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Good investments? An investigation into the short- and long-term returns on the Swedish MTFs.

Master Thesis

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Abstract

Multilateral trading facilities (MTFs) are fairly new and rapidly growing secondary tier stock exchanges. This thesis investigate the short- and long-term stock returns for all companies which have ever listed on a Swedish MTFs. I find evidence of IPO over-pricing for companies with institutional investors as these companies present negative short-term returns. In the long run, most of the companies on these exchanges return negatively but a few companies return multiple fold. MTFs provide an important function to the financial markets in providing financing for emerging growth companies that may later transition to first tier stock exchanges. In this context, MTFs act as both bridge financing and a filter, as companies that do not grow sufficiently remain listed on the MTFs whilst the worst performers are eventually acquired or liquidated whilst the successful companies jump stock exchange.

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Contents

1 Introduction

This thesis is an investigation into the short- and long-term returns after initial public offerings (IPOs) on the three multilateral trading facilities (MTF) in Sweden. I look at the first 30 days from the IPO in the short turn and 5 years for the long-term. The results are interpreted with a buy-and-hold cumulative returns method. This dual perspective intends to give insights into companies' returns after going public. This investigation measures all companies which has ever IPOd on a Swedish MTF. The MTF framework in its current form was introduce in 2004 with the Markets in Financial Instruments Directive (MiFID) as a European legislation to harmonize the standards for the European secondary exchange markets. The harmonization aims to increase the investor protection and increase the competition in the financial markets (Finansinspektionen, 2022b). There existed other secondary exchanges throughout Europe before MiFID which lacked harmonized regulations. Due to frauds and scandals, Europe's largest secondary exchange, Neuer Markt shut down its operations in 2003, a year before MiFID was introduced (Giudici & Roosenboom, 2004).

The Swedish MTF exchanges have together hosted 866 IPOs since their inception in 2004 and the number of IPOs is increasing with time. The companies in my sample employ over 100 000 people in 2021 which can be seen in later in Table 1. This highlight the economic importance and societal impact these companies have on Sweden's economy. There are despite their economic importance little previous research on the short and long-term returns on the Swedish MTFs. The lack of previous research on the companies in these MTFs reveal the scientific blind spot this investigation aims to cover. There are to my knowledge no previous research which investigated the short- and long-term returns exclusively on these three exchanges.

The MTF exchanges demand less stringent listing requirements regarding corporate age, company size, and equity free float compared to the traditional stock exchanges which are also called first tier exchanges (Vismara, Paleari, & Ritter, 2012). The MTF framework increase market efficiency through price discovery for smaller companies (Riordan, Storkenmaier, & Wagener, 2011). Lower listing requirements does however come with downsides as the listing requirements are in place partly for investor protection. Conversely, more lenient requirements increase investor risks through increased information asymmetries between current and future shareholders (Balakrishnan & Koza, 1993). Lower listing requirements could therefore affect the miss-pricing from the IPO, both in the short- and long-run, which was previously found on the European markets by (Vismara et al., 2012). (Howton, Howton, & Olson, 2001) also find that there are significant relationships between prior funding and first day returns. This relationship is believed to be caused by information asymmetries and agent incentives which affect the invested parties to change their miss-pricing of their equities in an IPO (Ritter & Welch, 2002). My investigation into the short- and long-term returns on these MTFs center around the three research questions:

- Research Question I. Are companies priced accurately when listing on the Swedish MTFs?
- Research Question II. Do MTF's constituent companies' returns distributions conform to first tier exchange returns?
- Research Question III. Are there correlators with long-term stock returns?

I find in this investigation that institutional investors over-price their companies in the IPO in the short-term. This is true for both subgroups of institutional investors: private equity (PE) and venture capital (VC) investors. Both these subgroups return negatively the first 7 days after the IPO whilst the rest of the sample return around zero on average, also significantly lower than the short-term IPO returns on first tier exchanges (Lowry, Officer, & Schwert, 2010), (Loughran & Ritter, 2004). In the long run, the best companies "jump" from the IPO exchange to another stock exchange. This finding is in line with (Vismara et al., 2012) who conclude this mechanism to be the most important function of secondary stock exchanges. My investigation confirms and extends this stock exchange jumping framework with the findings that old and poorly returning companies are later acquired and taken private. This extension hints that there is a pecking order to the outcomes after listing the equities on the secondary exchanges. The most successful companies jump exchanges; the mean returning majority remain listed on the IPO exchange; a minority of less successful companies are acquired; a minority are bankrupted and liquidated.

The findings in short- and long-term returns have implications for two perspectives: investors and markets. The findings in this thesis present price patterns that give rise to tradable opportunities for portfolio strategies in line with (Ritter, 1991). This only applies to the ex-ante variables where the information known to investors before the event can present tradable opportunities. The returns also have implications for the financial markets and the price discovery mechanism of the public markets and the availability to capital for traditionally too immature companies (Riordan et al., 2011). The investor and market perspective are also of interest to policy makers ability to understand the returns for the companies on these exchanges. Policy makers need to be aware that there are fundamental differences between the short- and long-term returns between companies on first- and second-tier exchanges.

