevant to our research.

To develop our variables, we collected the mean value for the last trading month between the high and low prices for each share to calculate the H/L ratios. Moreover, we gathered the logarithm value of daily market returns over the general OMX market index during the last two months before the IPOs listed. Book value is the accounted total assets minus liabilities on each IPO. A leverage ratio is the relative debt over equity ratio to associate risk. This information as well as opening and closing prices are used as the basis to calculate our adjusted degree of underpricing. These data are gathered from the DataStream database to avoid overlapping information by using several sources. However, the relative IPO activity was gathered from both the website of NASDAQ OMX and Wedfell, etc. (2013, p. 7-10) on their Stockholm Corporate Finance IPO market report. The Bank prestige was calculated by using the data frequency pattern and gathering data from each IPO prospectus. More description regarding the sources will be described further in this chapter.

3.6.1 Secondary sources

Our secondary source of data mostly relies on databases. Our main database is DataStream Advance from the Thomson Reuters Company that provides financial data from several international companies. We relied on this database due to its access to varied data and the possibility of simplifying our search to get constant data that can be compared equally. For other data, regarding the quantity of underwriters and IPO activities we relied on the SFSA, NASDAQ OMX and Aktietorget databases to gather market information and obtain the financial reports of each IPO.

Data from secondary sources have been gathered from other researchers for specific reasons (Bryman & Bell, 2011 p. 320-322). Saunders, Lewis & Thornhill (2009, p. 317-319) defined secondary data as the accounted amount of data that had been already interpreted. We gather our data from a specific database, which had been already manipulated and interpreted from other researchers. Therefore, we are not familiar with how this data had been gathered and what kind of methodology they used. However, Saunders, Lewis & Thornhill (2009, p. 317) emphasised secondary data has potential advantages such as better time management and placing our findings into a wider context. This is one of the main reasons why we did not rely on primary data since it requires the researcher to obtain raw data for further interpretation (Saunders, Lewis & Thornhill 2009, p. 304). We have just two months to conduct the study, which is not enough to gather sufficient financial information from a significant population of IPOs.

Saunders, Lewis & Thornhill (2009, p. 319) state that it may be hard to determine the degree of quality of secondary data. Also Churchill & Lacobucci (2005, p. 168-170) argued the use of secondary sources may not be associated with the topic or deviate from the purpose of our study. We base our data from a single database and our purpose is to establish a comparison over two separated contexts. Since we apply the same principle to our data for each firm, our comparison will be valid and it will not damage the quality of our research.

3.6.2 Data sample

Our sample comprises of 101 IPOs from an initial sample of 188 listed in both OMX and Aktietorget. 87 companies were rejected due to their lack of financial information or due to lack of access to their financial prospectus. For those companies, since the amount of information gathered was not enough to use as test subjects for our study, they were rejected, leaving the rest as a reasonable data sample size. As a result, almost 40 % of our sample is attributed to IPOs listed on the OMX market. On the other hand, 60% of our data represents IPOs listed in the second-tier market. After developing an exploratory analysis, we identify several extreme cases that can correspond to IPOs listed in shifting periods: hot or cold. Consequently, high extreme cases may be a reflection that both markets may not reflect similar impacts on each of the factors.

This could carry a higher risk of outlier observations that may influence negatively our equation model. To minimise errors to spread, we conduct a Winsorisation on almost 5% of our data. Pedlow et al. (2010, p. 3229) described Winsorisation as a process that adjusts outliers capping their extreme values over values within a specific percentile range. We estimated our data to be valid within the 10% percentile since these percentiles represent a fair adjustment of our data that would severely compromise the quality of our analysis.

For further testing, we developed descriptive statistics to analyse the spread of the data on each factor and verify if they are normally distributed. For all data from the main and

second-tier market, those with higher skewness requires normalisation using a logarithmic transformation. Similar to Sahoo & Rajib (2012, p. 72), the purpose of using a logarithmic transformation is to adjust the data into a normal distribution for a better prediction in our model. The benefits of log transformation will be discussed further. For the negative values, we added a constant $k=1$ to account for these values on our log transformations.

3.7 Presentation of Variables

As we discussed in the literature review, we rely on a series of variables for our study and use them in our equation model. The selection of variables had been previously presented on our hypothesis presentation back in the literature chapter. However, this list (Table 1) will present the variables, joint with the expected outcome of our testing model according to the theories and/or previous similar studies.

Risk Proxies	**Expected Outcome**	**Variable**	**Measure process**
Real Return Opening price	+	**LOG_REAL_R_OP**	Real Return for opening price measures the degree of underpricing related to the first price offered within trading price periods as defined in DataStream. We consider opening price as the first price given for IPO's share during the first trading period and associate it to the closing price at the very end of the same period. Higher returns are associated to higher underpricing
Real Return offering price	+	**LOG_REAL_R_OFF**	Real Return for offering price is associated with the introduction price (*Teckningskurs)* as stated in the financial prospect on each of the IPO's in this study. We consider this measure as real return given for IPO shares during the first trading period plus the first offering period. We use this variable to cross-compare the value given from DataStream. Higher returns are associated with higher underpricing
High Price to Low Price (H/L)	+	**LOH_H_L**	The most common procedure to measure H/L ratio is taking the mean value between high and low price of the initial trading month after listing period. We developed the same procedure as suggested in Sahoo & Rajib (2011, p. 46)
Operational History of the firm (AGE)	-	**LOG_AGE**	The age data is collected from various sources, and it is often from companies' main pages where it states when the company was founded. The operational history is the period between the first year of operations and the first trading period in the public market given in years.
Leverage of the IPO (LEVERAGE)	+	**LOG_LEVERAGE**	Leverage is a measure of debt to equity ratio, which was gathered from DataStream
Book Value (BV)	-	**LOG_BV**	Book value is measured as the total assets minus intangible assets and liabilities at the IPO first trading period
Volatility (VOLA)	+	**LOG_VOLA**	Market volatility represents the natural logarithm of daily returns of the respective index. We conduct the same procedure as described in Saho & Rajib (2012, p. 64 -65) which bases the average weighted value two months previous to the IPO first trading period
IPO Activity (ACTIVITY)	-	**LOG_ACTIVITY**	The annual interval and relative frequency of listed IPOs on each respective market
Investment Bank Prestige (IBP)	-	**LOG_IBP**	The rating measuring mechanism has its similarities with a method that has been used by Kirkulak & Davis (2005). The position frequency in our method is also the determined variable for ranking. Instead of the shares that have been taken by the respective underwriters, we give a different score for the underwriter in different leading positions. Primary

			underwriters receive a score equal to one and secondary underwriters only get half of it. The absolute total score value determines the position for each of the underwriters and the frequency for the underpricing process.
EPS	-	**LOG_EPS**	This measure associates the last annualised sum of financial and interim reports for gains over issued shares on each of the listed IPOs

Table 1. **Variables log-transformed for each of the variables and relevant for the study**

To determine the degree of underpricing we base our study on the real returns of both offering and opening price, for several reasons. According to Benveniste & Spindt (1989, p. 344), the offering price associates a first valuation when the IPO is settled by the amount of information given to the underwriter. The underwriter matches this information and evaluates the degree of risk for the IPO to underperform on the aftermarket period. However, the opening price associates the first trading price during the first trading period as the optimal price to offer the issued shares. In this sense, the opening price becomes the first price that an investor can perceive over IPO issued shares which can determine if the IPO had been previously underpriced or overpriced. The difference between opening and closing price indicates if the IPO had been underpriced properly. As Saunders (1990, p. 5) described, there is a lag between the offering and opening prices given by the period between the announcement of the IPO to be listed in the market and the actual trading period. However, offering and opening prices are reserved for different types of investors: institutions and individuals. Since underpricing seeks the optimal price for both types of investors, we must conduct our analysis on both aspects to avoid a biased perspective of the topic.

For the H/L ratio, we based our calculation one the one given by Sahoo & Rajib (2012, p. 26-49) that determined this ratio as a useful method to associate risk proxies. We perform a similar calculation by taking the last weighted average difference of high and low prices ratios that associate volatility to the IPO's share price. Higher volatility in share prices associates higher uncertainty, which translates to higher underpricing. From similar context, the age of firms and bank prestige is considered as relevant risk proxies to influence the degree of underpricing. We calculated bank prestige by emulating the approach given by Kirkulak & Davis (2005) while considering underwriter's participation in order to support prices.

Kirkulak & Davis (2005, p. 466) established a relationship to identify the relative frequency an underwriter takes the lead underwriter role as shown in Table 2. The first column represents an independent underwriter, the second column represents the relative frequency of responsible shares and the third column represents the position of each IPO. The underwriter that issues most shares by each respective IPO tends to be in the leading position. The last column reveals the sum of the total frequency that the underwriter takes on each position.

Numerical example of the reputation ranking method

Underwriter	Underwriter Shares					Underwriter Position					Position Frequency				Rank
	IPO 1	IPO 2	IPO 3	IPO 4	IPO 5	IPO 1	IPO 2	IPO 3	IPO 4	IPO 5	Lead	Second	Third	Fourth	
One	0	0.1	0.3	0.7	0.2	0	3	2	1	2	1	1.33	0.5	0	3
Two	0.1	0.1	0.4	0.3	0.2	3	3	1	2	2	1	1.33	1.5	0	2
Three	0.5	0.3	0.15	0	0.4	1	2	3	0	1	2	1	0.5	0	1
Four	0.4	0.5	0.15	0	0.2	2	1	3	0	2	1	1.33	0.5	0	3

Table 2. **Numerical Example of the reputation ranking method, retrieved from Kirkulak & Davis (2005, p. 466)**

The goal of this table is to identify the market share of an underwriter to be in the leading position and is associated with the underwriter's reputation. For this study, we base bank

frequency as underwriters on each of our IPOs to see whether high frequent participation could lead to a good reputation. The higher frequency will lead to better price support and less information asymmetry which diminish the degree of underpricing.

As we described in an earlier chapter, banks are more reputation driven and they make alot effort to not overprice the value of IPO shares, otherwise, it may damage their image in front of investors. IPOs with higher underwriter coverage can achieve higher price support and lower information asymmetry, which leads to a lower degree of underpricing. Also, regarding information asymmetry, a company with a higher financial historical record can reduce the amount of uncertainty as it provides more data to be evaluated. Older firms can ease a better suggestion for optimal price which can minimise the degree of underpricing. For both the age of firms and bank prestige, we gather information directly from their prospectus that can be accessed in the SFSA database.

To calculate leverage and avoid relying on several databases, we use the data available from DataStream and gather the amount of total liability over total equity. Similar to our calculation of leverage, we calculate the book value directly from data gathered from DataStream and using the same approach given by Sahoo & Rajib (2012, p. 65) as the amount of total assets minus intangible assets and liabilities that associate the IPO valuation given during the first trading period. On the other hand, earnings per share was gathered directly from DataStream instead of being calculated as the weighted sum of the total financial interim reports for the last three years before the IPO being listed. Instead, we use the approximate data given by DataStream that is only based on the data during the last annualised period. We did not think this would make any difference in our study, and the value given by DataStream will be enough to provide a fair analysis. Lastly, market volatility was adjusted for each opening and offering, gathered from DataStream using the OMX general index returns to ease our observations regarding underpricing for both main and secondary markets. We adjust the market volatility as the weighted average value that is two months before the first trading period of the IPO.

