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# **Long-Term performance of Swedish IPOs**

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**1990 to 2002**

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### **Abstract**

We have performed a study much similar to Ritter's (1991) about long-term aftermarket performance of IPOs on the Swedish market during the years 1990 to 2002. The study resulted in evidence for that Swedish IPO do underperforms their benchmark-portfolios during a 36-months period. Though, the grade of underperformance depends of the chosen benchmark. The study is mainly focused on a particular benchmark, a portfolio of non-issuing firms matched by size and sector. Compared to this benchmark the sample of IPOs underperforms with on average 21,35 %.

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### 1. Introduction

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*In this chapter we are going to present the background of our research problem, and why the problem is relevant today, which will motivate our research question. We are also going to describe the delimitations of the study and give an outline for how the study will be presented.*

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#### 1.1. Background

Several studies have documented anomalies in the pricing and performance of IPOs. These anomalies can be classified into three categories, (1) The initial underpricing. This underpricing has been discovered to be highly cyclical with some lasting for months in which the average return is much higher than its benchmarks Ibbotson (1975). This underpricing was on average 14,3% in U.S. (Ritter, 1991) and 14,1% in U.K. market for example (Levis, 1993). (2) Ibbotson and Jaffe (1975) stated the "hot issue" market phenomenon. A "hot issue" market is a time period when many firms goes public, the "hot issue" market phenomenon implies that an IPO in such period underperforms in the long run. (3) The long-run underperformance phenomenon, this anomaly was first illuminated by Ritter (1991). Ritter discovers a significant underperformance in the long-run for IPOs measured by different benchmarks during a three year period. Many similar studies have been made on several different markets. Although we have not found any extensive study on the Swedish IPO market, the only recent study on that brings up Sweden in this area is a study of similarities of IPO performance in an international perspective made by Loughran, Ritter and Rydqvist in 1994.

After the peak in number of IPOs in Sweden 1999 the IPO activity has started to increase again after its stagnation in 2002-2004. In the latest months there has been much fuzz in Swedish media about one of the most powerful families in the Swedish industry wants to take one of their companies private with the motivations that the public stock-market do not give that sector a fair valuation because of the stock-markets

short-term thinking. The latest IPOs on the Stockholm stock-exchange has been made by companies in the consumer discretionary industry which had a very positive performance its first month of public trading.

### ***1.2 Purpose and Research Question***

In this study we have the purpose to evaluate whether documented IPO anomalies also apply on the Swedish IPO market with focus on the long-run performance. Thus, do Swedish IPOs underperforms in the long-run, could this possible underperformance be sector specific, could it be explained by the IPO's initial return or size of the issuing company?

### ***1.3 Delimitations***

We are only going to study the Swedish IPO market. We have delimited the time period to IPOs made during a twelve year period, 1990-2002. We are only going to study IPOs and have sorted out listing of new companies through merger or spinoffs.

### ***1.4 Outline***

The remaining part of the study is outlined as follows: In chapter two we present the methodology used for data collection and formulas for calculations that will be conducted. Chapter three summarizes the relevant research that has been published in this field. In chapter four we present the empirical result from the study and in chapter five we are analyzing the results presented in chapter four. In the last chapter we present our conclusions and give some suggestions for further studies.

## 2. Methodology and Data

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*The chapter contains an account for the methodological approach and the procedures used when collecting data and conducting the study. We also take in account different choices made that may have affected the result of the study and describing the formulas used for computing.*

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### 2.1. Approach

This study is divided into two parts, in the first part our ambition is to find out whether Swedish IPO's underperforms in the long-run or not. In the second part we will study if an underperforming IPO can be explained by firm-size, sector or initial return of the issuing company.

This study has been conducted using a quantitative approach, which in our sense is undisputable the most suitable. For the calculations in the first part we have used Microsoft Excel, and for the time series regressions in the second part we have used E-views.

### 2.2. Literature Study

When conducting the literature review to summarize the previous research in the IPO area, the databases ELIN@Lund, Google Scholar and ScienceDirect were used. Search criteria's as "IPO", "long-run performance" and "initial public offerings" among others gave us an exhaustive overview of the research field. The database search showed the way to the research of Ritter (1991) in which this study have its base.

### **2.3. Empirical Data**

The data used in the study consists of a sample of 143 IPO's on the Stockholm stock-exchange during the period of 1990 to 2002. Information about IPO's was collected using DataStream Advance 4.0 where we sorted out all new issues on the Stockholm stock exchange during the selected time period. To be classified as an IPO, a public issue shall fulfil the following criteria:

- No cross-listing - the company to be listed should not be listed on any other stock exchange.
- Companies that are transferred from other public markets do not meet the criteria as an IPO.
- No spin-offs or mergers – issues that are result of spin-offs or mergers do not qualify as an IPO.

The IPO data consists of monthly observations, starting with the closing price from the first public trading day to avoid the common abnormally high initial return. We measure the company's performance on a monthly basis for 36 months. According to Ritter (1991) among others, 36 months is most common time period to measure the aftermarket performance. To calculate the monthly returns we have used justified stock prices, meaning that the prices are adjusted for corporate actions (stock splits, stock issues, bonus issues etc.) Firms that is delisted before the end of the 36 month period is truncated and ends with the last listing date on the Stockholm stock exchange.

The data collection using DataStream resulted in a sample of 376 IPO's and after cross checking the data, by comparing the information with data of IPO's from the Stockholm Stock exchange, the sample decreased to the final of 143 IPO's. The reason to the downsized sample is mainly due to DataStream included firms transferred from Nya Marknaden, which we not classify as IPOs. We decided only to use the IPOs with an exact match to increase the reliability in the study. We consider the sample to be random and a sample of 143 IPO's to be enough to retain statistical significance.