2 Literature Review

2.1 MTFs as secondary exchanges

There are per 2022, three companies that are allowed to provide MTF services in Sweden: First North Growth Market, Spotlight, and Nordic Growth Market (NGM) (Finansinspektionen, 2022a). The oldest exchange is NGM, which

started its operations in 1984 outside the MiFID MTF scope (Market, 2022). Spotlight was founded in 1997 when the Swedish stock exchange monopoly was removed and ran its operations as Aktietorget (AktieTorget, 2006). The company changed its name to Spotlight exchange in 2018 (Lindblad, 2018). First North is a subsidiary of NASDAQ Nordic and has operated as an MTF marketplace since 2006 (Cision, 2006). All three MTFs have a collective number of 866 total listings from the inception in 2004 up until 2021. The Swedish stock markets consist of the main, regulated stock market, Nasdaq OMX Stockholm, and these three MTFs. The regulated exchange, OMX Stockholm, is also referred to as a first-tier stock exchange whilst the MTFs are secondary tier stock exchanges. The secondary exchanges are part of the MTFs framework which was introduced in 2004 through MiFID (Finansinspektionen, 2022b). OMX Stockholm hosts the largest companies and is subject to more stringent regulatory requirements than the MTFs. Listing a company on a first-tier exchange is expensive. An IPO on a first-tier exchange costs on average 7% of the total market capitalization for $25-50mil companies and around 3.5% for $1 billion companies in 2020 on the U.S. equity markets (Statista, 2022).

2.2 Short-term returns and IPO under-pricing

(Chan & Lo, 2011) investigate the relationship between IPO mispricing and information asymmetries. The duo proxies information asymmetries with a lack of credit ratings and finds that companies without publicly available credit ratings have higher IPO mispricing compared to those which have ratings. The duo concludes the credit ratings to be a tool for reducing information asymmetry between the new and old shareholders to reduce uncertainty in the IPO pricing. The duo also find that long-term returns are not affected by the introduction of pre-IPO credit ratings.

(Lowry et al., 2010) map the short-term IPO returns in the U.S. equity markets. Lowry et al. find that there are significant time trends in IPO markets with returns differing in both mean and volatility as a function of time. They conclude that there are IPO "hot-markets" (Lowry et al., 2010, p. 1) which need to be taken into consideration when estimating or predicting IPO returns, under-pricing, and volatility. Their findings hint that the magnitude of effect in any sample will vary, depending on the time interval sampled. Lowry et al. assesses that there are differences between industries and finds that tech companies tend to have higher variability in first-day returns. This finding is however correlated with the biggest hot-market in their sample, the 2000s tech rally where the proportion of tech listings was higher than the other sampled periods (Lowry et al., 2010).

(Loughran & Ritter, 2004) also find time trends in first-day returns after the IPOs on the U.S. equity markets. The duo finds that the period between 1999-2000 experienced 65% average first-day returns, compared to 15% from 1990-

1998 and 7% in 2001-2003. The duo assesses incentives as drivers of the IPO underpricing, where the hot-markets in 1999-2000 were driven by riskier tech investment. The duo rest this conclusion on findings from (Riordan et al., 2011) that IPO underpricing correlates with the riskiness of the particular company. The finding by Riordan et al. could explain both Loughran and Ritter and Lowry et al. findings that new tech IPOs are associated with greater variability and mean first-day return which may be due to time variability, i.e. "hot markets" and the increasing riskiness of these tech stocks. Loughran and Ritter also attribute the differences in under-pricing as a result of diverging incentives for the IPO underwriters. The duo argues that the hot market periods had a lesser focus on maximizing shareholder returns at the IPO and a higher focus on attracting new IPOs to the underwriter (Loughran & Ritter, 2004). This finding hints that incentives play a role in the IPO which might have implications on whether differences in financial backing affect the short-term returns.

Companies list their equities on a public exchange for the reasons of raising capital, increasing liquidity to their equity, or divesting from the company (Draho, 2004), (Hulthén, 2019). The incentives for owners, managers, employees and investors can diverge with respect to these reasons for listing the company's equities. In this respect, companies with different ownership structures might also diverge in short- and long-term returns. The management of a company might have their job security in the highest interest whilst an owner might have shareholder value and/or private benefits prioritized (Pauly, 1968). The incentives differ both with respect to the investment´s time horizon and motivators, as an institutional investor typically invests with 3-5 years in mind, whilst a private investor might have a significantly longer investment horizon and a professional investor might experience multiple IPOs in their career whilst an entrepreneur typically face fewer IPOs (Barrot, 2017). These differences are important when dealing with short- and long-term returns in IPOs. If there are different incentives between investors, then the first-day returns could differ between these substrates of investors as their incentives differ in an IPO which might affect the IPO pricing. (Ritter & Welch, 2002) solidify the incentives-based analysis in the IPOs in their investigation into the short-term allocation, pricing, and returns in IPOs on the U.S. equity markets between 1980 to 2001. They find a mean first-day return of almost 20% for the whole sample. Ritter and Welch also argues that the underlying driver of short-term returns are not information asymmetries but rather come from behavioral perspectives and differences in incentives. The literature on short-term returns centers around the incentives and information-based analysis and predictors to the short-term returns after the IPO.

(Hulthén, 2019) find that VCs prefer to sell their stake in a startup through a merger or acquisition (M&A) rather than an IPO into second-tier exchanges. Hulthén argues that this preference of M&A over IPO stems from the minimization of time-risk and liquidity risks associated with selling the whole stake at once. The problem for institutional investors in an IPO is that their stake

is often locked from trading for 180 days after the trading has begun (Layne & Lenahan, 2020). This is a protective measure for the incoming investors after the public offering and forces the prior investor to share returns and volatility during the lockup period. Hulthén also find that VCs prefer exiting a portfolio company through a regulated IPO, followed by a foreign and domestic M&. The secondary tier exchange IPO is the last resort for these investors and is often considered when all other options are exhausted. This has further implications for these investors' behavior when listing a company on the Swedish MTFs. A crucial piece of information for this substrate of companies is that the VC investors most often being the driver and in charge of the exit decision as opposed by the entrepreneurs when these investors have equity stakes in a portfolio company (Smith, 2005).