3.8. Time Frame

To conduct our study, we analyse the IPO activities in a time period of 10 years in the Swedish market between 2003 and 2013. The main reason is that market activities are related to hot and cold market periods previously discussed. As seen in Fig. 3 the total number of Swedish IPOs listed in the market in the years of 2003 and 2008 were zero, which are the best examples of two cold periods. Both periods are characterised by preceding important global financial crises that shake the overall financial market slowing down any kind of financial activity. During the financial crisis a degree of risk arises leading investors to be more sceptical to investment in newer IPOs and issuers struggle to sells shares and securities. As a result the, IPOs cannot find a source of income to finance their financial operations. We interpret from Ljundqvist, Nanda & Singh (2006, p. 1691) and Alti (2005, p. 1107) that IPO activities are positively correlated with a higher feeling of optimism. This feeling of optimism is attributed to an overall financial performance of the market. As described in the literature review chapter, when the valuation of the market rises, issuers see an opportunity to bring IPOs to the market. On the other hand, investors perceive an optimistic feeling due to a raise of market quality. As long as the new listed IPOs perform well financially, it seems that any IPO will perform well. This period of market bonanza is defined as a hot market period.

Conversely, when the market experiences a continuous lesser listing of IPOs, the optimistic feeling collapses and falls into cold market periods. Cold market periods were described as periods with lower IPO activities and can be associated to recent financial crises. Block &

Sandner (2009, p. 306) interpreted this relation establishing that VC firms and/or investors are less motivated to fund-raise newer firms during and after financial crisis periods. Alti (2005, p. 1107-1108) describes the quality of the overall market deteriorates by listing IPOs that are less willing to be market pioneers. These IPOs have lower chances of outperforming further growth and/or development and most of them are more likely to default. As a result, when the market starts to decrease its overall value, investors feel less willing to invest in newer IPOs and start estimating higher risks for investment and/or perceived IPO overvaluation. Some results given by Gao, Zhu & Ritter (2013, p. 30) revealed that during the period after 2001 (after the dot.com bubble) the number of IPOs being listed dropped down to an average of 99 per year.

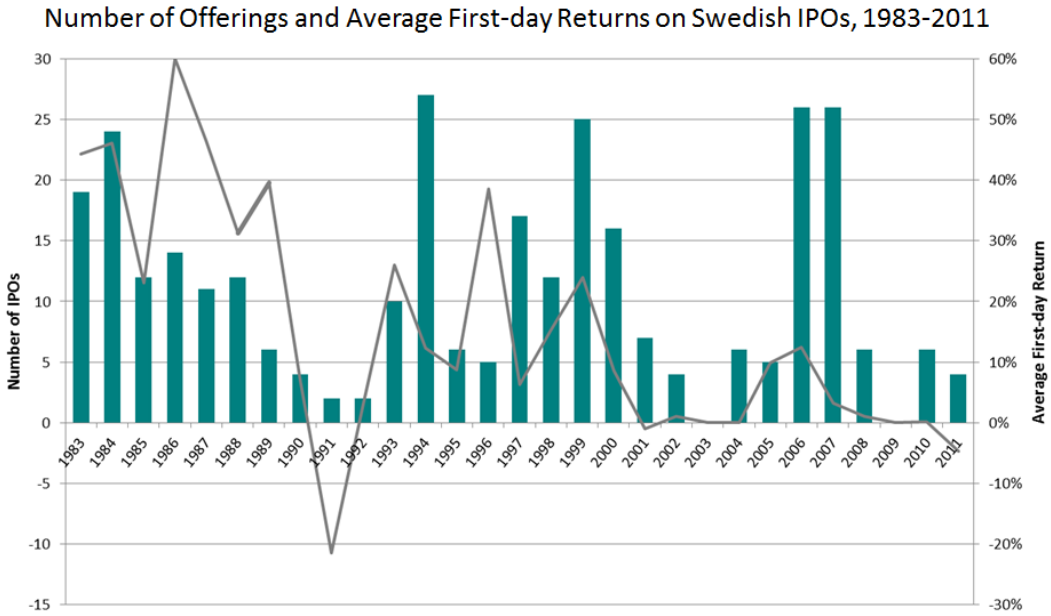

Fig. 3 **Number of Offerings and Average First-day Returns on Swedish IPOs, 1983-2011 retrieved from Ritter (2012)**

During the chosen time period, Swedish IPO market momentum increased between 2006 and 2007 being followed by a dramatic drop in 2008 that can be associated with the global financial crisis. Block & Sandner (2009, p. 306) argued that during periods of recession, VCs consider IPOs as a less attractive option to expand their capital investments. On the other hand, angel investors are less concerned about the financial crisis, but the amount of investments declined. Moreover, Block & Sandner (2009, p. 296) state low IPO market activities create problems for VCs firms on their exit strategies due to the levels of liquidity in the IPO market. For our model, we decided to choose the period between 2003 and 2013 since we can measure growth in the financial market until it reaches the maximum hot market period value and the subsequent cold market periods afterwards and its consolidation in 2013. Previous periods may reveal similar figures, which will not provide newer insights for our study.

Another point of interest lies in the merging of the Stockholm market with OMX jointly with the Finnish and Danish market. The OMX provides a wider market environment with higher capitalisation. Therefore, the chosen period will also reveal if this new merged market would influence underpricing activities performed by the underwriters.

3.9. Regression Analysis

To further develop our analysis, we decided to perform a regression analysis to evaluate the

degree of underpricing for both the main and secondary markets. Further, we use a dummy variable as a moderator to detect systematic variances between both markets as presented by Brown (1968, p. 515). From Bedeian & Mossholder (1994, p. 160-161) we decided that the best approach for our study is to conduct a multiple linear regression by which all the independent variables are tested against a dependent variable to evaluate if there is a unique effect from each of the variables, and this will explain the variation on the degree of underpricing. Further explained by Bedeian & Mossholder (1994, p. 162-163), a multiple linear regression allows a simplified analysis where all the variables that seem to be independent of each other and have a particular relation towards the dependent variables are tested simultaneously. The basis for a multiple linear regression to be valid is given by an F-test where the associated p-value allows us to determine if the model is statistically relevant to associate a relation between independent and dependent variables. Once a significant p-value ($p < 0.05$) is achieved, we can establish relations between dependent and independent variables and give a high confidence of their individual implications. Moreover, from our literature review, we understood that the market context may influence the decision to conduct underpricing and it is related to how the market itself influences the valuation of an IPO. Therefore, establishing a dummy variable would minimise noise on our analysis and perceive systematic changes. As previously discussed, comparing variances between dependent and independent variables can be as a result of different market contexts

In the process, a dummy variable that conditions the regression may take different forms, either in the absence or in conjunction with its presence. The significance of dummy variables had been discussed and presented in several studies to minimise the context of the statistical interpretation into a narrower perspective. As an example, Brown (1968) revealed that the absence of dummy variables to moderate regression models minimises the adjusted measurement, leading us to interpret the model as less explanatory for a given independent variable. Dummy variables allow establishment of differences in a given context. For our study, the overall quality of the market may influence IPO activities and the degree of underpricing. Therefore, we assume that the number of IPOs listed on the main market may not equally reflect the same degree of quality, information asymmetry and/or financial records with IPOs listed in the secondary market, suggesting MARKET_TYPE as a control dummy variable comprising values 0 for IPOs listed on the OMX market and 1 for IPOs listed on Aktietorget.

In the case that our log-transformed variables still present higher skewness, we will conduct a robust regression analysis to minimise the absolute error due to the sum of squares. McDonald, Michelfelder & Theodossiou (2009, p. 294) defined, robust regression as least median squared regression adjustment resistant to outliers. Contrary to normal linear regression, these regressions are less sensitive to outliers and they based on the media measurements of data to interpret the linear relation between dependent and independent variables. We suspect that skewness may exist in our data as IPOs may present a major density of IPOs on some ranges of data than other IPOs, e.g. Most IPOs will present a brief financial history than other IPOs with large book records.

However, in order to minimise errors to spread in our equation model, we will conduct a correlation matrix analysis to check the presence of multicollinearity in our equation model, and this will be explained in the following section.

3.9.1. Correlation matrix

Before developing our model, a correlation matrix is built to determine how interrelated the

factors are which influence the degree of underpricing. A correlation matrix would simplify our equation model by rejecting variables that are collinear. Multicollinearity stands for a mutual correlation between two or more explanatory variables. This correlation determines variation as one of the variables can be predicted from another one which affects the whole equation erratically. Similar to Sahoo & Rajib (2012, p. 72-73), multicollinearity can be perceived by observing correlation levels slightly higher on other predictors than the independent variables by themselves. Once multicollinearity is detected, it is relevant to take out these correlated variables to make the equation model a better predictor. On the other hand, a correlation matrix will allow us to identify if the variables can be good predictors for our study and towards our equation model.

In Table 2 (see appendix) the variables have been tested to verify if there are any signs of multicollinearity between our independent variables. According to our results, if the correlation between independent variables is higher than the correlation between dependent variables, we can assume there is a certain degree of multicollinearity (Sahoo & Rajib 2012, p. 72-73). We identify no strong correlation between our dependent variables and independent variables. The lack of correlation can be conditioned by several factors. A multicollinear relation between two or more variables can influence negatively the explanatory goal of our equation model. Therefore, we perform a VIF test to verify if multicollinear relationships may exist between our variables. The variable LOG_VOLA presents higher correlation with LOG_H_L (-0,386**). Also, LOG_BV seems to be higher correlated with LOG_H_L (0,479**) and LOG_VOLA (-0,207**). LOG_AGE seems to have higher correlations with LOG_H_L (0,485**), LOG_VOLA (-0,367**) and LOG_BV (0,486**). Lastly LOG_ACTIVITY presents higher correlation with LOG_H_L (-0,319**), LOG_VOLA (0,227*) and LOG_BV (-0,222*). Since this correlation is higher between independent variables than its correlation towards dependent variables, the risk of a multicollinear relation may be present. Therefore, a VIF test is conducted as presented in Table 3. The VIF analysis did not reflect any relevant multicollinear interaction between independent variables since its value is far below 3. A value between 3 and 5 would determine a certain risk for multicollinearity. Like Sahoo & Rajib (2012, p. 77), we gave a limit of a VIF value around 5 to consider a high risk of multicollinearity as a spread error may influence our model negatively.

Furthermore, the low degree of internal correlation between dependent and independent variables may be caused by different market contexts. Therefore, we developed a second correlation matrix analysis over both OMX and Aktietorget to observe any data improvements. The correlation matrix for both Aktietorget and OMX market presented in *Table 4* and *Table 5* do not reveal important changes, especially within the Aktietorget market. However, *Table 5* with relations between dependent and independent variables reveal correlation improvement for LOG_BV_OMX (0,349*), LOG_H_L_OMX (0,447**) and LOG_AGE_OMX (0,320**), suggesting the interdependent relations may be influenced on different market contexts. Therefore, we will conduct observational measures for both of the market to support our empirical findings and further analysis.

Since the interdependent relation between independent variables scored low on the VIF test for the general model (VIF < 2), there has been no necessity to conduct a second VIF test to verify multicollinearity between independent variables as factors for each market.

3.9.2. Underpricing equation model

First, we develop our regression model as reflected in equation (1). We conducted a logarithmic transformation to our variables since we consider a non-normal distribution

across the several observation periods. Similar to Sahoo & Rajib (2012, p. 72), variables may present variances between the mean and median due to skewness. However, we associate underpricing variation as equally associated to variances between each variable. Therefore, a log transformation becomes a better predictor to associate the degree of underpricing over the four mentioned categories. After an exploratory analysis using SPSS, the variables LOG_AGE, REAL_R_OFF, REAL_R_OP, LEVERAGE, H/L, LOG_VOLA, LOG_EPS, LOG_IBP, LOG_ACTIVITY and LOG_BV presented positive skewness to the right. Since the distribution is not normal for these variables, we interpreted a log transformation to adjust a normal distribution over the population sample. After applying a log normal distribution, most of the variables did not adjust normally, so we interpret the model using a robust regression model as follows:

(1)

LOG_REAL_R_OP = Beta 0 + Beta 1LOG_AGE + Beta 2LOG_BV + Beta 3LOG_LEVERAGE Beta 4 LOG_H_L + Beta 5LOG_VOLA + Beta 6LOG_ACTIVITY + Beta 7LOG_EPS + Beta 8LOG_IBP

LOG_REAL_R_OFF = Beta 0 + Beta 1LOG_AGE + Beta 2LOG_BV + Beta 3LOG_LEVERAGE + Beta 4 LOG_H_L + Beta 5LOG_VOLA + Beta 6LOG_ACTIVITY + Beta 7LOG_EPS + Beta 8LOG_IBP

The degree of underpricing is an adjusted calculation as presented in equation (2) as previously discussed in chapter 2 within underpricing processes of the IPO.