### 2.4 Evaluating the aftermarket performance

To evaluate whether IPOs underperforms or not we have calculated monthly benchmark adjusted returns as the return on the specific stock minus the return on the benchmark for the corresponding period.

#### 2.4.1 Benchmark-adjusted average returns

The benchmark adjusted return for stock  $i$  in event month  $t$  is calculated as:

$$ar_{it} = r_{it} - r_{mt}$$

The average benchmark adjusted return on a portfolio of  $n$  stocks on event month  $t$  is the equally weighted arithmetic average of benchmark adjusted returns

$$AR_t = \frac{1}{n} \sum_{i=1}^n ar_{it}$$

The t-statistic for the average adjusted return at event month  $t$  and  $n$  number of observations for month  $t$  and the standard deviation  $sd$  for month  $t$  is calculated as

$$AR_t \cdot \sqrt{\frac{n_t}{sd_t}}$$

The cumulative benchmark adjusted aftermarket performance from event month  $q$  to event month  $s$  is the summation of the benchmark adjusted returns:

$$CAR_{q,s} = \sum_{t=q}^s AR_t$$

The t-statistic for the cumulative average adjusted returns for month  $t$ ,  $CAR_{1,t}$ , is calculated as:

$$CAR_{1,t} \cdot \sqrt{\frac{n_t}{csd_t}}$$

Where  $n_t$  is the number of trading firms each month and  $csd_t$  is computed as

$$csd_t = [t \cdot var + 2 \cdot (t - 1) \cdot cov]^{1/2}$$

Where  $t$  is the event month,  $var$  is the average cross-sectional variance, and  $cov$  is the autocovariance of the  $AR_t$  series.



### 2.4.2 Three-year buy and hold strategy

As an alternative to the cumulative benchmark adjusted returns we are presenting the model used by Ritter (1991) model for a three year buy and hold strategy that is computed as follows:

$$R_i = \prod_{t=1}^{36} (1 + r_{it})$$

Where  $r_{it}$  is the raw return on firm  $i$  in event month  $t$ , this is a measure of a three-year buy-and-hold strategy where a stock is purchased at the closing price on the first trading day after issuing and holding the stock for 36 months. To get this return benchmark adjusted we use a wealth relative measure which is defined as:

$$WR = \frac{(1 + \text{average\_3-year\_total\_return\_on\_IPOs})}{(1 + \text{average\_3-year\_on\_matching\_firms})}$$

If this results in a wealth relative less than 1,00 it can be interpreted as IPOs underperforms its benchmark, if greater than 1,00 it can be interpreted as the IPO outperforms its benchmark.

### 2.4.3 Benchmarks

To answer the question if the sample of 143 IPO's in the long-run underperforms, the choice of benchmarks has to be considered. The first benchmark used is OMX all-share index with historical quotes from 1989 to 2005 which is used to compare the performance of the whole sample. The second benchmark consists of sector indices on each sector in which the sample is divided, and the third benchmark consists of a sample of comparable firms based on size and sector.

#### *Sector Indices*

The sector indices used in the study is based on the sector classification from the Stockholm stock-exchange. ([www.omx.se](http://www.omx.se)). To get the benchmark sector indices we used the following indices collected from DataStream: OMX, DataStream and Affärsvärlden. The sector index had to cover the whole period from 1990 to 2005. In

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some cases we couldn't find indices that covered the whole period, instead we used different indices overlapping. To be sure of that the indices matched we calculated the correlation coefficient on the period they both covered. The correlation coefficient where never below 0,897 (1,00 means perfect positive correlation). The sector classification is displayed in table 2.1.

*Table 2.1 Sector indices*

Index	Name
10	Energy
15	Materials
20	Industrials
25	Consumer Discretionary
35	Health Care
40	Financials
45	Information Technology
50	Telecommunication

### *Firms matched by size and sector*

In addition to sector indices we have constructed matching portfolios for each firm that went public during our sample period. We did this to get a more precise benchmark for the specific companies. When constructing the portfolios we took two variables in consideration, size and sector. The firms in the matching portfolio also had to meet the criteria that it had to been publicly traded for at least three years before it could be placed in a matching portfolio, because according to the hypothesis of this study that a firm going public underperforms its comparables for the first 36 months. We have conducted indices with 8 classifications for sectors (the same as for the sectors in table 2.1). When we took size into consideration we conducted three classifications; small, medium and large. When determining size we used the total assets on the firm's balance sheet.

< 100 million SEK in total Assets => Small

> 100 million SEK in total assets < 100 000 million in total assets => Medium

> 100 000 million SEK in total assets => Large

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When conducting the portfolios we gave every company included equal weight based on raw returns.

### *All share index*

As an additional benchmark the OMX all-share index has been used to evaluate whether the IPOs underperforms the overall market. We chose the OMX all-share index because it is the all-share index including the most securities trading at the Stockholm stock-exchange.

## **2.5 The regression analysis**

In the second part of this study we are going to use regressions to evaluate whether different firm specific data explains the performance of an underperforming issuing firm. To evaluate whether the underperforming companies respective initial return, size, and sector explains its performance we are using a multiple regression analysis. We have used the specific firm's percentage change as the dependent variable and the initial return, size and sector.

$$r_i = \alpha + \beta_{IR} + \beta_{size} + \beta_{sector} + \varepsilon_i$$

Where

$r_i$  = return on the underperforming stock

$\beta_{IR}$  = Index for initial return

$\beta_{size}$  = Index for size

$\beta_{Sector}$  = Index for sector

$\varepsilon_i$  = Errors, which corresponds to the variation in  $r_i$  that can not be explained by the equation

When conducting a multiple regression analysis several assumptions has to be fulfilled, there shall be no linearity in the residuals, the residuals shall be homoscedastic, no covariance in the residuals, no autocorrelation in the residuals and the residuals shall be normal distributed.