2.3 Long-term returns

(Ritter, 1991) investigate the short- and long-term returns of equities in the U.S. stock market. Ritter investigates 1526 IPOd companies and find that short-term returns are short-lived. The companies in Ritter's sample have a mean return lower than comparable companies. Ritter concluded, in line with the later study by Lowry et al. that the IPO market has strong cycles and that (1) investors are temporarily over-optimistic in future returns and (2) the IPOd companies take advantage of these over-optimistic tendencies.

(Guo, Lev, & Shi, 2006) investigate the short- and long-term returns on the U.S. IPO market between 1980 and 1995 which included 2696 IPOd companies. The long-term returns time horizon is defined to be 3 to 5 years with a buy-and-hold abnormal returns framework. The trio discovers that short- and long-term IPO returns are correlated with underlying factors such as research and development (R&D) expenditure. Guo et al. find that short-term returns correlate negatively with these expenses but long-term correlate positively, i.e. increased R&D expenditures are associated with higher long-term returns. These findings show, in line with (Ritter, 1991), that there is tradable, ex-ante information that predicts short- and long-term stock price returns.

(Howton et al., 2001) investigate the relationship between stock returns and the companies' board of directors. They find that companies with a "strong board of directors" (Howton et al., 2001, p. 1) lead to lower information asymmetry and agency problems. They conclude that short-term returns are related to sharing ownership by both insiders and outsiders whilst the long-term returns are related to the ownership by insiders i.e. board members (Howton et al., 2001).

(Vismara et al., 2012) investigate secondary tier stock exchanges in the short- and long-term. The trio investigates the British, Italian, German, and French exchanges which include 3755 companies, spread between 1995-2009, after the

introduction of the secondary markets in Europe. They define the long-term as 3 to 5 years after the IPO date. Vismara et al. find that the main effect of the introduction of secondary exchanges is the possibility for smaller companies to obtain capital from the public financial markets. They note that the long-term returns on the secondary exchanges are below the traditional exchanges as many companies fail to sustain long-term returns. They use a buy-and-hold abnormal returns framework and conclude that the regulated first-tier exchanges return 12.3%, whilst the secondary markets return on average -19.0% in their total sample in the long-run. In a further stratification to Brittain alone, the outcomes are even larger: 25.5% versus -27.5%. This highlight the disparities between the first- and secondary-tier exchanges and highlights the differences between the different tiers of stock exchanges. With these findings, the trio concludes that the main benefit of the introduction of secondary exchanges is to facilitate smaller companies to raise capital and in the event of commercial success, later jump to a first tier exchange. The authors conclude, just like (Lowry et al., 2010) the occurrence of IPO hot markets, i.e. periods with increasingly frequent IPOs that corresponds to higher IPO pricing and volatility. The hot markets in Vismara et al.'s sample include a third of all IPOs but only constitute 4 years in total. Furthermore, Vismara et al. note that 71.5% of the companies in their sample did not meet the requirements to list on a regulated exchange, which demonstrates why these smaller companies would have remained private without the secondary exchanges available.

(Haugen & Udell, 1972) investigate the effects acquisitions have on the shareholders' value. The duo find that acquired companies' shareholders benefit from being acquired and that the majority of the value addition occurs before the time of the merger, which is due to the price premium paid by the acquiring party for the acquired company's equity. This finding demonstrate that the value creation in acquisitions is also recorded in the stock price. This is a premise for investigating value creation from acquisitions on public stock markets proxied by the company's stock price. Since the returns are recorded on the public stock price and effects that are not recorded in the stock price will be omitted from any analysis of the stock price.

(Giudici & Roosenboom, 2004) investigate the European stock markets for a more narrow period of 1996 to 2000 which includes 555 non-financial companies that went public on six different European exchanges[1]. Giudici and Roosenboom defines the long-term horizon to 3 years post-IPO. The authors also note that market-wide scandals forced Europe's largest secondary exchange, German Neuer Markt to default in 2003. They examine the secondary exchanges before the introduction of MiFID in 2004 and find that the long-term returns are a "very poor long-term investment" (Giudici & Roosenboom, 2004, p. 23). The duo concludes the poor long-term performance may stem from (Miller, 1977)'s

[1]Neuer Markt (n=303), Nouveau Marché (n=144), Nuovo Mercato (n=35), Nieuwe Markt (n=14), Euro.NM Belgium (n=13), and NASDAQ Europe (n=46)

findings: lack of information leads to increased risk through uncertainty as the prospects of the listing companies range from "this is the next Microsoft" to "this dog will not see its second birthday" (Houge, Loughran, Suchanek, & Yan, 2001, p. 1). Giudici and Roosenboom also contributes the initial miss-pricing on secondary exchange IPOs to the lack of information, which is inherent to the more lenient listing requirements on secondary exchanges.

3 Research Questions

This thesis is divided in three research questions for investigating the Swedish MTFs. All figures and analyses are tailored around these questions. The discussion and conclusion also center around these questions. The questions are expressed to get the fullest insights into the short- and long-term returns on the Swedish MTFs. The questions are.

Research Question I. Are companies priced accurately when listing on the Swedish MTFs?