(2)

REAL_R_OP = (PPi,t – OPi,0) – RM
REAL_R_OFF = (PPi,t – OFFi,0) – RM

3.9.3 T-test independent sample analysis

To compare whether the factors influencing underpricing may differ between the main and second-tier markets, we will develop an independent sample t-test for our dependent variables. Similar to Cliff & Denis (2003, p. 37) and Abrahamsson, De Ridder & Råsbrant (2011, p. 7-8), a t-test determines the mean difference of two paired groups over a target variable. For our study, we will determine if the mean variation in the degree of underpricing that we associate over real return on offering and opening price may differ between main and secondary markets. Further described by Abrahamsson, De Ridder & Råsbrant (2011, p. 7-8), a significant t-test will determine the mean values that variables in each group are influenced differently. For our study, we will give a statistical significance for a p-value < 0.05.

3.9.4. Criticism

The main concern for our study is the degree of causality and generalisation of our study of Swedish IPOs and how much this study will be influential in further studies in the same field. As discussed in Bryman & Bell (2011, p. 163), the direction of the study can generate ambiguity when the relation between variables can generate causal influence on motivation. In this sense, determining natural causality is hard to assess by only interpreting the data. Therefore, similar to Zhu (2014, p. 776) and Holmen & Högfeldt (2004, p. 352), we became

more conservative and created a correlation matrix to compare it with previous empirical evidence that associates a correlation between those variables. Since most of the studies were performed in different markets and/or different contexts; similarities between the results and correlation between variables will influence our discussion and suggest these results may be applied on a general basis.

Also, due to time constraints, we did not perform an individual analysis on each IPO to reveal if underpricing could be motivated by other factors. However, to identify this factor, it would require a different type of study and a more direct contact with employees and managers to gain information that is out of public access. However, the existence of these factors may be revealed by discrepancies between the study results and the theories that we used for our study.

3.10. Quality Criteria

Our first concern is the generalisation of our study. Bryman & Bell (2011, p. 163-165) argued generalisation arises when it increases sample size. For our study, we studied all the listed IPOs in our time frame which allow us to present the IPO landscape and the relation between underpricing and our identified factors. Therefore, we can ensure the study represents the actual context where IPOs decide to underprice and determine the factors that motivate an underwriter to perform underpricing in both the main and secondary markets. However, whether this study can be applied to future studies depends on external factors that may reshape the financial market itself.

To fully consider an IPO and make it valid for our study, it must be listed within our time period. From an initial sample of 188, we managed to retrieve information for 101 representing almost 53% of our initial target population. In this sense, the results obtained may be a strong representation over all the IPOs listed in Sweden between those periods. Considering the total number of IPOs listed on yearly basis varies constantly and considering there was an important reduction during and after the events of the financial crisis, the total number of listed IPOs for both markets is not as large as it may be for other types of studies. Therefore, despite the size of our sample, we can assume the proportion is relatively significant over the whole IPO's population, meaning that similar results might be obtained whether the size of the same increases or not within the given time frame

Regarding replication, we developed this study to be applicable over the Swedish market and especially in both the main and secondary markets. However, how well the study results can be applied on a general basis will depend on the context within which both markets will operate in the future. As discussed previously, financial markets are changing constantly, adapting new regulations and newer patterns that may influence the decision for most IPOs to be listed. However, these circumstances may only be relevant if newer financial regulations are applied, which will change the actual market context. Our study bases the differences between the main and secondary markets as a comparison between the major and minor regulated markets. From Bryman & Bell (2011, p. 164-165), we interpret that from the random sampling generalisations arise over the entire population and this limits bias; it applies positively in our study. Since we analyse a relatively large random proportion of the total number of IPOs listed within our delimited time frame, the study presents the IPO landscape 'as is'. Therefore, a further comparison between the main and secondary markets using a similar approach may reveal similar figures and present consistency in the findings.

Lastly, another concern is about validity. Bryman & Bell (2011, p. 159-160) discussed validity approaches and considered whether the concepts chosen to describe a study really support its

approach and results. Validity will influence our study, from our selection of theories to the basis of our foundation for develop this study further. We base our study on research related to underpricing motivators and the relation between those of underwriters and investors. We can ensure that the theoretical approach connects well with the concepts and the models used in this study. From our secondary sources, the data gathered cannot determine which kind of initial purposes the researcher had in mind. This may present a complication if the amount of databases used in this study is large and varied. However, we limited our database to gather data for easy comparison, as the information gathered from one database over an IPO's activity may be based on similar codes and procedures. The relation between these variables is consistent and provides a reasonable consistency to interpret the study as valid for further research. On the other hand, validity also associates the theories we rely on to build up our equation model. Most of the theories were based on different markets where we identified that their characteristics may differ from the Swedish market. However, the approaches used in this study build a general foundation that can be interpreted and applied in other types of study to evaluate the degree of underpricing. Therefore, the approach given in this study thoroughly follows the theories applied in other studies.

3.11. Ethical Considerations

As identified by Bryman & Bell (2011, p. 128-129) ethical considerations such as invasion of privacy or harm to participants requires direct participation from individuals who provides data or detailed information to make possible the development of this research. The lack of human participation and the methodological approach used in this research makes it impossible to generate any kind of damage to any specific individual. In this sense, our concern is to ensure that the results and analysis provided in this research does not generate any type of harm that may indirectly affect or damage the individual belonging to such institutions or organisations. As a result, we did not disclose or reveal any detailed information of our test subjects to preserve their anonymity and confidentiality.

In the case of lack of informed consent, Bryman & Bell (2011, p. 136) explain that individuals and test subjects may agree to participate in the development of a particular study to determine whether this development may generate any type of perjury. Since the data gathered comes from external sources and such data is available publicly, there was no need to ask for consent on the usage of such information. All organisations and/or institutions that did not disclose any of the information required to conduct this research were discarded from our sample.

Regarding the risk of deception, Bryman & Bell (2011, p. 136-137) define it as the lack of consistency by the authors to mislead participants or subject to believe the research had other ulterior motives. In this sense the risk of deception deals with the proper usage of data and information to obtain proper results and develop the analysis on this research. To ensure we met the requirements, we only based our analysis and conclusions from the literature review and the theoretical framework gathered in this research. For us to be able to minimise the risk of deception we developed the study using a deductive approach on a quantitative research study type to minimise the influence of personal beliefs or suppositions.

4. Empirical Findings and Analysis

This chapter presents the empirical findings of the study and the respective data analysis. The chapter initially focuses on underpricing behaviour and IPO activity in both the first- and second-tier markets. The statistical results of the variables in this research are then presented. Lastly, a general analysis is provided.

4.1 IPO Initial Return and Activity

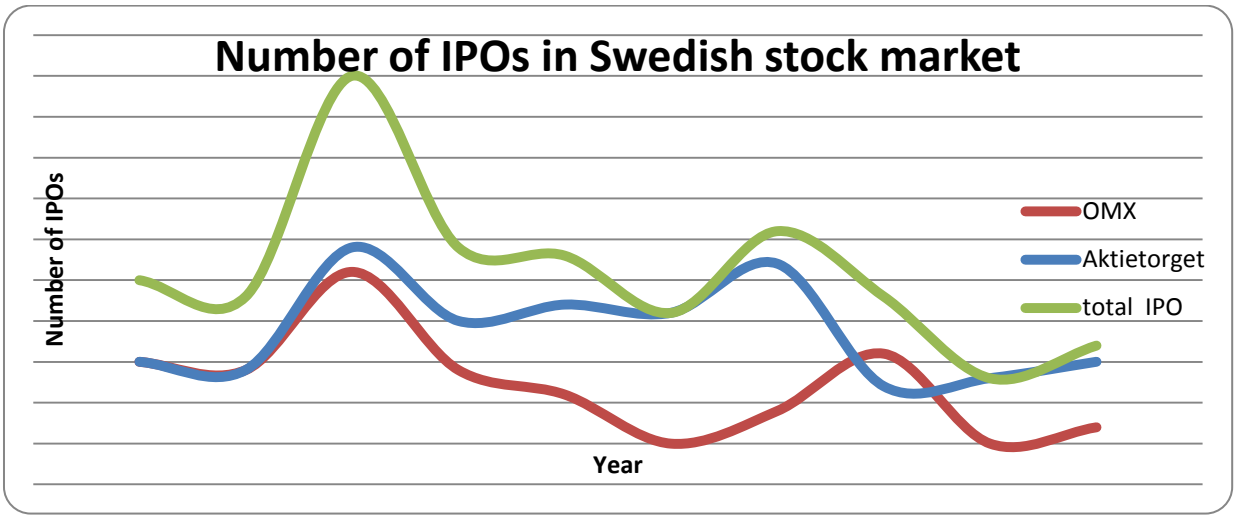

Fig. 4 Number of listed in the Swedish market

There are clear differences between the first-tier and second-tier markets in terms of the number of IPOs that take place in each (Fig 4.), with 72 in the main market and 138 in the Aktietorget. The overall number of IPOs peaks in 2006 after which it fluctuates, showing a downward trend over the subsequent period. During the years 2003, 2009 and 2012, no IPOs were listed on the main market. A common movement in both markets occurs in 2006 when both the first and second market realised a relatively high number of IPOs, indicating a "high IPO activity period". The years 2009 and 2012 could be considered "low IPO activity periods" where IPO activity was lower in both markets compared with other years. Lastly, Fig. 4 shows a general downward trend for the total number of IPOs listed during the chosen time period.

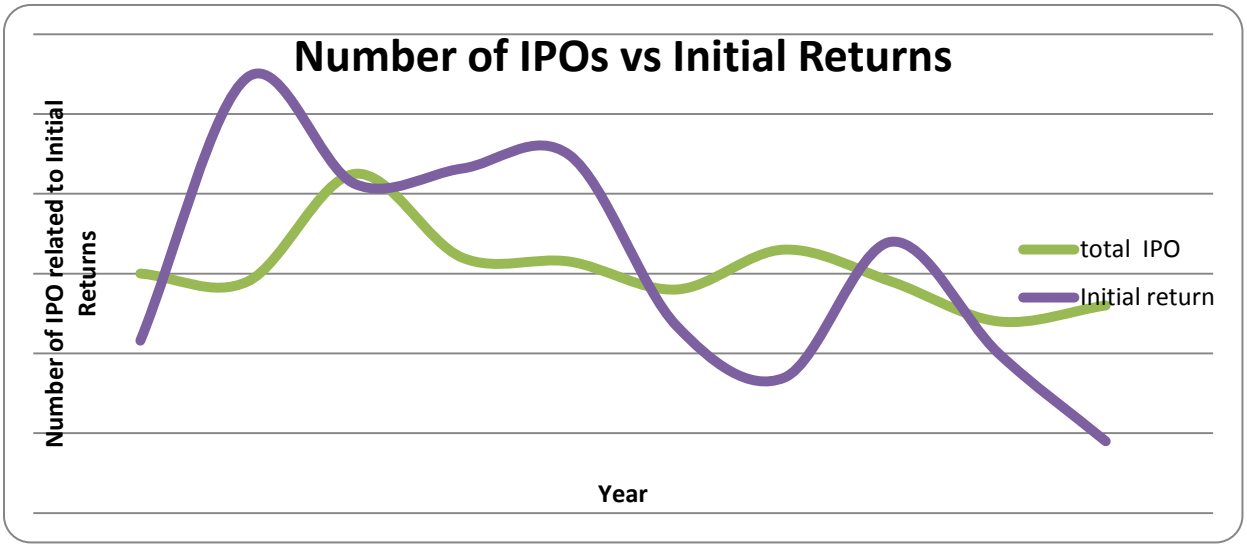

Fig. 5 Number of IPO listed vs Initial return's on listing periods

Fig. 5 shows that a strong initial return momentum (hot IPO market) (Dimovski and Brooks 2003, p. 279) is followed by a strong IPO momentum (high IPO activity period). This phenomenon has been relatively consistent. On the other hand, it also shows that the duration of transactions has extended over the time period and the gap between the number of IPOs and the average initial return has narrowed. A high initial return period appears before a high IPO activity period and after a low IPO activity period.