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The Jarque-Bera test is used to test whether the residuals are normally distributed, the Ramsey-Reset test to test the residuals for linearity, White's heteroscedasticity test to test for homoscedasticity and the Durbin-Watson to test for autocorrelation. To minimize heteroscedasticity, the residuals have been adjusted using the Newey-West estimator.

### **2.5.1 Independent variables**

#### *Sector index*

We have used sector, the same indices as mentioned earlier, to evaluate if a underperforming issuing firm could be explained by its specific industry's performance during the corresponding period.

#### *Size*

We have created three different indices according to size, the classifications are determined by the firms balance sheet total assets, the size classes are as follows:

< 100 million SEK in total Assets => Small

> 100 million SEK in total assets < 100 000 million in total assets => Medium

> 100 000 million SEK in total assets => Large

#### *Initial return*

Since the measures of aftermarket performance are conducted excluding the initial return, we are also going to evaluate if the initial return explains the first 36-months performance of the underperforming firms. We have calculated the difference between the firms offering price and the stock's closing price on its first public trading day. The initial returns of the sample was divided into five percentiles and created an equally weighted portfolio for each percentile. To get initial return to be a valid benchmark for a company, the company itself has been excluded from the index.

### 3. Literature Review

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*This chapter summarizes the previous research in the IPO field. To get a full insight in the research we have studied the three anomalies that are brought up in the IPO research. Though this study is focusing on the long term-performance of IPO's, we think it is important to look into the entire research field. The chapter starts with a review of the earliest studies and then treats the three anomalies separately and ends with a summary.*

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#### 3.1 Early studies

The IPO market has since the 1960's been subject to a large number of studies. One of the earliest well known studies in the area was conducted by Ibbotson (1975) who investigated the performance of new issues of common stock for public trading during 1960 to 1969. Ibbotson and Jaffe (1975) studied the "hot issue" market during the same time period and found evidence for serial correlation which indicated that the statistical assumption of serial independence for new issues returns was invalid. The IPO markets are often classified as hot or cold, Ibbotson and Jaffe (1975) and Ritter (1984) are viewing this classification in terms of periodic underpricing.

Ibbotson (1975) had the objectives to measure the initial performance of new issues and test the aftermarket for departures from market efficiency. Ibbotson discovered evidence for positive initial performance and this evidence was explained by initial underpricing / low offering price or overvaluation of new issues. Regarding the aftermarket Ibbotson found no evidence for departures from market efficiency despite some tendency of IPO's to produce positive excess returns in the first year and negative excess returns the following three years.

After 1975 the initial performance of IPO's and the "hot issue" markets was the focus in numerous studies (Carter and Manaster, 1990; Miller and Reilly, 1987; Ritter, 1984;

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1987; 1991; Ibbotson, Sindelar and Ritter, 1988; Alvarez and Gonzales, 2005; Levis, 1993; Loughran, 2002; a.o.). The long-run performance of initial public offerings was except for Ibbotson (1975), that used a sample of only 200 IPO's, not studied much until Ritter (1991) studied the anomaly that IPO's tend to underperform in the long-run. Starting with Ritter (1991) the long-run performance became a popular study-object and was the research subject in many studies in different markets. Ritter (1991) used a sample of 1526 IPO's in the American and New York stock exchanges during the period 1975 to 1984. The study resulted in evidence for that in three years after the IPO the firms significantly underperformed the comparable firms matched by size and industry used in the study.

To evaluate the long-run performance Ritter (1991) used two different measures. These measures were average benchmark-adjusted returns (AR), and three-year buy and hold returns for both the IPO's and the set of comparables. The comparables was matched by industry and size with each IPO and listed on the American or New York stock exchange. For the initial period and the three year aftermarket period Ritter (1991) used benchmark-adjusted returns calculated as the monthly raw return on a stock minus the monthly benchmark return for the corresponding 21-day trading period. The benchmarks Ritter used were the following:

- CRSP value weighted NASDAQ index.
- CRSP value-weighted Amex-NYSE index.
- Listed comparable firms matched by size and industry
- Index of the smallest size decile of the NYSE

Ritter (1991) documents empirical findings that the sample of 1,526 IPO's significantly underperforms the set of comparable firms matched by size and industry both statistical and economical using AR and CAR.

When calculating the three-year buy and hold return Ritter (1991) shows that the sample IPOs produces an average three year holding period return of 34.47% compared to the sample of listed stocks that have an average of 61.86% during the corresponding period. Measured in dollar invested, the wealth relative ratio for the three year period is 0,831

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for the IPO's meaning that for every dollar you put in an IPO you get 17 % less than if you invest in a comparable non-issuing firm.

The work of Ibbotson (1975), Ibbotson & Jaffe (1975) and Ritter (1991) among others lead the researchers to study IPO's in three different measures; the initial underpricing, the "hot issue" markets and the long-run underperformance phenomenon. The remaining part of this literature review documents the findings in the three anomalies.

### ***3.2 The initial underpricing***

The initial returns of IPO's are in most previous studies proved to be abnormally high and the most IPO's are thereby tending to be underpriced (Carter and Manaster, 1990; Miller and Reilly, 1987; Ritter, 1984, 1987, 1991 among others). The initial return is defined as the difference in price between the offering price and the price of the IPO after the closing of the first trading day (Ritter, 1991). A major part of the studies that documents IPO underpricing assume that the different players in the IPO hold different information about the true value of the IPO and this generates incentives to the underpricing, a large number of these studies meaning that the underpricing is used as a signal by the issuer (Allen and Faulhaber, 1989, Grinblatt and Hwang, 1989, Welch, 1989 and Brau and Fawcett, 2006)

The explanation to the signalling hypotheses is mostly that the issuer has more information about its future cash flows than the investors. They thereby underprice their IPO with the intention to receive more positive price reaction in later announcements of firm decisions or when they want to raise more capital (Tsangarakis 2004).