This research question focuses on the short-term returns post IPO. The literature finds diverging patterns in the IPO pricing. (Lowry et al., 2010) find that IPO pricing, is heavily time-dependent and that there are "hot markets" in IPO short-term returns. Such time dependence was also found by (Loughran & Ritter, 2004) which concluded that market information asymmetries have been reduced by time and the first day returns have dropped from 65% to 12% in less than 10 years in their U.S. first-tier exchanges focused sample. Lastly, (Vismara et al., 2012) shows that there are differences between first- and secondary-tier stock exchanges and that the secondary markets perform significantly worse than their first-tier counterparts in the short-term returns. This renders the Research Question (I) which investigates if the pricing in the IPO is accurate. Accurate pricing is in this context defined as a minimization of the difference between the valuation in the IPO and the market's valuation. I.e. short-term return non-significantly different from zero means there is no significant miss-pricing in the IPOs. The research question is investigated both in sample aggregate and in the substrates. It is further investigated in a cross-sectional first-day return distribution and in a first 30-day time-series analysis. Findings from this research question will bring insights into the IPO returns for the secondary exchanges and highlight differences in the investigated substrates. The findings from this research question is compared to previous literature for the context of the findings.

Research Question II. Do MTF's constituent companies' returns distributions conform to first tier exchange returns?

This research question is intended to give context to the findings in research questions I and III. It investigates how the returns are distributed, cross-sectionally. The returns are investigated on a daily-, short-term-, and long-term return basis. Having these three perspectives help understand the time series analysis and give context to both the statistically significant and insignificant findings in the time series analysis as it provides context that the time series analysis lack. It furthermore gives indications to future research where there might be patterns in the data but where my estimation errors are too large given the estimated coefficients. The distributions also have implications for significant findings, since they help demonstrate how the data is distributed and what drives the data. (Officer, 1972) find that daily returns distributions for the U.S. primary stock markets are symmetric, but with too large tails for the data to be Gaussian distributed. (Greene & Fielitz, 1977) find that the long-term returns distributions on the first-tier exchanges in the U.S. follow a Pareto-Levy distribution which is further described by (Mandelbrot, 1960), which presents a heavy concentration of low returning companies but a minority of companies that get almost all returns (Greene & Fielitz, 1977). The findings from this research question have implications, both from the investor perspective but also from the market efficiency perspective. This will also give insights into the longevity of these companies after going public and give insights which policy makers need to take into consideration when stipulating policies regarding the secondary-tier exchanges.

Research Question III. Are there correlators with long-term stock returns?

This research question is intended to give depth into which companies are producing excess and deficit returns. This research question uses ex-ante and ex-post company-specific characteristics and provides insights into what drives the underlying data generating processes. This research question also has implications for the corporate life cycles of the sampled companies. (Vismara et al., 2012) find that companies with long-term success tend to switch exchange for their equities, something which this research question might solidify for the Swedish MTFs. This research question has implications for both the investor and market efficiency perspective. Investors need to understand the characteristics of better-returning companies as these characteristics may provide tradable opportunities, given the information is known ex-ante when the returns are yielded. The market's efficiency through price discovery also benefits from better insights into these markets in the long-run, which was previously found by (Riordan et al., 2011).

4 Methodology

4.1 Method

This is an investigation into three areas: cumulative short-term returns, cumulative long-term returns, and cross-sectional returns distributions. One year is defined as 250 trading days, one week is 5 days. The time-series investigation uses the buy-and-hold approach below where each period is compared from the time of IPO. This means that companies that IPO in different years are normalized in time and all companies are treated as if they IPO on the same date, also further detailed below.

Buy-and-hold returns framework

The long-term time horizon is inspired by (Vismara et al., 2012)'s 3-5 years definition of the long-term return as their investigation related the same type of exchanges but in different markets. My sampled horizon extends Vismara et al.'s horizon and regards all periods up until the fifth year. This gives more detailed insights into the long-term returns. The methodology framework is inspired by (Knif & Pynnonen, 2013)'s buy-and-hold abnormal returns. Knif and Pynnonen's analysis is based on discounting the returns with a bench marking index. I perform this discounting (or comparison) in a later stage in my investigation. This methodology disparity is a compromise due to data quality which is further discussed in the Data Chapter. The buy-and-hold approach is defined below.

$$r_t = (\prod_{t=0}^{T}(1 + r_{i,t})) - 1) \tag{1}$$

Where T is time, i is individual companies, n is number of companies, r is individual cumulative return.

Equation 1 shows the cumulative returns for each company in time of the IPO until T. This method computes the cumulative returns for each company in the given sub-sample. The r_t is a vector of cumulative returns with the length of T. This vector represents the normalized cumulative returns. Each sample consists of multiple constituent companies and the weighting between these companies is defined by the weighting formula below.

$$w_{i,t} = \frac{1}{n_t} \tag{2}$$

Where w is individual weight, n_t is the number of companies in each period.

Equation 2 shows the equally weighted returns in each time period. The weightings are the inverse of the number of companies in each period. This yields an equal weighting in the sub-sample for each period. As the data availability declines with time, each allocation to the remaining companies increases. This stems from the difference in n_t which affect the weights, w_t. The n_t is demonstrated in the long-term figures as the relative data availability. The weights and returns are summarised in Equation 3 below.

$$R_t = \sum_{t=0}^{T} w_t * r_t \tag{3}$$

Where R_t is the weighted returns in each period.

Equation 3 shows the final returns measure for every category in each period, i.e. the equally weighted buy-and-hold returns. The returns from Equation 3 are the mean returns which follow the cumulative returns defined by (Knif & Pynnonen, 2013). These mean are compared to standard errors to obtain statistical measures. The standard errors are defined by (Lyon, Barber, & Tsai, 1999)'s framework, which yields the following definition.

$$SE_t = \frac{\sigma_t}{\sqrt{n_t}} \tag{4}$$

Where SE_t the standard error in each time period, n_t is the number of companies in each time period, and σ_t is the cross-sectional standard deviation in each time period within the given sub-sample.