According to the data, we could observe that higher IPO activity usually appears after a period of higher initial return. This could be because there is usually a delay from a firm deciding to go public until it can be listed. During the high IPO initial return period, "followers" start to realise the lucrative opportunities of becoming listed, hence they start to seek listing (Alti 2005, p. 1107). Because of the complex IPO procedure and the increasing number of firms that file for public listing, the delay for listing could lengthen. We find this conventional pattern in Fig. 5, which shows a high IPO activity period occurring after a high IPO initial return period.

Both hot and cold IPO market periods are related to certain macroeconomic conditions. As described by Derrien (2006, p. 297), during bullish market conditions, more money could be raised and IPO returns are higher. We can clearly identify a significant drop in IPO activity after the global financial crisis in 2008. The impact is most obvious in the main market. However, IPO activities have also decreased in the second-tier market but the magnitude of the drop is more moderate. Companies listed in the second-tier market are usually small venture capital companies. These findings could suggest that smaller companies or venture capital-backed companies are less sensitive to macroeconomic factors than firms listed in main markets.

An inverse relationship appeared in 2011 where a significant drop in IPO activity appeared in the second-tier market alongside a rise in IPO activity in the main market. The reason for the drop in IPO activity in second-tier markets could be caused by a significant drop in the initial return from both opening prices (-13%) and offering price (-2%). The increase in the main market could be explained by the recovery of the global economic market. Generally, we find that IPO activities in main markets are more related to general economic conditions whereas the IPO activities in second-tier markets are less sensitive and may be more related to the degree of underpricing in relation to previous years.

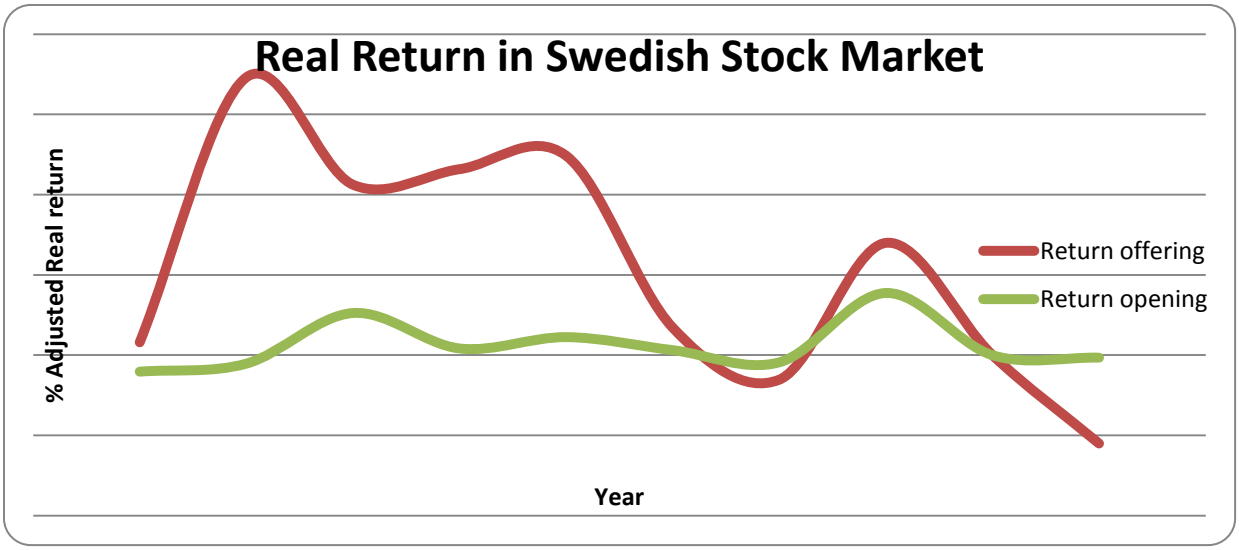

Fig. 6 Real return in the Swedish Stock market

The average initial real return on the Swedish stock market has been mostly positive during the study period. But there is a clear difference between the real return from the offering price and the real return from opening price. The peak occurs in the year 2005 where the real return from the offering price reached 69%. The peak in terms of real return from an opening price occurred in 2011. The real return from opening has been relatively harmonised over the time period with a lesser degree of volatility. The geometric return for opening price is 2% and 18% for the offering price. The standard deviation for the opening price is 6%; for the offering price it is 30%.

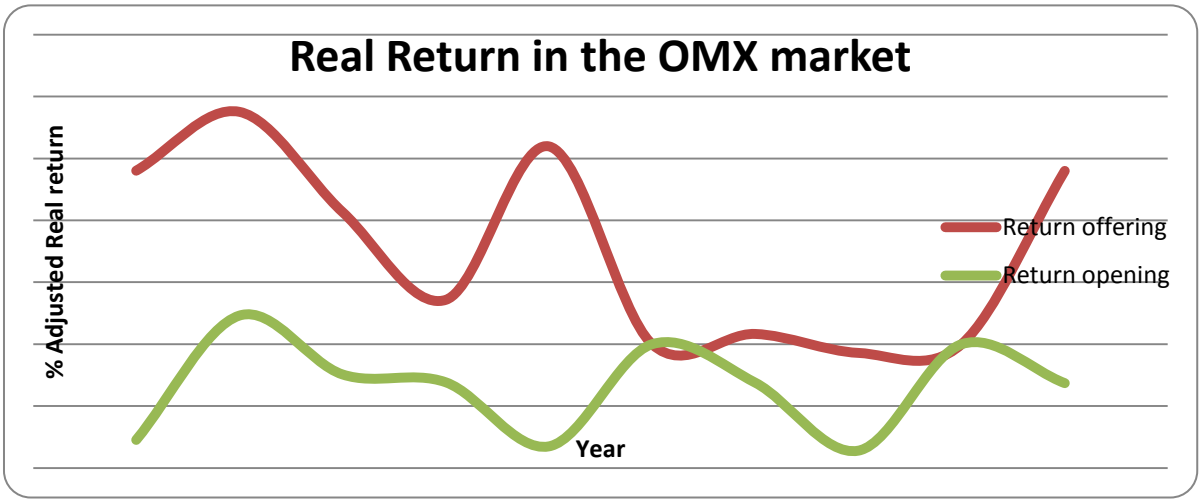

Fig. 7 Real Return in the OMX market

The most relevant finding presented in Fig. 7 is the deviation of real returns between offering and opening prices. The initial return from opening failed to outperform the market. The geometric mean for opening return over the period has been -1% with standard deviation of 1%. On the other hand, the offering price largely outperforms the market. The geometric mean for the offering return over the period is 3% with a standard deviation of 3%.

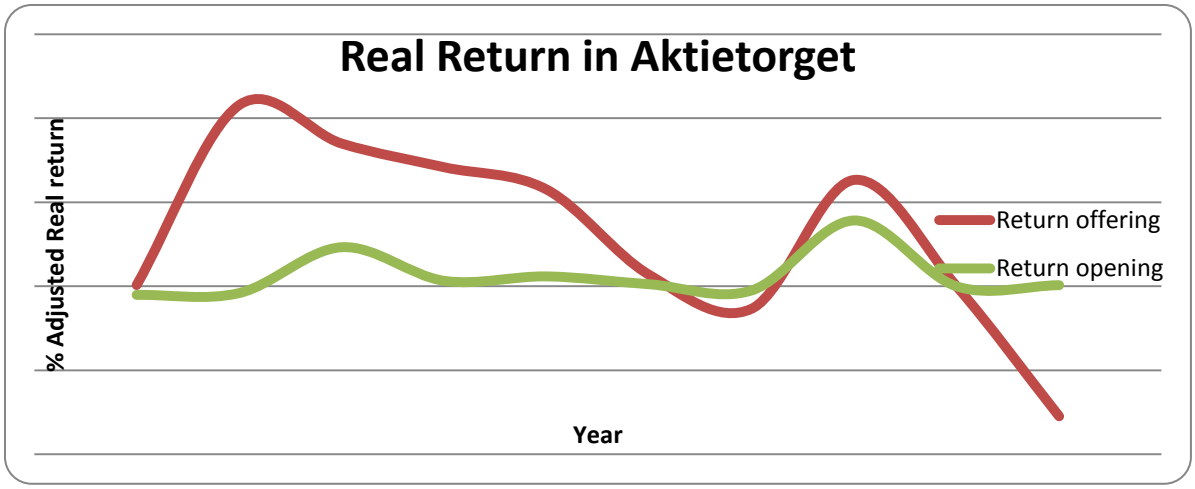

Fig. 8 Real return in Aktietorget

In Aktietorget, the real return for both the offering and opening prices has outperformed the market. The geometric mean for real return in terms of offering price has been 14% with a 56% standard deviation. The geometric return from opening price has been 5% with a standard deviation of 14 %.

Compared with the OMX market, the volatility in the second-tier market has been higher. It is also followed by relatively higher real returns. The peak in real returns occurred in both markets between the years 2005 and 2006, and diminished for both markets after 2008. In 2013, the main market begins to generate a positive real return again but only from the offering side. Previously, both markets had presented higher returns from the offering price.

This result gives us a clear picture about the real return in each market. According to Vismara, Paleari and Ritter (2012, p. 367) most of the IPOs listed in the second-tier market tend to have higher abnormal initial returns. Based on our results, initial returns appear to be higher in the second-tier market both from the opening and the offering. The geometric mean of the initial return from the offering price is 3% in the main market compared to 14% from the second-tier market. The geometric mean of the initial return from the opening is -1% from the first-tier market compared with the second-tier market, which is 5%. Another interesting finding is the deviation between the different types of return. Karlis (2000, p. 83) stated that private investors are more likely to face overvalued IPOs as a result of the competitive advantage given to institutional investors to crowd out private investors in undervalued IPOs, which suggests that it is hard to receive share allocation in IPOs that are profitable in the main market. Given this condition, it could be harder for private investors to generate any profit from the main market by participating in IPOs. According to Loughran and Ritter (2004, pp. 8-9), informed investors could use their advantage in information asymmetry to influence share allocation. Therefore, private investors' allocation cannot be guaranteed. If private investors invest in IPOs solely by acting between the opening and closing spread, the positive abnormal return would not be likely to exist. Therefore, the profits that are associated with the degree of underpricing can be realised by following the strategy of investing in the offering price but not in the opening price.

Compared to the first-tier market, the profit opportunities in the second-tier market appear to be much better. Private investors could receive a real return by both investing in offering or opening prices. But, higher returns are also followed by a higher degree of risk. The degree of volatility for both opening and offering return are much higher in the second-tier market than the volatility that is presented in the first-tier market. This is, of course, normal in a positive risk-return relationship; By observing the coefficient of variation (*CV=Standard deviation/*

real return) of the real return, we conclude that the standard deviation in proportion to each real return is higher in the second-tier market than in the main market. In the main market, CV appears to be approximately 1% of the offering price and is not valid for the opening price because there are no real returns. In the second-tier market, the CV is 4% of the offering price and 2.6% of the opening price. By this comparison, we would conclude that there is an even larger degree of underpricing in the second-tier market, which seems to be more profitable than the main market. Safety-first investors would still prefer to invest in the main market if there is preferred share allocation for them and invest in the second-tier market solely in returns over the opening price.