As mentioned above the initial underpricing has been studied in a number of different markets. Loughran, Ritter and Rydqvist (1994) discuss evidence on the short-run and long-run performance of IPO's in an international aspect. Loughran et al. studied short-run return for IPO's in 25 countries and found that all of the studied markets show a significant abnormally high initial return. Though, the amount of underpricing differs among countries. Loughran et al. concludes that average initial returns tends to be

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higher (1) the higher the degree of government interference, (2) the earlier in the process of going public a fixed offering price is set and (3) the riskier the firms going public.

Levis (1993) makes a study of 712 IPO's on the London Stock exchange from 1980 to 1988 and find evidence for significant abnormal returns on the first trading day. Levis also argues that the abnormal first day return is a result of underpricing the IPO. Tsangarakis (2004) examines the price performance of Greece IPO's during 1993-1997 pointing out that the Greek IPO market differs in many ways from the international. Tsangarakis is using a sample of 108 IPO's and find evidence for that the short-run behaviour of Greek IPO's is consistent with the international evidence regarding the initial returns.

Levis (1993) finds an average of 14.3% return on the first trading which is almost exact the same as Ritter (1991) found (14.1%) on his study in the U.S. market. Levis also finds that the initial returns are higher for larger companies when they go public.

### **3.3 The "hot issue" markets**

Hot issues are in general defined as particular IPO's that have risen from their offering prices to higher than average price in the aftermarket (Ibbotson and Jaffe, 1975). The IPO market are often considered in periods of high and low intensity (hot and cold markets), Ibbotson and Jaffe finds evidence for that IPO underpricing is cyclical and concentrated in particular time periods. According to Ritter (1984) a "hot issue" market is often characterized by an increase in the number of IPO's, severe initial underpricing and frequent oversubscription.

Ritter (1984) analyzes the "hot issue" market in 1980, in that period the average initial return of IPO's was about 48% compared to about 16 % in the "cold issue" period. The "hot issue" market was found to be associated with natural resources IPO's and the market equilibrium explanation was found to be insufficient. According to Ritter this feature is consistent with a risk and return trade-off.



Empirical evidence for that the “hot issue” IPO market exists in both time periods and in industries are documented by among others Allen and Faulhaber (1989), Asquith, Jones and Kieschnick (1997) Loughran (2002) and Helwege and Liang, (2004). Allen and Faulhaber studies if firms use the underpricing as a signal, assuming that the firm has the best knowledge of its prospects. The result of the study is in line with the result of Ritter (1984) that underpricing arise in a separating equilibrium. Loughran (2002) discuss that the issuers rarely get upset by the initial underpricing and gives an explanation about why the “hot issue” markets exists.

Sutton, Wong and Zechner (2001) evaluates a model that predicts that the likelihood of “hot issue” markets depends on the distribution of market size uncertainty and the degree of network externalities that exists in the preferences of the consumers. Brailsford, Heaney and Shi (2004) develops a model that focus on supply and demand that incorporates economic conditions and focuses on both the time series behaviour on the underpricing and volume of IPOs. The study results in evidence for that the past volume leads the future volume of IPOs.

### ***3.4 The Long-Run underperformance phenomenon***

How an IPO perform in the Long-Run was as mentioned above was examined by Ibbotson (1975) that argues that his evidence supported the prediction of the “efficient market hypothesis” and by Ritter (1991) that showed evidence for significant underperformance. The long-run performance is defined by Tsangarakis (1994) as how the following prices of an IPO compare to the offering price and to its first market price, the capital market efficiency hypothesis propose that the price of an IPO in the aftermarket should not produce excess returns.

The evidence for long-run performance can also be evidence for that IPO’s not really are initially underpriced; Aggarwal and Rivoli (1990) used the theory of fads to explain that IPO’s not are initially underpriced. Aggarwal and Rivoli instead meaning that

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IPO's are fairly priced according to the IPO's essential market value. This is argued for in the study, with evidence showing that the negative market-adjusted performance of IPO's lasts over a 250-day period. This is much longer than what is justified by market efficiency. Aggarwal and Rivoli interpret this as evidence for that IPO's are in general not underpriced.

Internationally the anomaly that IPO's underperform in the long-run has been studied a lot and according to the results from most of the studies the anomaly appears to hold. Levis (1993) that studied both the initial returns and the long-run performance using a sample of 712 U.K. IPO's on the London stock exchange concludes that the IPOs in the UK underperformed a number of relevant benchmarks in the first 36 full months of public trading.

When Levis (1993) studied the aftermarket performance he used three different CAR benchmarks. Levis finds that the average underperformance is -11,38%, -8,31% respective -22,96% for the different CAR benchmarks. All returns are excluding the first month of trading. He finds that this underperformance is economically and statistically significant. The magnitude depends on the choice of benchmark employed for calculating the cumulative adjusted returns (CAR).

Ljungqvist (1993) studied the performance of German IPO's and found positive initial returns but negative returns in the long-run. Positive initial returns and negative long-run aftermarket returns was also found in Latin America by Aggarwal, Leal and Hernades (1993) who examined the IPO performance in Latin American countries. Keloharju (1993) found evidence for that the market-adjusted returns of a sample of IPO's in Finland showed negative numbers after ten months from the issue.