This method applies equal weighting between all companies in the categories, as seen in Equation 1. This equal weight would in practice mean a daily adjustment in portfolio allocation since different returns in one period, in reality, will have an effect on the weight in the following periods. The unweighted portfolio will give equal emphasis to each company, taking a broad approach that takes an interest in all listed companies. This can be contrasted with a weight-based approach. Such approach would bias the results towards a sub-strata of companies. This would mitigate the effects of interest since the thesis is intended to investigate *all* companies on the 3 Swedish MTFs.

The cumulative returns and cross-sectional standard errors are presented in time-series-based figures. This medium present graphics of the findings. Each period in this figure is in practice a 2 sided student's t-test with 95% confidence levels which is the benchmark for buy-and-hold returns studies (Lyon et al., 1999). For figures with more than one included group, the figure present a double sampled t-test. These doubled sampled t-tests have 95% significance where the confidence bands of both lines are fully exclusive, i.e. no interception.

The short- and long-term returns are measured on the same sampled data but with different sampling frequencies. The short-term returns are measured daily. The long-term returns are measured and compounded with a weekly interval. The long-term returns are measured on this 5-day interval due to lacking data quality for some of the companies on the Swedish MTFs. The lacking data quality stems from the illiquidity and low trading volume in some of these companies, which corrupt the data in CapitalIQ's database. The low data quality for these companies renders data with unrealistic volatility. These companies with lower data quality are correlated with smaller capitalization, i.e. could be mitigated with a capitalization-based approach, but such an approach would ultimately not measure the intended underlying relationships. The data quality issue affects the data in minuscule magnitude but compounded over the 5 year period cause a large bias in the cumulative returns both in the returns and volatility. The bias is not present in the short-term returns analysis for the reason that all companies have higher quality data in the short term. This stems from higher liquidity in the first days of trading and more accurate stock price data. Using weekly stock price returns for long-term analysis decreases the t-values and lowers statistical significance. This means that the discovered effects in this sample are potentially understated. This conservative approach reduce potential robustness issues in the long-term investigation.

Using different time intervals for the short, and long-term returns have implications for the abnormal returns as the discounting index to which the returns are compared must be evaluated, thus more assumptions must be included. For this reason, the frameworks by (Vismara et al., 2012), (Knif & Pynnonen, 2013), (Lyon et al., 1999) are altered so the index comparison is done in the analysis, rather than included and discounted in the figures. This means that the figures have higher presented returns, compared to the aforementioned literature with measure the *abnormal* returns. This does not affect the comparison between sub-groups, since all groups are treated equally which means that underlying differences present themselves with this buy-and-hold returns framework. It does however mean that the findings in my thesis are not analogous to those of (Vismara et al., 2012) since my findings needs to be discounted by a chosen index. This discounting is elaborated in the *Time series analysis* Chapter.

4.2 Sample

This investigation into the MTF exchanges' constituent companies investigates all listings to any of the 3 Swedish MTFs. These are First North, Spotlight, and Nordic Growth Market (Finansinspektionen, 2022a). As stated, the MTF legal framework was laid in 2004 in MiFID which limits the study to this period as a start point. All companies are evaluated up until the endpoint of 31st December 2021. This endpoint is intended to include a maximal number of companies. The end-point also the start of writing this thesis mark the approximate top of a 10-year bull market (CapitalIQ, 2022a), (CapitalIQ, 2022b). By including

all companies up until this point and not any point beyond this bull market, returns can be overstated, compared to later dates when the stock market has turned downward. This is further evaluated in *Time horizon bias*. Such time horizon bias is inherent to this kind of analysis and was previously demonstrated by (Lowry et al., 2010) in their short-term IPO investigation. This means that the magnitude and findings for my sampled period might change with the period.

There have been a total of 866 companies which have listed on these exchanges in this time period (Nyemmisioner, 2022), (Nyemissioner, 2022b), (Nyemissioner, 2022a). Some companies have listed on 2 or even all 3 of the exchanges. All companies will only be counted once and on their initial public offering. There have under the same time occurred 259 listings on Nasdaq Stockholm, many of which were initially listed on the 3 investigated MTFs which I investigate in the analysis (Nyemissioner, 2022c). This trend illustrates that the MTFs constitute the biggest quantity of listings in Sweden during this period. The sample distributions are visualized in Figure 5.

4.3 Data

This thesis leverages panel data with a cross-sectional and time-series component. These are company-specific and stock price data. The data in this study stem from 2 data sources based on company-specific (cross-sectional) and stock price data (time series). Company-specific data is collected from Pitchbook. This data contains data for 795 companies. The data were acquired per 2022-02. Pitchbook has limited, or missing data for bankrupt/liquidated companies which rendered 71 companies with missing data. Pitchbook also has missing data for some company dimensions. For this reason, not all stratifications have an equal number of total companies in the corresponding analysis. This is not an issue for m methodology but leads to increasing standard errors. The stock price data was collected from CapitalIQ per 2022-02. CapitalIQ also has missing data for the same reasons as Pitchbook. This results in missing data of extra 82 companies. In total, there are 90companies that have no public data, the implications of this missing data are presented in *Survivor and missing data biases*.

4.4 Survivor and missing data biases

There are two sources of missing data bias present in this thesis. The first missing data bias is companies that have delisted too long ago for CapitalIQ and Pitchbook to still keep public records. These companies make up 89 companies and can potentially bias the findings on all research questions as their underlying distribution and data generating processes differ from those in this sample. This is survivor bias since the survivor differ from the companies which did not survive. Their data generating processes are likely different as these companies

suffered a different destiny, compared to the included companies. These companies can either have been acquired, liquidated, or otherwise made private. It is likely these companies inhibit higher volatility as all companies have either exited with a buyout by going bankrupt. This potential source of bias is however further discussed in the context of the findings in the *Discussion* chapter.