4.2. Statistical Results

We developed an independent t-test statistical analysis by which we compared the sample means between our two target markets to establish whether or not the degree of underpricing would be higher in second-tier markets. According to our previous analysis, we were able to discern differences between the main and second-tier markets, which may suggest that one of the markets is more underpriced than the other.

We tested both real returns over the offering and opening price and the results can be seen in Fig. 8a and Fig. 8b.

Group	Obs	Mean	Std. Err.	Std. Dev.
Aktietorget	61	.0153642	.0128515	.1003738
OMX	40	-.0071572	.0032824	.0207595
Combined	101	.0064448	.0079201	.0795961
diff		.0225213	.0132641	

diff = mean (Aktietor) - mean(OMX)

Ho: diff = 0 Satterthwaite's degrees of freedom = 67.6404 t = 1.9679

Ha: diff < 0	Ha: diff! = 0	Ha: diff> 0
Pr(T < t) = 0.9529	Pr(T > t) = 0.0941	Pr(T > t) = 0.0471

Fig. 8a Independent t-test unequal analysis for real return over opening price

Group	Obs	Mean	Std. Err.	Std. Dev.
Aktietorget	61	.0686008	.0380864	.2974642
OMX	40	.0133458	.0058614	.0370709
Combined	101	.0467176	.0232005	.233162
diff		.055255	.0385348	

diff = mean (Aktietor) - mean(OMX)

Ho: diff = 0 Satterthwaite's degrees of freedom = 67.6404 t = 1.4339

Ha: diff < 0	Ha: diff! = 0	Ha: diff > 0
Pr(T < t)= 0.9217	Pr(T > t)= 0,1566	Pr(T > t) = 0.0783

Fig. 8b Independent t-test unequal analysis for real return over offering price

As shown in the results, a positive value after calculating mean (Aktietorget) – mean (OMX) would lead to assume the degree of underpricing to be higher in the Aktietorget than in the OMX. The statistical results show p-values of 0.0471 and 0.0783 for the results associating

opening and offering price to obtain a positive result. This leads us to assume that there is enough evidence to prove that the degree of underpricing in the Aktietorget is higher than in the OMX market. Despite the p-value that establishes this relationship for real returns over offering price, it does not show a value below 0.05 so we can interpret that this relation is due to unequal sample sizes that may cause us to generate a type 1 error. Also, a larger sample of IPOs listed on the OMX may balance the statistical results to reveal a significant relationship.

From Table 6 and Fig. 9, the test for normality and the regression fit analysis reveal discrepancies on both tests for real returns in both opening and offering prices as predictors for the degree of underpricing. According to the statistical summary presented in Table 6, the F-statistic value for LOG_REAL_R_OP scored lower than 1 with a P-value higher than 0.759, suggesting that the normal distributed regression analysis is not suitable to predict changes in the degree of underpricing by using real returns over opening. Contrarily, an F-value of 1.915 with a p-value slightly above 0.05 (0.059) still suggests that real return over opening price can be a good predictor to estimate the degree of underpricing since almost only 6% of all the observations may be occurred by chance. However, the lower adjusted r-square values in both observations suggest that the model is still too complicated to use for predictions under a normal linear regression.

Since our data is not normally distributed due to the existence of biased data regarding IPO densities in certain ranges more than others, a robust regression is performed on weighted median least squares to minimise the impact coming from outliers, which we described in earlier chapters.

Model statistics	**R-sq**	**Adj. R-sq**	**Power F (7, 51)**	**Prob > F**	**No. of observations**
	0,447	0,399	0,9	0,529	101
Variable	**Label**	**Coef.**	**Std. Err.**	**t**	**P>t**
Controls					
Age of the firm	LOG_AGE	0,14	0,13	1,09	0,28
H/L	LOG_H_L	0	0,01	-0,48	0,63
Market volatility	LOG_VOLA	0,27	0,17	1,61	0,11
Book value	LOG_BV	0	0	-0,6	0,55
Bank Prestige	LOG_IBP	0	0,01	0,36	0,72
Earnings per Share	LOG_EPS	0,78**	0,07	4,7	0
IPO Activity	LOG_ACTIVITY	0,01	0,02	0,57	0,57
Leverage	LOG_LEVERAGE	-0,12	0,02	-0,54	0,59
Constant	_cons	-0,15	0,05	-2,56	0,01
NOTE	* P-value < 0,05				
	** P-value < 0,01				

Fig. 10 Robust Regression over LOG_REAL_R_OP

As discussed in McDonald, Michelfielder and Theodossiou (2009, p. 294-295), OLS linear regression, such as multiple linear regression, assimilates bias and error as normally distributed. The degree of bias on the entire population of the sample presents discrepancies on density for each of the factors . As the risk of expected bias had been assimilated, we conducted a robust regression for both real opening and real offering prices as predictors for the degree of underpricing. The robust regression results are presented in Fig. 10 and Fig. 11.

Model statistics	**R-sq**	**Adj. R-sq**	**Power F (7, 51)**	**Prob > F**	**No. of observations**
	0,582	0,546	1,18	0,317	101
Variable	**Label**	**Coef.**	**Std. Err.**	**t**	**P>t**
Controls					
Age of the firm	LOG_AGE	0	0,028	-0,01	0,99
H/L	LOG_H_L	-0,005	0,012	-0,45	0,66
Market volatility	LOG_VOLA	-0,317	0,037	-0,86	0,39
Book value	LOG_BV	-0,009	0,009	-0,98	0,33
Bank Prestige	LOG_IBP	-0,009	0,017	-0,5	0,62
Earnings per Share	LOG_EPS	0,086*	0,036	2,4	0,02
IPO Activity	LOG_ACTIVITY	0,013	0,036	0,35	0,73
Leverage	LOG_LEVERAGE	-0,04	0,047	-0,85	0,4
Constant	_cons	-0,213	0,115	-1,85	0,07
NOTE	* P-value < 0,05				
	** P-value < 0,01				

Fig. 11 Robust Regression over LOG_REAL_R_OFF

According to the results of the robust regression analysis, we obtained F-values of 0.90 and 1.18 for real return over opening and offering prices respectively, which implies that the general approach may still be too complicated to predict the degree of underpricing. However, we cannot apply dummy variables in this particular case. From Brown (1968, p. 515), power variables cannot factors like leverage, volatility or high-low ratio, and cannot be interpreted as dummy variables. Also, dummy variables may reduce the coefficient of determination adjusted R-square by trying to plot the regression over the dummy variables. Therefore, contrary to the normal approach given for dummy variables, we conduct the robust regression independently for each of the markets as shown in Fig. 12, Fig. 13, Fig. 14 and Fig. 15.

Model statistics	**R-sq**	**Adj. R-sq**	**Power F (7, 51)**	**Prob > F**	**No. of observations**
	0,346	0,173	1,99	0,082	41
Variable	**Label**	**Coef.**	**Std. Err.**	**t**	**P>t**
Controls					
Age of the firm	LOG_AGE_OMX	0,02	0,02	1,26	0,22
H/L	LOG_H_L_OMX	0,01	0,02	0,85	0,4
Market volatility	LOG_VOLA_OMX	-0,02	0,03	-0,5	0,62
Book value	LOG_BV_OMX	0	0,01	0,37	0,71
Bank Prestige	LOG_IBP_OMX	0,02	0,01	1,33	0,19
Earnings per Share	LOG_EPS_OMX	0,06	0,18	0,33	0,75
IPO Activity	LOG_ACTIVITY_OMX	-0,03	0,02	-1,4	0,17
Leverage	LOG_LEVERAGE_OMX	-0,07	0,03	-2,21	0,04
Constant	_cons	-0,15	0,36	-0,41	0,68
NOTE	* P-value < 0,05				
	** P-value < 0,01				

Fig. 12 Robust Regression for real return over offering price in the OMX market

Model statistics	**R-sq**	**Adj. R-sq**	**Power F (7, 51)**	**Prob > F**	**No. of observations**
	0,46	0,321	3,3	0,008	41
Variable	**Label**	**Coef.**	**Std. Err.**	**t**	**P>t**
Controls					
Age of the firm	LOG_AGE_OMX	0,003	0,009	0,31	0,76
H/L	LOG_H_L_OMX	0,004	0,01	0,46	0,65
Market volatility	LOG_VOLA_OMX	0,042*	0,019	2,2	0,04
Book value	LOG_BV_OMX	0,022**	0,007	3	0,01
Bank Prestige	LOG_IBP_OMX	0,018	0,007	2,44	0,02
Earnings per Share	LOG_EPS_OMX	-0,011	0,03	-0,37	0,71
IPO Activity	LOG_ACTIVITY_OMX	0,008	0,014	0,52	0,61
Leverage	LOG_LEVERAGE_OMX	-0,018	0,019	-0,97	0,34
Constant	_cons	0,041	0,061	0,66	0,51
NOTE	* P-value < 0,05				
	** P-value < 0,01				

Fig. 13 Robust Regression for real return over opening price in the OMX market

From Fig. 12 and Fig. 13, with F-value of 1.99 and 3.30 for both real returns on offering and opening prices respectively, we can verify whether or not the model had improved and become a better predictor to describe variation in the degree of underpricing within a confidence level of 92% and 99%. Contrarily, the results given for Aktietorget are presented in Fig. 14 and Fig. 15. The F-values of 0.97 for both real returns on offering and opening prices suggest that the observations occur at 40% by chance. This suggests that the predictor model is not suitable to interpret the degree of underpricing for the secondary-tier market and gives a confidence of 60% that a significant relationship between dependent and independent variables may exist.

Model statistics	**R-sq**	**Adj. R-sq**	**Power F (7, 51)**	**Prob > F**	**No. of observations**
	0,131	-0,005	0,96	0,476	
Variable	**Label**	**Coef.**	**Std. Err.**	**t**	**P>t**
Controls					
Age of the firm	LOG_AGE_AKTIETORGET	-0,247	0,146	-1,69	0,1
H/L	LOG_H_L_AKTIETORGET	0,039	0,388	1,01	0,32
Market volatility	LOG_VOLA_AKTIETORGET	-0,162	0,112	-1,45	0,15
Book value	LOG_BV_AKTIETORGET	0,003	0,031	0,11	0,91
Bank Prestige	LOG_IBP_AKTIETORGET	-0,005	0,052	-0,09	0,93
Earnings per Share	LOG_EPS_AKTIETORGET	0,841	1,018	0,83	0,41
IPO Activity	LOG_ACTIVITY_AKTIETORGET	-0,044	0,156	-0,28	0,78
Leverage	LOG_LEVERAGE_AKTIETORGET	-0,116	0,147	-0,79	0,43
Constant		-1,609	2,071	-0,78	0,44
NOTE	* P-value < 0,05				
	** P-value < 0,01				

Fig. 14 Robust regression for real return over offering price in the Aktietorget

Model statistics	**R-sq**	**Adj. R-sq**	**Power F (7, 51)**	**Prob > F**	**No. of observations**
	0,114	-0,025	0,589	0,82	
Variable	**Label**	**Coef.**	**Std. Err.**	**t**	**P>t**
Controls					
Age of the firm	LOG_AGE_AKTIETORGET	-0,075	0,045	-1,68	0,1
H/L	LOG_H_L_AKTIETORGET	-0,002	0,012	-0,2	0,85
Market volatility	LOG_VOLA_AKTIETORGET	0,018	0,034	0,54	0,59
Book value	LOG_BV_AKTIETORGET	0,014	0,01	1,41	0,17
Bank Prestige	LOG_IBP_AKTIETORGET	0,009	0,016	0,55	0,58
Earnings per Share	LOG_EPS_AKTIETORGET	0,242	0,313	0,77	0,44
IPO Activity	LOG_ACTIVITY_AKTIETORGET	-0,076	0,048	-1,57	0,12
Leverage	LOG_LEVERAGE_AKTIETORGET	-0,001	0,045	-0,02	0,98
Constant		-0,288	0,637	-0,45	0,65
NOTE	* P-value < 0,05				
	** P-value < 0,01				

Fig. 15 Robust regression for real return over opening price in the Aktietorget

As a result, the interpretation of the given hypothesis that associates each of the variables describing our identified factors will be more supported in main markets than in secondary markets, according to the results from the statistical test. Despite the robust regression, which could only adjust a 60% level of confidence, for explanatory purposes, we will continue to study the relationship of each of the factors that influence the degree of underpricing for each respective market.