Loughran, Ritter and Rydqvist (1994) studied the long-run return of IPO's in 9 different markets (by summarizing others and own articles). All of the papers they study including their own study on the Swedish market finds that IPO's all have negative adjusted returns in the aftermarket. They conclude that the long-run returns tend to be lower the riskier the firms that go public are.

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Loughran and Ritter (1995) shows evidence for that companies issuing new stock, both IPO's and SEO's, during 1970 to 1990 significantly underperforms relative to non-issuing firms for five years after the issue. The difference in the amount of invested money for the same wealth after five years is 44% more invested in the issuing company.

Gao, Mao and Zhong (2006) studies if the divergence of opinions affects the long-run performance of IPO's. The study is based on Miller's (1977) hypothesis that divergence of opinions may lead to asset overvaluation and subsequent underperformance in markets with restricted short-selling, such as the IPO markets. According to Miller (1977) greater divergence of opinions among IPO investors will lead to greater long-term underperformance. Gao et al. are using a sample of 4057 IPO's from 1980 to 2000 and finds that early IPO market return volatility is negatively related to subsequent IPO long-term excess return. That result is highly significant up to three years after the IPO. The study results in evidence for this underperformance to be much stronger for IPO firms than for comparables non-issuing firms matched by size and industry.

When reviewing the previous research on the long-run performance of IPO's we also discovered a few studies that not uphold that IPO's underperforms. Aggarwal and Kunz (1994) conducted a study on IPO's in Switzerland between 1983 and 1989 and this study resulted in findings that the excess returns for the Swiss issues persist for at least three years but if the purchase is made at the first day's closing price the three year returns are negative. More generally speaking Aggarwal and Kunz found that despite positive initial returns, the long-run performance tends to be neutral.

Tsangarakis (2004) examines the price performance of IPOs in Greece during 1993-1997 pointing out that the Greek IPO market differs from the international. Tsangarakis is using a sample of 108 IPO's in the study. Analyzing both in the short- and long-run and classifies long run as one year aftermarket performance. The study results in that Greek IPO's are inconsistent with long-run performance of IPO's in other countries since they have more positive long-run performance.

### ***3.4.1 Determinants of the long-run underperformance***

Studies that attempt to find explanations to the IPO underperformance phenomenon is represented among others by Eckbo and Norli (2005) who examines the risk return characteristics of a rolling portfolio risk- strategy based on the evidence shown by Ritter (1991) that IPOs underperforms in the long-run. Eckbo and Norli imply that the underperformance challenges the efficient market hypothesis and inspire expansion of other models as the behaviour asset pricing model. The study made by Eckbo and Norli with a sample of 6000 NASDAQ IPO's during 1972 to 1998 results in new evidence on potential risk-based explanations for the IPO underperformance. This evidence can be exemplified by that the IPO's expected return is comparable with its portfolio risk and that the -100% return realizations frequency is no greater for IPO's than non-IPO firms matched by size and industry. Though, there is a slightly greater chance that an IPO will experience a return realization of +1000% represented by non-priced risk. Eckbo and Norli show that IPO's anomalous returns reveal less risk exposure and explain this by both lower leverage and greater liquidity.

Ritter (1991) gives a few possible explanations for the underperformance that includes risk measurement, bad luck or fads and overoptimism. Ritter also documents various cross-sectional and time-series patterns to distinguish the possible explanations with findings that the underperformance is concentrated to rather young and growth firms. Ritter test the patterns in a multiple regression using the total three-year raw return as the dependent variable, as independent variables he uses the initial return, the three year total market return, the logarithm of one plus the age of the firm, the volume of IPOs in the year of issuance and dummy variables for the extreme cases. Except for the initial return, Ritter finds all the independent variables statistical significant at conventional levels.

Loughran and Ritter (1995) concluded that reasons to the underperformance can only to a modest portion be explained by book-to-market effects. The study also shows that an issuing firm has a slightly higher beta, which implies a higher return instead of the proved lower return. As reasons for the low returns for issuing firms Loughran and

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Ritter means that firms may take advantage of issuing equity when they are overvalued. Another possible reason for the underperformance to persist according to Loughran and Ritter is that investors may be betting on long-shots and misestimate the probability of finding a winner.

### **3.5 Summary**

The three anomalies about IPO's, the initial underpricing, the "hot issue" markets and the long-run underperformance, have in previous studies been explained in different ways. The initial underpricing, starting with Ibbotson (1975), have mostly been explained by signalling and information asymmetry. The "hot issue" markets, which are occurring when the initial underpricing is concentrated to certain time periods and/or certain industries, have been proved existing and also as cyclical explained by historical data.