Some companies are listed within the last 5 years, not all companies have stock price data for all periods. This is visualized in Figure 5. This means that the difference in time horizons must be accounted for in the empiric section. This can be handled in two ways, (i) the companies without sufficient data for all periods are excluded, or (ii) all companies are included but the missing data accounted for. As 44% of all companies were listed between 2018 and 2021, excluding these would reduce the robustness of the findings significantly. Therefore, all companies are included but missing data causes increasing standard errors, according to Equation 4. The exact method can be seen in *Methods Chapter* and follows (Lyon et al., 1999) framework. Therefore, this missing data problem will only bias the results towards non-significant results. It can however affect conclusions since not all categories have the same data loss problem. For this reason, data availability is included in all figures measuring long-term returns. This way, the data-availability bias between groups can easily be investigated and interpreted in each figure and in the discussion part.

4.5 Sampling horizon bias

All data were collected in February of 2022. February 2022 marks approximately the peak of a historically long bull-run for S&P-500 and OMX Stockholm (CapitalIQ, 2022b), (CapitalIQ, 2022a). The stock price data is recorded between 2004 and 2021. 2004 marked the introduction of the MTF framework and the first time an IPO can occur on these markets (Finansinspektionen, 2022b). 2021 marked the last fiscal year before this investigation was conducted. The cutoff point was determined as the last trading day of 2021. These points of 2004 and 2021 are meant to maximize the number of possible recorded IPOs on the exchanges to increase sample size robustness. The sampling can however impact both the magnitude and conclusion of the findings if one was to measure a different time interval, which can be seen in the difference between previous studies in different periods e.g. (Vismara et al., 2012) and (Giudici & Roosenboom, 2004) who find different magnitudes of long-term returns, partially due to different time horizons. This difference is further concluded by the findings of(Lowry et al., 2010) who contribute time variability as one of the biggest impacts on IPO short-term return. This sampling horizon bias will also potentially affect the findings in this thesis.

4.6 Segementation variables

The sample is analyzed both in aggregate and broken down into substrates in 3 dimensions, to get the most nuanced view of the returns. This multi-dimensional breakdown highlights the drivers of the returns and aims to find insights both from the investor and market efficiency perspectives. All internal distributions within these stratifications can be viewed in Figure 5. The segmentation mainly builds on the literature such as (Howton et al., 2001) who investigated the prior financing in terms of board members compared to returns, (Haugen & Udell, 1972) who looked at value creation after being acquired, and (Vismara et al., 2012) who investigated at stock exchange jumpers.

Acquired and non-acquired companies

Acquired companies are defined as companies that have been acquired by investors, after the company's IPO. This data is provided by the Pitchbook database (Pitchbook, 2022). This perspective investigates if the companies which are acquired return differently, compared to the companies which remain listed throughout. The acquisition can happen at any time and is not confined to the 5 year period, this is an ex-post approach and is intended to investigate if there are differences which can be seen in the two periods. Previous research found that the bulk of post-acquisition value occurred right before the ownership transfer in terms of the price premium for the acquisition (Haugen & Udell, 1972). This insight hints that acquired companies will see increased stock price returns, compared to their peers if their underlying, non-acquisition-related returns are equal. Haugen and Udell's findings are an important preposition to this substrate's investigation since they note that the value addition from the acquisition is recorded in the public share price. This stratification is interesting to investigate since differences hint that companies that are acquired have different returns compared to their non-acquired peers.

Stock exchange jumpers and remaining listed companies

This segmentation divides all companies into binary groups dependent on the company´s history of moving from one stock exchange to another. The list jumping group is defined as all companies which have ever changed in exchange for their equity. There are in total 101 recorded companies which have changed exchange for their equity in this sample, which account for 11.8%. This distribution between jumpers and remainders can be seen in Figure 5. There is limited research on the difference in the stock exchange jumpers in the Swedish MTF market. Previous research on European secondary exchanges found that list jumping is one of the important functions of secondary exchanges (Vismara et al., 2012). Investigating this dimension adds context from the Swedish markets to Vismara et al.'s findings. Findings in this stratification can give context to

the benefits of the MTFs to the Swedish equity markets.

First financing deal class

This segmentation variable categorizes all companies based on their first financing deal class. Companies that take external financing can raise multiple financing round, from different capital classes, which is seen in this sample. This means that many companies in this sample would be included in several bins, which could dilute the test statistics. For this reason, each company is categorized by Pitchbook's "First Financing Deal Class" category. Using the first financing deal class make all groups mutually exclusive. This renders the categories: Corporate backed, No investor, Private Equity, Venture Capital, and Other. These categories each include several sub-categories. All sub-categories are classified into these categories to best fit the type of investment it regards. Example: incubators are included in the *other* group but venture capital-backed incubators are included in the *VC* category. The *other* category contains all companies whom have unusual financial backings such as *grants* or *loans*. Previous literature has found incentive differences between these groups for listing companies (Hulthén, 2019), (Howton et al., 2001), (Ritter & Welch, 2002). Findings in this sample stratification have tradable implications for investors since this variable is recorded ex-ante, i.e. it is known to an investor by the time of IPO.

5 Cross sectional analysis

The cross-sectional analysis includes three parts. A IPO year distribution, a returns distribution for 3-time horizons, and a descriptive statistics table for the underlying companies.

5.1 Company Summary Statistics

The MTFs host companies with vastly different characteristics. These differences demonstrate in qualitative and quantitative dimensions. The qualitative differences relate to company history, operations, ownership, etc, some of which are described in Figure 5. Some of the differences which are quantifiable are presented in Table 1 below.