4.2.1. Hypothesis Testing

From our literature review, we base eight hypotheses on testing the influence of certain factors and proxies on the degree of underpricing in IPOs. Each hypothesis will interpret a null hypothesis Ho as beta coefficient equals zero, meaning there is no significance evidence to establish a direct interaction between independent and dependent variables. Therefore, the hypothesis will be conducted as follows.

H_1: The rise of the H/L ratio is positively associated with a rise in the degree of underpricing.

For the Variable LOG_H_L that interprets the weighted average between high and low prices for the last three months before the listing period, there was not enough evidence to reject the null hypothesis for both the OMX and Aktietorget markets. For OMX markets (as revealed in (Fig. 12 and Fig. 13), the p-values scored 0.404 and 0.647 for both real returns on offering and opening prices. Consider thess P-values P> 0.05 with a confidence interval of 95%,, it implies that there is no evidence to reject the null hypothesis. Consequently, the t-test statistic revealed p-values of 0.317 and 0.846 respectively for Aktietorget (Fig 14 and Fig 15.), which is also not enough to reject the null hypothesis. Therefore, neither of the H/L ratios within the OMX or Aktietorget seems to influence the degree of underpricing.

H_2: The degree of volatility in the market at the time of the IPO is positively associated with the degree of underpricing.

LOG_VOLA, which associates the degree of market volatility for both the OMX and Aktietorget, scored slightly significant evidence, suggesting a relationship between market volatility and the degree of underpricing. From Fig 12 and Fig 13, the t-test statistic scored p-values of 0.624 and 0.036, revealing just enough significance to reject the null hypothesis for the relationship regarding real return on opening price. However, as interpreted in Fig 14 and Fig 15, within the Aktietorget market, the t-test p-values comprising scores of 0.153 and 0.593 mean that there is not enough evidence to reject the null hypothesis. This therefore suggests that market volatility does not have a positive relationship with the degree of underpricing in secondary markets in Sweden.

H_3: The number of IPO activities in the market at the time of an IPO will be negatively associated with the degree of underpricing it incurs.

The LOG_ACTIVITY variable accounted for the relative IPO activities for either OMX or Aktietorget market. The t-test statistic for real returns on offering and opening prices within the OMX market (Fig. 12 and Fig. 13) scored p-values of 0.171 and 0.606, suggesting that there is no evidence to reject the null hypothesis, implying that there is no significant evidence to suggest a negative relationship between the degree of underpricing in an IPO and the amount of IPO activity in a particular market. Similarly, Fig. 14 and Fig. 15 revealed p-values of 0.779 and 0.122 for real returns on offering and opening prices in the Aktietorget market respectively. This also suggests that there is no evidence to reject the null hypothesis, which also gives us enough evidence to suggest that IPO activities do not affect the degree of underpricing in the Aktietorget. This could suggest that the amount of IPO activity in the markets over the sample period is an automatic result of the financial crisis rather than a risk proxy factor to evaluate IPO risk and minimise information asymmetry.

H_4: The age of IPO firms is negatively associated with the degree of underpricing.

For the variable LOG_AGE, this determines how long it has been operating before IPO. It did not present significant evidence to reject the null hypothesis. For the OMX market (Fig. 12 and Fig. 13), the test statistic revealed p-values of 0.216 and 0.762 for real returns on offering and opening prices respectively, meaning that there is no significant evidence to suggest that firm age influences the degree of underpricing in an IPO. However, in Fig. 14 and Fig. 15, the test statistic revealed p-values of 0.097 and 0.099 for both real return on offering and opening price, suggesting that despite a p-value > 0.05, a relationship between firm age and degree of underpricing may exist in secondary markets. Furthermore, testing and/or a larger sample may improve the t-test statistics and p-values, leading us to assume that a negative relationship between the firm age and underpricing in the secondary market may exist.

H_5: The book value of IPO firms is negatively associated with the degree of underpricing.

For the variable LOG_BV, which determines the size of the book value of listed IPOs within the trading period, a slight significance had been encountered to suggest that it may influence the degree of underpricing. For the Aktietorget market, Fig. 14 and Fig. 15 revealed no t-test statistical significance with p-values scoring 0.912 and 0.166 for both real returns on offering

and opening prices respectively. This suggests that there is no evidence to reject the null hypothesis, implying that book value does not influence the degree of underpricing in secondary markets. For the OMX market (Fig. 12 and Fig 13), a p-value of 0.005 for the t-test statistic that associates real returns on opening price suggests that a positive relationship may exist with the degree of underpricing, which is contrary to our initial supposition.

H_6: The leverage ratio of IPO firms is positively associated with the degree of underpricing.

The degree of leverage (debt to equity ratio), interpreted as the LOG_LEVERAGE variable, only revealed slight significance in the OMX market. Fig. 12 and Fig. 13 revealed a t-test statistic with a p-value of 0.035 related to the real return on offering price. This relationship gives us enough evidence to reject the null hypothesis, suggesting that a negative relationship between leverage and the degree of underpricing may exist. This suggests that underwriters use the information gathered from IPO companies' financial reports and analyse how they can cover any aftermarket expenses or absorb aftermarket risk. As suggested by Latham and Braun (2010, p. 672), IPOs with a larger debt to equity ratio may be associated with companies that lack resources, increasing risk and uncertainty on aftermarket events, which may influence underpricing. However, the t-test with a p-value of 0.341 gave no evidence to reject the null hypothesis, implying that for real return on opening price, there is no relationship between leverage and the degree of underpricing. Similarly, for Aktietorget (Fig. 14 and Fig. 15), the t-test scored p-values of 0.434 and 0.984, suggesting that there is not enough evidence to reject the null hypothesis, which means that there is no evidence to establish a relationship between leverage and the degree of underpricing for IPOs listed in the Aktietorget.

H_7: The EPS of IPO firms is negatively associated with the degree of underpricing.

The variable LOG_EPS represents the average of an IPO company's earnings per issued shares registered in its last financial and interim reports of its last annualised period before being listed on the public market. The t-test statistic revealed no relationship between earnings per share and the degree of underpricing, as evidenced in Fig. 12 and Fig. 13 with p-values of 0.747 and 0.714 for real returns on offering and opening prices respectively in the OMX market. Similarly, Fig 14 and Fig. 15 revealed no significant evidence to reject the null hypothesis with t-test statistic p-values of 0.413 and 0.444 for real returns on offering and opening prices in the Aktietorget. Therefore, we can assume that there is no significant evidence to imply that earnings per share has a positive relationship with the degree of underpricing. Earnings per share do not seem to be a significant factor influencing the degree of underpricing in each of the markets. This could suggest that underpricing in the Swedish market may be motivated by factors other than earnings.

This observation is quite interesting as the basis for considering earnings per share as a valuable risk proxy is due to its connection to information asymmetry. An IPO with a higher degree of earnings must associate an IPO with higher potential or obtain certain advantages over other IPOs. However, earnings per share depend on how many shares the IPO provides and what the relative profit associated with its share is.

H_8: Underwriter reputation is negatively associated with the degree of underpricing.

The last variable, LOG_IBP, interprets the relative frequency of underwriters in IPOs before the trading period. The t-test statistic for real returns on opening price and offering prices in

the Aktietorget (Fig. 14 and Fig. 15) market scored p-values of 0.582 and 0.928, which do not give us enough evidence to reject the null hypothesis. Also, the t-test statistic for real returns on opening and offering prices in the OMX market (Fig 12 and Fig 13) revealed p-values of 0.021 and 0.194. These results give us enough evidence to reject the null hypothesis, establishing a positive relationship between the degree of underpricing and the frequency of underwriters on listed IPOs, going against our initial proposition. Underwriters may behave differently in conducting IPOs in the main and second-tier markets, which may influence how each market perceives their role.

H1a: The degree of underpricing is higher in the second-tier market compared with the first-tier market.

These findings enable us to consider the degree to which information asymmetry between the main and second-tier markets influences the degree of underpricing. According to the Swedish Central Bank (2013, p. 7), the main and second-tier markets differ in terms of the number of financial requirements in each and whether IPOs listed on each market decide to comply or not with these regulations. This leads us to assume that IPOs listed in the Aktietorget, which are more flexible to adapt to such financial regulations, would present a higher degree of information asymmetry between issuers and underwriters. As a result, underwriters may deliberately increase the degree of underpricing to preserve their reputation according to our findings in Fig. 13 (Lewellen, 2006 p. 615). This relationship exemplifies why the degree of underpricing is influenced by underwriters' reputation in the OMX market. IPOs listed on the OMX market would face larger demands from the SFSA to comply with the regulations driving them to be more transparent, leading to a minor degree of underpricing. On the other hand, we were unable to associate such a relationship with the IPOs listed in the Aktietorget; this implies that underwriters are not motivated to preserve their reputation or that the lack of information provided by the issuers drives them to increase the degree of underpricing. In any case, the lack of consistent statistically significant relationships from our results and variables towards this market leads us to consider whether underwriters base their estimations on other proxies to determine the degree of underpricing in an IPO.

Also, as stated by Vismara, Paleari and Ritter (2012, p. 382-383), IPOs listed in second-tier markets tend to be less credible, driving investors to be more sceptical before committing to any kind of investment. Therefore, there is a possibility that IPOs listed in second-tier markets deliberately promote higher underpricing to attract investors and gain financial momentum, as suggested by Ljungqvist, Nanda and Singh (2006, p. 1691) and Alti (2005, p. 1107). This leads us to assume that underpricing in IPOs in second-tier markets may often be configured in reaction to the degree of information asymmetry.

4.3. General Market Analysis

From Fig 11, we can see that in terms of the Swedish market, most of the variables are not significant enough in relation to opening price or offering price. In other words, the degree of underpricing phenomenon cannot be predicted by most of these variables in the general Swedish market. The only significant variable for both opening price and offering price is the EPS variable. According to Sahoo and Rajib (2012, p. 67), a high earnings per share value shows good firm fundamentals and is also an important component of IPO pricing. A higher earnings per share ratio raises the expectation of outside investors the probability of an IPO firm generating future economic profit. Firms' higher earnings per share are positively related to their offering price. In our hypothesis, we expected IPO firms with a higher offering price to receive a lower degree of underpricing, which, in this case, is contrary to our empirical

findings. Our evidence shows that the investors are willing to pay a larger premium for both the offering and opening price. Outside investors' expectations of firms' potential future profits outweighs the possibility of a higher offering price being offered to them, which leads to a higher degree of underpricing.