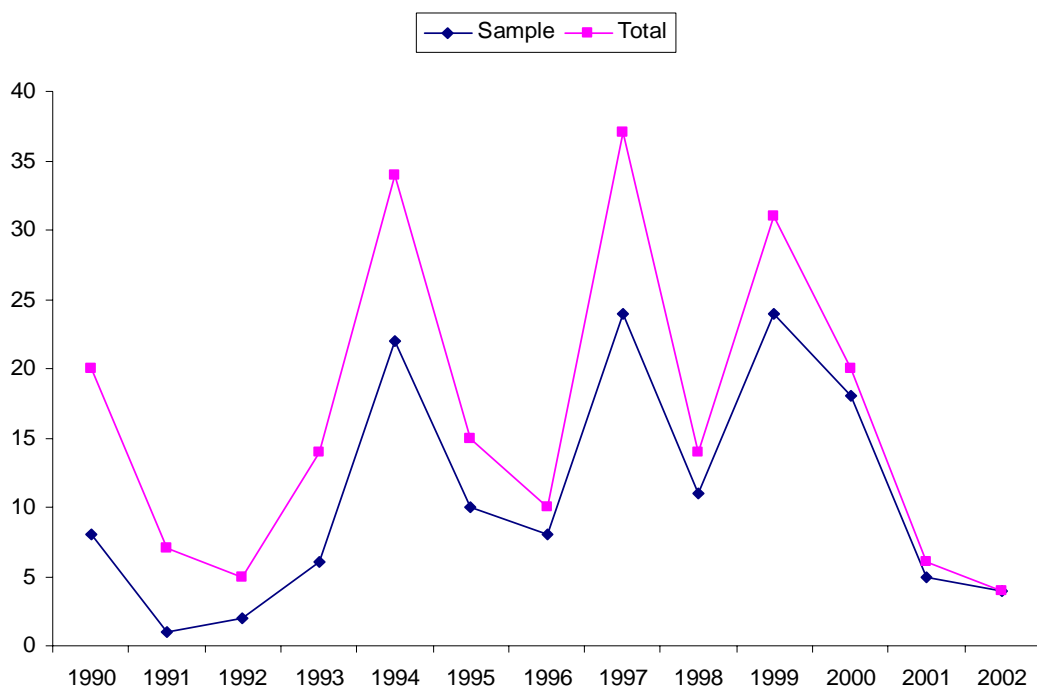
The first two anomalies was the base for the third, the long-run underperformance phenomenon, which have been studied in a number of different markets and time periods. The long-run underperformance of IPO does seem to hold internationally and in most studies the IPO's shows lower returns than their comparable public traded companies.

Attempts to explain the long-run underperformance phenomenon have been conducted using multiple regression analysis in numerous studies. Different benchmarks have been used as independent variables with varying statistical results.

### 4. Empirical Findings

*In this chapter we present the empirical result of our study. First we show an overview of the yearly distribution of IPOs during the sample period. Second we are showing our result regarding the aftermarket performance of our sample and last we display the regression result of factors that may explain the performance.*

The total number of IPOs in the Swedish market during the time period of 1990 to 2002 compared to the IPO sample used in this study is shown in figure 4.1. The total number of IPOs during these years was 217 and the number of IPO's included in our sample is 143. Out of these 143 this study shows that 86 issuing firms underperformed one or more benchmarks during the first 36 months after the IPO.



*Figure 4.1 Total number of IPOs compared to number of IPOs in sample during 1990 to 2002.*

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As figure 4.1 shows the annual number of IPOs fluctuates a lot during the sample period with its peaks in 1994, 1997 and 1999. During 1994 the IPOs was dominated of companies within the industrial sector, the IPOs during 1997 were not dominated by any specific sector. The IPOs conducted during 1999 and 2000 was mainly companies operating in the information technology or telecommunication sector. Figure 4.1 also shows a large drop in the number of IPOs conducted in 2001 and 2002 compared to the recent years before.

### **4.1 The aftermarket performance**

The aftermarket performance is measured with two different measures. First we use different benchmark adjusted returns that shows the benchmark-adjusted return compared to the benchmark and second we use the three-year buy and hold return to calculate wealth relatives.

#### **4.1.1 Adjusted returns**

The results from the benchmark adjusted average returns ( $AR_t$ ) and cumulative benchmark-adjusted average returns ( $CAR_t$ ) calculations will be the measure whether a issuing firm underperforms its benchmark or not. AR and CAR is calculated for all benchmarks used in our study, matching portfolio, firm-size, sector and all-share index. The benchmark with highest economical and statistical significance was the portfolio of matching firms based on size and sector, the AR and CAR results of this benchmark are shown in table 4.1. The cumulative firm size-adjusted return showed that the IPOs underperforms its comparables with 21.0%, the t-statistic is -1,862 which means the underperformance is statistical significant. The market- and sector -adjusted returns showed insignificant both economical and statistical.

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*Table 4.1 Matching portfolio-adjusted average returns and cumulative average returns.*

Month of seasoning	Number of observations	AR <sub>t</sub> %	CAR <sub>t</sub> %
1	143	-2,47%	-2,47%
2	143	0,06%	-2,42%
3	142	2,17%	-0,25%
4	142	-0,85%	-1,10%
5	142	-1,89%	-2,98%
6	142	-0,43%	-3,41%
7	142	-3,69%	-7,10%
8	142	1,82%	-5,28%
9	142	3,24%	-2,03%
10	142	0,18%	-1,85%
11	141	-0,62%	-2,48%
12	139	-0,69%	-3,17%
13	139	-0,87%	-4,03%
14	139	0,77%	-3,26%
15	138	2,41%	-0,85%
16	136	-5,79%	-6,64%
17	136	-3,14%	-9,79%
18	135	1,24%	-8,55%
19	133	-0,65%	-9,20%
20	132	2,06%	-7,15%
21	130	0,81%	-6,34%
22	128	-3,16%	-9,51%
23	127	-1,67%	-11,17%
24	127	2,56%	-8,61%
25	127	-4,87%	-13,48%
26	125	1,04%	-12,43%
27	123	0,27%	-12,16%
28	122	-4,09%	-16,25%
29	122	-1,31%	-17,56%
30	122	4,02%	-13,54%
31	121	-3,85%	-17,39%
32	121	2,14%	-15,26%
33	121	-0,37%	-15,63%
34	121	1,03%	-14,60%
35	121	-4,90%	-19,50%
36	121	-1,86%	-21,35%

Table 4.1 shows the result of our calculation on matching portfolio-adjusted average return (AR) and cumulative matching portfolio-adjusted return (CAR) for the issuing firms in the sample for each of the 36 months after the IPO. The adjustment is conducted using a portfolio of comparable firms matched by size and industry. As the table shows, during a 36 month period an IPO underperforms its comparable portfolio with on average 21,35%. The t-statistic for CAR in month 36 is -2,2543 which indicates



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statistical significance for the underperformance. As seen in table 4.1 the number of observations decreases with time, this is explained by the fact that 22 of the IPOs in our sample were delisted before 36 months trading.