Measure	Revenue	Employees	Total Raised	EBIT	IPO Year
Count	793.00	796.00	560.00	787.00	713.00
Mean	34.84	136.42	28.91	0.99	2015.38
Std	157.34	485.60	115.64	147.40	4.48
Min	-0.24	1.00	0.05	-3522.62	2004
P25%	0.24	8.00	2.14	-2.37	2013
P50%	2.69	23.00	5.86	-0.77	2016
P75%	16.41	75.00	19.70	0.68	2019
max	3494.84	8031.00	1850.61	2015.63	2021

Table 1: Descriptive Statistics for company specific info (€ MIL), employees (n)

Table 1 includes descriptive statistics over company-specific measurements for all companies with sampled data. Not all companies have data for all parameters with *Total Raised* having the lowest amount of data due to not all companies raising money in ways that are counted by Pitchbook's database. These measures relate to external financing. There are data on revenue, employees, earnings before interest, and tax (EBIT) for around 790 companies which can be compared to the total of 855 in the sample.

The descriptive statistics are the first highlight of the diverging properties between the companies. The mean revenue is €157M, but the median is only €2.69 MIL and the 75% percentile €16.41 MIL. Likewise, the variability is large for the other measure with the mean being far lower than the median. It is further noteworthy that the median EBIT is negative. This shows that more than half of all companies included in this sample have negative EBIT, something which was also found in other samples (Vismara et al., 2012). 560 of all companies have raised capital which Pitchbook's database has recorded, with the mean post-money valuation being €92 MIL for all companies, compared to a median of €18.0 MIL, once again showing the uneven distribution between these companies. Table 1 also shows the wide range between the companies. This is expressed in the "Employees" category where the biggest company has over 8000 employees per 2021, 50x above the mean. This pattern is also true for the other measurements and can be seen in every category. The insights from this table is a first peek at the different characteristics between the companies on the MTFs.

5.2 IPO yearly distribution

Chapter *Data availability bias* showed that data availability is pressing for the robustness of this investigation, especially in the long-term when data loss becomes more prevalent. It is therefore pressing to investigate the IPO yearly distributions to see the age of the companies in this sample. Differences in mean IPO year should be compared with relative data availability in the long-

term returns figures. These combined tell if the data loss is due to the age of the companies being too short, or if the companies have been made private through a liquidation or acquisition.

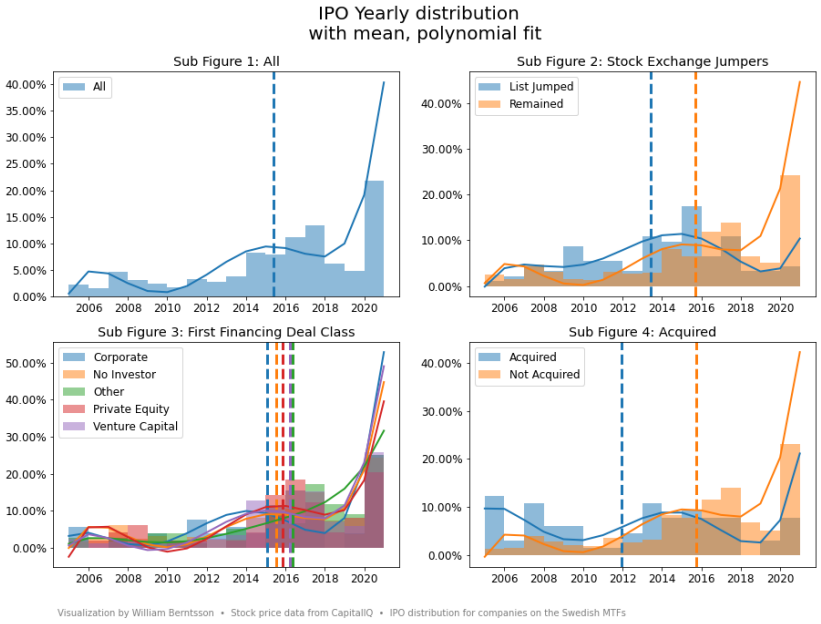

Figure 1: IPO yearly distributions for 2004 to 2021. With polynomial fit (−) and mean IPO year (- -).

Figure 5 displays the relative IPO distributions in the 4 investigated dimensions: All, List Jumpers, First financing deal class, and Acquired. Each distribution display relative distributions for readability due to differing sub-sample sizes. A polynomial fit is included for easier comparability between the sub-categories but should not be viewed as any form of predictor and not be extrapolated outside this sample. The polynomial fit is present to emphasize general trends. The observations from this figure should be taken into consideration when investigating data-availability bias in Chapter *Results*. The mean IPO is also the median period since the years are linear. All IPOs which occur after 2017 will have dava availability issues since these companies have yet to record 5 years of returns.

Sub Figure 1: IPO distribution by all

Figure 5, subfigure 1 displays the IPO distribution on the Swedish MTFs in aggregate. There is a time trend in the listings on these exchanges which is overall increasing with time. There is however variability between years with a peak in 2007, 2017, and 2021. These peaks constitute what (Lowry et al., 2010) called "hot-markets", i.e. periods with increased frequencies of IPOs. The mean company IPOd their equities in 2015, which is visualized with the vertical blue dotted line.

Sub Figure 2: IPO distribution by Stock Exchange Jumpers

Figure 5, subfigure 2 shows the IPO time distribution between companies whose list jumped or remained on the IPO exchange. This subfigure displays that companies that list jumped more often had their IPO between 2013 and 2018 which shows that most companies that list jump have matured for some years before jumping exchange. This observation is in line with the literature that the secondary exchanges act as a springboard toward the primary markets Vismara et al.. The difference in the mean is almost 2 years for the sub-groups.