In terms of offering price, we find a positive relationship between underwriters' reputation and the degree of underpricing. This is also contrary to our hypothesis, as we assumed that the degree of underpricing in an IPO would be lower when a more reputable underwriter is involved. However, as we mentioned earlier, the relationship between underpricing and underwriter reputation could have changed from negative to positive. Kirkulak and Davis (2005, p. 452) suggested that underwriters' behaviour may have changed during the latter half of the 1990s. The relationship between underpricing and reputation could be positive during certain economic conditions. This theoretical argument supports our findings about the positive relationship between these two variables both in terms of the offering price and the opening price. Our chosen sample period incorporates one of the worst financial crises in history alongside two booming markets both before and after the crisis. As IPOs are naturally rarer in cold markets, there was a significant amount of activity during the booming periods. Our IPO activity data showed that there was no IPO activity in the main market during the period of financial crisis. Therefore, in the booming market conditions, underwriters would be more likely to support the degree of underpricing in order to compete with other underwriters. Firms striving for IPO during the hot market tend to expect a higher aftermarket return, which could generate higher capital gains. In order to protect their reputation and prevent negative effects on their market share, underwriters would prefer to support a higher degree of underpricing (Lewellen 2006, p. 638).

There are more variables that could be considered to have a relationship that is significant in association with the opening price and the offering price. Besides the bank reputation variable, volatility of the market and book value per share are also found to have effects on underpricing. Sahoo and Rajib (2012, p. 66) suggest that market volatility is a suitable proxy for market risk. Gleason Johnston and Madura (2008, p. 1107) support this suggestion by stating that higher risk is often associated with higher market volatility. Therefore, volatility is the overall risk of the general market. If the volatility before the IPO listing date is higher, the effect should be positive on the degree of underpricing, which is consistent with our hypothesis.

Sahoo and Rajib (2012, p. 65) stated that book value per share is an appropriate fundamental justification for the IPO share valuation. It is similar to earnings per share in the sense that a higher book value per share tends to be positively related to the offering price. Book value per share is measured by the firm's total assets scaled by the total number of shares outstanding. The replacement cost would be lower for investors if the book value per share is higher, meaning they receive a higher amount of firms' assets compared to IPOs that have lower book value per share. When there is higher book value per share, consequently the price to book (P/B) ratio is lower. An investor is therefore likely to consider it as a valuable stock, which means that the current market price assumes a lower expectation in growth. Lower growth expectation is also associated with lower risk for investors. However, according to our hypothesis in which we assumed that higher offering price and lower risk should be associated with a lower degree of underpricing, it has been rejected once again. The investor in the Swedish main stock market may have higher expectations of stock value and would prefer to pay more for stocks with higher book value that are allocated to them.

According to the results presented above, there is no explanatory variable for the underpricing

phenomenon in Aktietorget. We therefore examine how well such theoretical evidence can be generalised on the relatively less regulated market. We conclude that there are behavioural differences between the main and second-tier markets. The test result in Aktietorget was not significant enough to support our theoretical assumptions. The magnitude of the differences between the two markets is more or less consistent with our previous assumptions in terms of the degree of underpricing and IPO activity behaviours. However, we have to admit that most of the theoretical variables are based on the observations from the main market with an environment and conditions that may differ from Aktietorget. Nevertheless, if the differences in environment and conditions could contribute to a deviation between variables and the degree of underpricing, it is consistent with our findings.

We conclude that, compared with the main market, the deviation in size and the degree of regulations that characterises Aktietorget should have significant effects on underpricing behaviour. We therefore believe that the theoretical framework may be more significant in the markets that are identical to the market where the theories are generated. There could be other variables that have better explanatory power to predict IPO performance on the Aktietorget that we have not yet captured in relation to underpricing behaviour.

5. Conclusion

Through our empirical observations, we found underpricing to behave differently in different types of market. The differences in sizes and regulations could have contributed to such deviations. This finding is consistent with Vismara, Paleari and Ritter (2012, p. 367-370) who revealed that deviations in both the degree of underpricing in an IPO and firms' incentives to conduct an IPO are caused by different factors in the different types of market such as regulations and investor base etc. The degree of underpricing is larger in the second-tier market than in the first-tier market, as is the risk of IPOs, which is positively correlated with uncertainty (Benveniste, Erdal and Wilhelm, 1998, p. 745). There is also a large difference between the initial return from the opening price and the initial return from the offering price. As a result, we believe that safety-first investors would prefer to only invest in the main market on the offering price. If they choose to invest in Aktietorget, we believe that they would prefer to invest in the opening price in terms of their risk-return considerations. According to the data, in terms of IPO activity, the first-tier market is more related to general economic conditions such as expansion and contraction, as described by Dimovski and Brooks (2003, p. 279). The second-tier market, however, is less sensitive to such conditions but may be more affected by the degree of underpricing in IPOs in previous years, similar to the "pioneers" and "followers" relationship described by Alti (2005, p. 1107).

The degree of underpricing that might occur in the Swedish stock market is very difficult to predict. The theoretical assumptions have more explanatory powern the first-tier market than in the second-tier. We discovered that, in general, the fundamental risk proxies have mostly appeared to be significant: once in the general Swedish stock market (including both the first-tier and second-tier market) and once in the first-tier stock market. Other risk proxies, such as volatility and underwriter reputation, have also been shown to have a relationship with underpricing but only in relation to the main market. On the other hand, no variables were found to have a relationship with the second-tier market.

6. Future research

As presented in our observations, we realise that deviations in market environment and conditions could have significant effects on investors' behaviour. This resonates with Holm and Rikhardsson's (2006, p.38) suggestion that enviromental effects have the potential to influence investors' investment allocation decisions. Also, by studying the theoretical framework behind IPO pricing and underpricing, we learned that changes in different market participants' behavioural norms over the course of time is conventional. An example of such a change in behaviour is Kirkulak and Davis' (2005, p. 452) suggestion that the negative relationship between underpricing and underwriter reputation reversed during the latter half of the 1990s. Therefore, the latest behaviour evidence must be kept up to date and the environment dispersion considered carefully. Traditional underpricing behavioural theories, such as "signalling effects", are important in the sense that they provide us with ideas and approaches for how further research studies should be conducted. This work provides us with evidence that in some particular markets, such as Aktietorget, tailored inductive research is necessary to identify the variables which could explain how underpricing is constructed.

Therefore, future research could involve conducting inductive research to identify the relevant factors/risk proxies that significantly influence the degree of underpricing in IPOs on a

smaller scale. We have to consider the environmental factors when conducting such research. We therefore recommend that future researchers do not attempt to generalise a whole country's market behaviours at once but instead begin by narrowing down any research angles to specific markets.

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Appendix

TABLES

Table 2. Correlation matrix over Real returns on both opening and offering price

Correlations

		LOG_REAL_R_OFF	LOG_REAL_R_OP	LOG_LEVERAGE	LOG_H_L	LOG_VOLA	LOG_BV	LOG_IBP	LOG_AGE	LOG_ACTIVITY	LOG_EPS
LOG_REAL_R_OFF	Pearson Correlation	1									
	Sig. (2-tailed)										
	N	101									
LOG_REAL_R_OP	Pearson Correlation	,401**	1								
	Sig. (2-tailed)	,000									
	N	101	101								
LOG_LEVERAGE	Pearson Correlation	-,200*	-,090	1							
	Sig. (2-tailed)	,045	,368								
	N	101	101	101							
LOG_H_L	Pearson Correlation	-,073	,004	,099	1						
	Sig. (2-tailed)	,471	,968	,325							
	N	101	101	101	101						
LOG_VOLA	Pearson Correlation	,008	,082	,000	-,386**	1					
	Sig. (2-tailed)	,938	,417	,998	,000						
	N	101	101	101	101	101					
LOG_BV	Pearson Correlation	-,099	-,030	,104	,474**	-,207*	1				
	Sig. (2-tailed)	,324	,762	,302	,000	,038					
	N	101	101	101	101	101	101				
LOG_IBP	Pearson Correlation	,009	,153	,032	,086	-,122	-,094	1			
	Sig. (2-tailed)	,926	,128	,753	,391	,226	,348				
	N	101	101	101	101	101	101	101			
LOG_AGE	Pearson Correlation	-,002	,024	,023	,485**	-,367**	,486**	,018	1		
	Sig. (2-tailed)	,985	,815	,819	,000	,000	,000	,861			
	N	101	101	101	101	101	101	101	101		
LOG_ACTIVITY	Pearson Correlation	,057	,064	-,108	-,319**	,227*	-,222*	-,146	-,119	1	
	Sig. (2-tailed)	,569	,526	,283	,001	,022	,025	,145	,237		
	N	101	101	101	101	101	101	101	101	101	
LOG_EPS	Pearson Correlation	,068	,198*	,106	,156	-,103	-,093	,040	,098	-,117	1
	Sig. (2-tailed)	,498	,047	,289	,120	,307	,355	,694	,328	,242	
	N	101	101	101	101	101	101	101	101	101	101

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

***Table 2* Correlation matrix of REAL_R_OFF and REAL_R_OP with each of the factors**

Table 3. VIF analysis for multicollinearity test

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	LOG_LEVERAGE	,967	1,034
	LOG_EPS	,920	1,086
	LOG_VOLA	,834	1,198
	LOG_ACTIVITY	,868	1,152
	LOG_BV	,734	1,362
	LOG_H_L	,639	1,564

a. Dependent Variable: LOG_AGE

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	LOG_AGE	,673	1,486
	LOG_LEVERAGE	,967	1,034
	LOG_EPS	,930	1,076
	LOG_VOLA	,827	1,209
	LOG_ACTIVITY	,893	1,120
	LOG_BV	,702	1,425

a. Dependent Variable: LOG_H_L

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	LOG_AGE	,722	1,385
	LOG_H_L	,656	1,524
	LOG_LEVERAGE	,973	1,028
	LOG_EPS	,961	1,041
	LOG_VOLA	,792	1,263
	LOG_ACTIVITY	,871	1,148

a. Dependent Variable: LOG_BV

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	LOG_AGE	,638	1,568
	LOG_H_L	,624	1,604
	LOG_BV	,651	1,537
	LOG_LEVERAGE	,969	1,032
	LOG_EPS	,918	1,090
	LOG_VOLA	,805	1,242

a. Dependent Variable: LOG_ACTIVITY

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	LOG_ACTIVITY	,874	1,144
	LOG_AGE	,666	1,502
	LOG_H_L	,627	1,594
	LOG_BV	,642	1,557
	LOG_LEVERAGE	,967	1,034
	LOG_EPS	,911	1,097

a. Dependent Variable: LOG_VOLA

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	LOG_EPS	,922	1,085
	LOG_VOLA	,791	1,264
	LOG_ACTIVITY	,861	1,161
	LOG_BV	,646	1,548
	LOG_H_L	,600	1,667
	LOG_AGE	,631	1,584

a. Dependent Variable: LOG_LEVERAGE

***Table 3* VIF analysis over LOG_BV, LOG_VOLA, LOG_H_L, LOG_BV, LOG_ACTIVITY and LOG_LEVERAGE**

Table 4. Correlation matrix over each of the Factors in the Aktietorget market

Correlations

		LOG_REAL_R_OFF_AKTIETORGET	LOG_REAL_R_OP_AKTIETORGET	LOG_AGE_AKTIETORGET	LOG_H_L_AKTIETORGET	LOG_VOLA_AKTIETORGET	LOG_BV_AKTIETORGET	LOG_IBP_AKTIETORGET	LOG_EPS_AKTIETORGET	LOG_ACTIVITY_AKTIETORGET	LOG_LEVERAGE_AKTIETORGET
LOG_REAL_R_OFF_AKTIETORGET	Pearson Correlation	1									
	Sig. (2-tailed)										
	N	61									
LOG_REAL_R_OP_AKTIETORGET	Pearson Correlation	,389**	1								
	Sig. (2-tailed)	,002									
	N	61	61								
LOG_AGE_AKTIETORGET	Pearson Correlation	,073	,127	1							
	Sig. (2-tailed)	,576	,331								
	N	61	61	61							
LOG_H_L_AKTIETORGET	Pearson Correlation	,004	,154	,303*	1						
	Sig. (2-tailed)	,976	,237	,018							
	N	61	61	61	61						
LOG_VOLA_AKTIETORGET	Pearson Correlation	-,009	,062	-,351**	-,395**	1					
	Sig. (2-tailed)	,944	,637	,006	,002						
	N	61	61	61	61	61					
LOG_BV_AKTIETORGET	Pearson Correlation	-,042	,057	,230	-,027	-,048	1				
	Sig. (2-tailed)	,749	,662	,074	,836	,714					
	N	61	61	61	61	61	61				
LOG_IBP_AKTIETORGET	Pearson Correlation	,010	,179	-,012	,229	-,184	-,135	1			
	Sig. (2-tailed)	,941	,167	,927	,076	,156	,298				
	N	61	61	61	61	61	61	61			
LOG_EPS_AKTIETORGET	Pearson Correlation	,092	,242	,018	,047	-,015	-,427**	,017	1		
	Sig. (2-tailed)	,481	,060	,889	,719	,909	,001	,899			
	N	61	61	61	61	61	61	61	61		
LOG_ACTIVITY_AKTIETORGET	Pearson Correlation	,024	,012	-,130	-,206	,357**	,142	-,030	,130	1	
	Sig. (2-tailed)	,855	,924	,318	,111	,005	,275	,820	,317		
	N	61	61	61	61	61	61	61	61	61	
LOG_LEVERAGE_AKTIETORGET	Pearson Correlation	-,224	-,048	-,208	-,080	,073	-,022	,046	,043	,113	1
	Sig. (2-tailed)	,083	,711	,107	,539	,576	,867	,722	,742	,388	
	N	61	61	61	61	61	61	61	61	61	61