### 4.1.2. Wealth relatives

Since the matching portfolio-adjusted average returns showed the highest economical and statistical significance we used the alternative measure, where we calculate wealth relatives (WR), on the matching-portfolio benchmark. The wealth relatives measure the performance based on a three-year buy and hold strategy

The average three-year buy and hold return for the IPOs in our sample is 38,32 % and 76,38% on average for the IPO stocks corresponding matching-portfolio excluding the initial return. This results in a wealth relative 0,78 which implies that the IPOs underperforms its matching portfolios with 22,00 %.

*Table 4.2 Ranking of three year holding period total return.*

Rank		Three-year holding period total return (%)	
		IPO Sample	Matching portfolios
1	(lowest)	-99,84	-90,70
7		-97,39	-80,10
14		-88,77	-63,55
21		-73,73	-50,00
28		-57,06	-34,54
36		-45,60	-18,36
43		-27,98	-14,04
50		-17,82	0,53
57		-14,95	13,27
64		-8,40	27,20
71	(median)	-3,75	33,69
78		8,19	43,64
85		19,35	57,98
92		40,03	70,28
99		58,59	89,12
107		73,28	108,98
114		84,21	148,09
121		108,64	246,31
128		154,58	341,05
135		359,87	734,68
143	(highest)	769,7	1584,03

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Table 4.2 shows the aftermarket performance for the IPO firms in our sample compared to the performance of the matching-portfolio during the corresponding 36 month period. The lowest IPO aftermarket performance was -99,84 % which was a small-size company in the telecom sector with its IPO in July 2000, the matching portfolio with the worst performance, -90,70 %, during a 36 month period was a portfolio with small companies in the health care sector during a 36 month period starting in December 1995. The IPO with the highest return 769, 70% for the 36 month period was a mid-size company in the industrial sector and was listed in July 1995.

*Table 4.3 Aftermarket performance measured by wealth relatives categorized by firm-size.*

Size	IPO Average 3-y BHR	Matching portfolio average 3-y BHR	WR
1	20,52%	122,57%	0,5415
2	58,51%	59,39%	0,9944
3	19,36%	49,72%	0,7972

The wealth relatives for the sample of IPO's categorized by firm-size is consistently below 1,0 which indicates that all issuing firms on average underperforms the non-issuing firms in the same size. During our sample period the mid-size issuing firms in our sample have a wealth relative of 0,99 meaning that the stock performance is almost exactly like its comparables . In comparison to that the small-size firms underperforms the most with a wealth relative of 0,54.

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*Table 4.4 Aftermarket performance measured by wealth relatives categorized by sector.*

Sector	IPO Average 3-y BHR	Matching portfolio average 3-y BHR	WR
Energy	-13,12%	-42,93%	1,522
Materials	26,14%	124,89%	0,561
Industrial	49,78%	39,62%	1,073
Consumer disc.	65,40%	56,91%	1,054
Health care	13,85%	93,35%	0,589
Financials	14,60%	46,62%	0,782
IT	57,48%	153,71%	0,621
Telecom	-65,73%	-53,93%	0,744
All firms	18,15%	52,28%	0,78

Table 4.4 displays that there are only three out of eight sectors where the sample of issuing firms outperforms its sector. The most underperforming firms are found in materials- and IT-sectors with wealth relative of 0,56 respectively 0,62. Issuing firms in the Consumer discretionary and the Industrial sectors are performing about the same as their comparable portfolios and the sector that outperforms its matching-portfolio the most is the Energy with a wealth relative of 1,52.

*Table 4.5 Aftermarket performance measured by wealth relatives categorized by initial return.*

IR (%)	IPO Average 3-y BHR	Matching portfolio average 3-y BHR	WR
IR < -1,5	38,97%	63,22%	0,8514
-1,51 < IR < 3,5	13,89%	11,13%	1,0248
3,51 < IR < 9,5	30,79%	80,51%	0,7245
9,51 < IR < 23	60,22%	120,53%	0,7265
IR > 23,1	54,45%	103,43%	0,7593

In table 4.5 is the aftermarket performance categorized by the size of the initial return. The average initial return for the sample was 14,78 %. Table 4,5 displays that the IPOs in our sample with an initial return higher than 3,5 % have a wealth relative below 1,0 and are thereby underperforming the matching portfolio. Also IPO's with negative

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initial return below -1,5 % shows wealth relative that indicates slightly underperformance.

*Table 4.6 Aftermarket performance measured by wealth relatives categorized by year of issuance.*

Year	Total numbers of IPO	IPO Average 3-y BHR	Matching portfolio average 3-y BHR	WR
1990	20	-33,75%	-38,92%	1,0846
1991	7	-12,12%	33,11%	0,6602
1992	5	135,01%	77,03%	1,3275
1993	14	53,12%	143,08%	0,6299
1994	34	48,21%	83,11%	0,8094
1995	15	213,37%	221,51%	0,9747
1996	10	94,64%	117,12%	0,8965
1997	37	91,52%	219,65%	0,5991
1998	14	-5,12%	121,11%	0,4291
1999	31	22,42%	-17,44%	1,4828
2000	20	-59,85%	-52,41%	0,8438
2001	6	-36,15%	-4,98%	0,6719
2002	4	29,13%	82,72%	0,7067

In table 4.6 the sample firms are presented by year of issuance, the result show that the wealth relatives are below 1,0 in 10 of the 13 years in the sample period. In 1998 the largest underperformance shows with a wealth relative of only 0,43 and the largest outperforming can be found in 1998 where the wealth relative is 1,48.