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

***Table 4* Correlation matrix on each of the factors over LOG_REAL_R_OP_AKTIETORGET and LOG_REAL_R_OFF_AKTIETORGET**

Table 5 Correlation matrix on each of the factors over the OMX market

Correlations

		LOG_REAL_R_OP_OMX	LOG_REAL_R_OFF_OMX	LOG_EPS_OMX	LOG_LEVERAGE_OMX	LOG_H_L_OMX	LOG_VOLA_OMX	LOG_BV_OMX	LOG_IBP_OMX	LOG_AGE_OMX	LOG_ACTIVITY_OMX
LOG_REAL_R_OP_OMX	Pearson Correlation	1									
	Sig. (2-tailed)										
	N	40									
LOG_REAL_R_OFF_OMX	Pearson Correlation	,550**	1								
	Sig. (2-tailed)	,000									
	N	40	40								
LOG_EPS_OMX	Pearson Correlation	,106	,116	1							
	Sig. (2-tailed)	,516	,477								
	N	40	40	40							
LOG_LEVERAGE_OMX	Pearson Correlation	-,276	-,085	,193	1						
	Sig. (2-tailed)	,085	,604	,234							
	N	40	40	40	40						
LOG_H_L_OMX	Pearson Correlation	,275	,447**	,133	-,018	1					
	Sig. (2-tailed)	,085	,004	,414	,914						
	N	40	40	40	40	40					
LOG_VOLA_OMX	Pearson Correlation	-,004	-,211	-,303	-,023	-,088	1				
	Sig. (2-tailed)	,980	,191	,057	,886	,591					
	N	40	40	40	40	40	40				
LOG_BV_OMX	Pearson Correlation	,349*	,107	,550**	-,033	,238	-,249	1			
	Sig. (2-tailed)	,027	,510	,000	,839	,140	,122				
	N	40	40	40	40	40	40	40			
LOG_IBP_OMX	Pearson Correlation	,065	-,029	,138	,022	-,089	,002	,000	1		
	Sig. (2-tailed)	,688	,860	,395	,892	,587	,992	1,000			
	N	40	40	40	40	40	40	40	40		
LOG_AGE_OMX	Pearson Correlation	,310	,320*	,045	-,002	,230	-,366*	,410**	,082	1	
	Sig. (2-tailed)	,052	,044	,784	,992	,153	,020	,009	,616		
	N	40	40	40	40	40	40	40	40	40	
LOG_ACTIVITY_OMX	Pearson Correlation	,032	-,014	-,446**	-,204	,227	-,110	-,158	-,346*	,190	1
	Sig. (2-tailed)	,846	,931	,004	,207	,159	,501	,331	,029	,241	
	N	40	40	40	40	40	40	40	40	40	40

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5 **Correlation matrix on each of the factors over LOG_REAL_R_OP_OMX and LOG_REAL_R_OFF_OMX**

Table 6 Multiple regression analysis for both Real opening and offering price returns

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,244[a]	,060	-,033	,237014

a. Predictors: (Constant), OMX or Aktietorget, LOG_IBP, LOG_EPS, LOG_LEVERAGE, LOG_VOLA, LOG_ACTIVITY, LOG_AGE, LOG_BV, LOG_H_L

b. Dependent Variable: LOG_REAL_R_OFF

ANOVA[a]

Model		Squares	df	Mean Square	F	Sig.
1	Regression	,324	9	,036	,642	,759[b]
	Residual	5,112	91	,056		
	Total	5,436	100			

a. Dependent Variable: LOG_REAL_R_OFF

b. Predictors: (Constant), OMX or Aktietorget, LOG_IBP, LOG_EPS, LOG_LEVERAGE, LOG_VOLA, LOG_ACTIVITY, LOG_AGE, LOG_BV, LOG_H_L

Coefficients[a]

Model		dized Coefficients B	Std. Error	ed Coefficients Beta	t	Sig.
1	(Constant)	-,177	,392		-,451	,653
	LOG_LEVERAGE	-,285	,158	-,189	-1,804	,075
	LOG_H_L	-,003	,048	-,011	-,068	,946
	LOG_VOLA	,010	,126	,009	,077	,939
	LOG_BV	-,008	,035	-,033	-,233	,816
	LOG_IBP	,004	,058	,008	,076	,940
	LOG_AGE	,048	,096	,064	,494	,622
	LOG_ACTIVITY	,010	,126	,009	,079	,937
	LOG_EPS	,109	,121	,097	,899	,371
	OMX or Aktietorget	-,044	,087	-,092	-,499	,619

a. Dependent Variable: LOG_REAL_R_OFF

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,399[a]	,159	,076	,076508

a. Predictors: (Constant), OMX or Aktietorget, LOG_IBP, LOG_EPS, LOG_LEVERAGE, LOG_VOLA, LOG_ACTIVITY, LOG_AGE, LOG_BV, LOG_H_L

b. Dependent Variable: LOG_REAL_R_OP

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,101	9	,011	1,915	,059[b]
	Residual	,533	91	,006		
	Total	,634	100			

a. Dependent Variable: LOG_REAL_R_OP

b. Predictors: (Constant), OMX or Aktietorget, LOG_IBP, LOG_EPS, LOG_LEVERAGE, LOG_VOLA, LOG_ACTIVITY, LOG_AGE, LOG_BV, LOG_H_L

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Beta	t	Sig.
1	(Constant)	-,093	,127		-,735	,464
	LOG_LEVERAGE	-,042	,051	-,081	-,816	,417
	LOG_H_L	,023	,015	,232	1,513	,134
	LOG_VOLA	,068	,041	,183	1,659	,100
	LOG_BV	,016	,011	,196	1,456	,149
	LOG_IBP	,029	,019	,155	1,559	,123
	LOG_AGE	,020	,031	,077	,631	,529
	LOG_ACTIVITY	,009	,041	,025	,229	,819
	LOG_EPS	,103	,039	,268	2,625	,010
	OMX or Aktietorget	-,072	,028	-,445	-2,551	,012

a. Dependent Variable: LOG_REAL_R_OP

Table 6 robust regression over LOG_REAL_OP and LOG_REAL_OFF on respective factors

FIGURES

Fig. 9 Normality plots and Regression fit for Real return opening and offering price

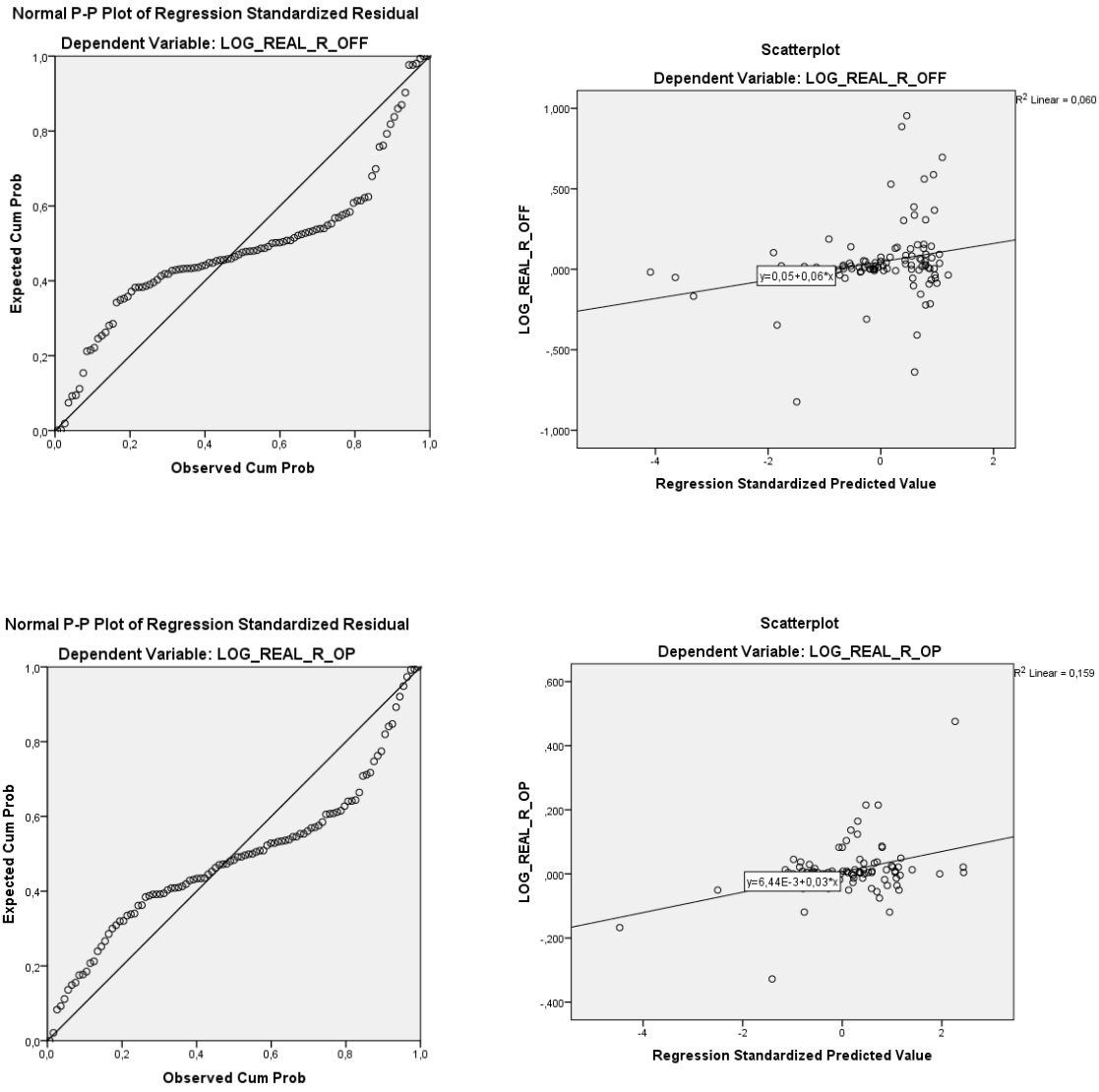

***Fig. 9* Normality plot and Regression fit for REAL_R_OFF and REAL_R_OFF**