### 4.2 Regression results

To find out if the performance of the underperforming IPOs could be explained by either firm-size, sector or the initial return we the following regression on the IPOs that underperformed their matching portfolios.

$$r_i = \alpha + \beta_{IR} + \beta_{size} + \beta_{sector} + \varepsilon_i$$

50 of the 86 underperforming IPOs showed significance for one or more of the independent variables. After residual testing for autocorrelation, normality and linearity

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only 44 IPOs remained significant. Of the 44 significant IPOs showed 57 % significance for firm-size, 41 % for initial return and 32 % for sector. The average adjusted  $R^2$  was 0,281.

*Table 4.7 Example of regression results*

	<i>Intercept</i>	$\beta_{Size}$	$\beta_{Sector}$	$\beta_{IR}$	$R^2_{adjusted}$
(1)	-0,11 (0,05)	1,9 (0,006)	-0,5 (0,11)	3,15 (0,05)	0,17
(2)	-0,13 (0,0028)	-1,05 (0,17)	1,11 (0,02)	0,07 (0,91)	0,14
(3)	-0,06 (0,037)	1,18 (0,047)	0,38 (0,25)	1,78 (0,007)	0,49
(4)	-0,05 (0,04)	-0,7 (0,52)	0,6 (0,38)	4,5 (0,0006)	0,25
(5)	-0,03 (0,02)	0,5 (0,02)	0,42 (0,004)	0,12 (0,65)	0,25

Table 4.7 shows an example of regression results for five companies that showed significance for one or more of the independent variables, P-values in parenthesis. All companies showed a negative intercept in the regression analysis. Our model showed a satisfying adjusted  $R^2$  for most of the companies that underperformed.

### 5. Analysis

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*In this part of the study we are analyzing the empirical result presented in previous chapter and relate the result to the findings in previous studies.*

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#### 5.1 Adjusted returns

When conducting the benchmark-adjusted average returns (AR) and cumulative adjusted returns (CAR) for the IPOs in our sample we got the result that the IPOs underperforms their comparables on average with 21,35% which is in line with Ritter's (1991) result, 29,13 %. Our result that IPOs underperforms is also in line with most of the international research in this field.

#### 5.2 Three-year buy and hold return

As shown in table 4.3 the smallest issuing firms had the worst performance compared to the matching portfolio. Ritter (1991) concludes that older firms perform better than younger during the first three year after going public. Since small firms overall are young our result could be interpreted in accordance to Ritter's conclusion.

During the information technology "bubble" many small and young firms took very bad beat in the aftermarket, which affects our result that small firms do underperform. According to our result mid-size companies perform about the same as their comparables this could be due to the many mid-size companies in the industrial sector that went public around 1994 which had a good aftermarket performance.

When looking at the wealth relative categorized by sector the health care industry has the worst aftermarket performance. This could be explained by that small- and mid-size biotechnology firms are considered unsuitable for public trading according to the recent

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fuzz about the major owners in Gambro who wants to take the company off the public market.

As table 4.4 shows, issuing firms in the consumer discretionary sector outperforms their comparables. This could be interpreted as this sector is appropriate for public trading which could explain that the major part of the companies that went public during recent years (2005-2006) could be found in the consumer discretionary industry, for example Kappahl, Hemtex and Gant.

As shown in table 4.5 there is no direct correlation between the initial return and the issuing company's aftermarket performance. Ritter (1991) did not found a clear correlation between the initial return and aftermarket performance, although Ritter found slightly signs of that those IPOs with very high initial performance underperformed in a wider scale.

In our test for the "hot issue" market phenomenon we did not found any clear evidence rather the other way around. As seen in table 4.6 the companies that went public in 1999 which was a year with many IPOs they outperformed their comparables with about 48%. Also this could be explained by the IT bubble where all information technology firms where traded at irrationally high prices for a period lasting longer than our 3-year period cover.

### **5.3 Regression results**

Ritter (1991) found significance for all the independent variables in his multiple regression except for the initial return. Our model for testing if the performance of the underperforming issuing firms were dependent of firm-size, sector or initial return resulted in low level of significance for all the independent variables. Though, the result from the regression is in accordance with previous tested variables. The independent variable that in most cases were significant was firm-size which is in line with the wealth relatives categorized by firm-size in table 4.3.

## 6. Conclusions

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*In this chapter we present our conclusions made based on the result of the study. We will also give a few suggestions to further research.*

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### 6.1 Conclusions

The main conclusion in our study is that IPOs do underperforms during a 36-months aftermarket period. The underperformance has the highest significance, both economically and statistically, when the IPOs are compared to a portfolio of non-issuing firms matched by size and sector. This benchmark should also be considered the most justifying since it contains firms that are most equivalent to the issuing firm. IPOs also underperform benchmark firms in the same size, which increases the validity of the underperformance.

We found no evidence for that IPOs issued during a “hot issue” market period underperforms in a larger scale than during a “cold issue” market period. We neither found any significant evidence for that the initial return should have any affect on the long-term performance, though we found tendencies for that IPOs with a high initial return underperforms more than firms with a low initial return.

### 6.2 Suggestions to further research

A study made on a specific sector’s aftermarket performance that is using different firm-specific variables that could affect IPO performance in that certain industry would be interesting.

Another interesting research problem in this field would be to study if the aftermarket performance of IPOs in the Swedish market is affected from the riskiness of the issuing firm.



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