Sub Figure 3: IPO distribution by first financing deal class

Figure 5, subfigure 3 shows the relative yearly IPO distributions stratified by the first financing deal class. The fitted lines show there are only minor trends and that the differences in financing status do not correlate with the IPO year. This means that the data availability bias in this stratification will not be due to a difference in IPO date. All sub-groups mean IPO occurred in 2015.

Sub Figure 4: IPO distribution by Acquired

Figure 5, subfigure 4 shows the distributions for companies that have been acquired post IPO and those which have not. There are big differences in IPO years as many acquired companies were listed in the older part of the sample. This means that the acquired companies are older, compared to their non-acquired counterparts. This observation must be taken into account when investigating this stratification. The difference in mean IPO year is more than 4 years, the biggest difference between any group. This is further discussed in the *Discussion* and have strong implications for the *acquired* companies' return trajectories.

5.3 Returns distribution

The returns distributions are evaluated in 3 dimensions. First the distribution of the daily returns for all companies and all days. This can be seen in Figure 2.

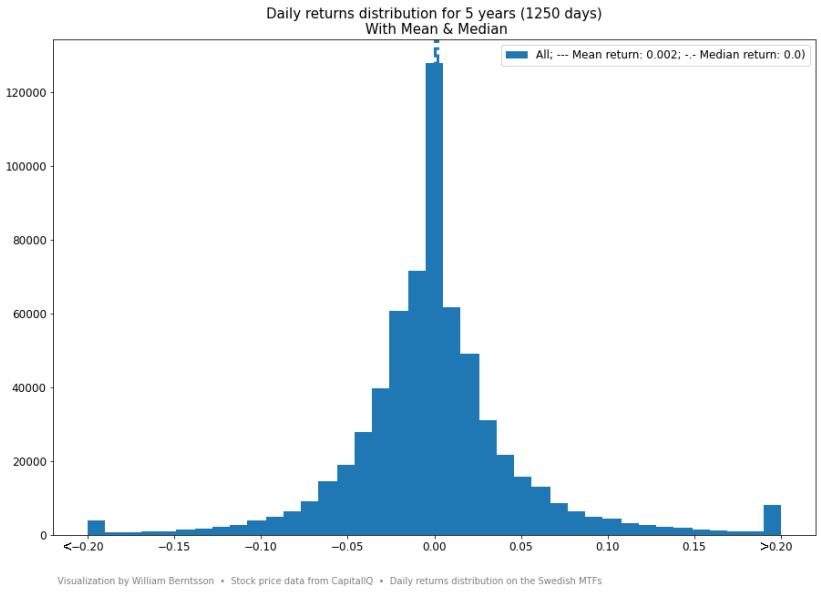

Figure 2: Daily returns distribution for all companies first 5 year (1250 days).

Figure 2 displays the returns distribution for all companies in all days. The returns distribution is heavily concentrated around zero with a slight negative skew. The median is negative when looking at all individual returns. The mean and median are included as lined and dotted lines but collapse to one line due to their similarities in values for this particular figure. These values are also presented in the legend.

The mean return is however positive which is an effect of large positive outliers. This can be seen in the outlier bins that > 0.2 or $> 20\%$ daily return far out-weight the < -0.20 or $< -20\%$ bins which show significant outliers. Figure 2 display the patterns which was also described by (Officer, 1972) with a symmetric distribution with heavy outliers.

The underlying distributions must also be investigated on a *first day* return basis since the distribution of first-day returns must diverge from *all* daily returns if the first trading day should be significant. This investigation into the first-day return distribution can be seen in Figure 3

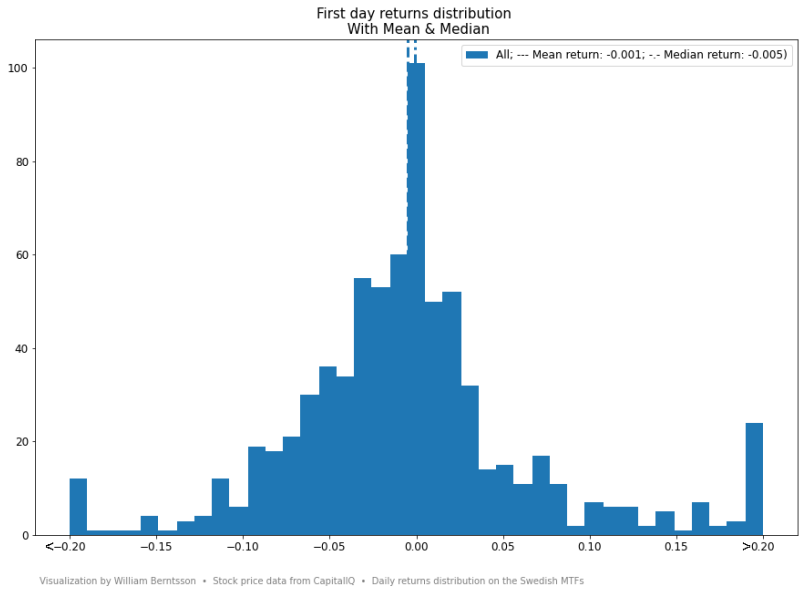

Figure 3: First day returns for all companies in the sample.

Figure 3 display the first day returns distribution for all companies which have IPOd on the Swedish MTF with publicly available data. The mean first-day return is -0.001, which is not statistically significantly different from zero, this insignificant difference is also seen in Figure 6. It is however interesting that, despite statistical insignificance, the coefficient is negative. This stands in stark contrast to the findings of (Loughran & Ritter, 2004), (Ritter & Welch, 2002) and (Lowry et al., 2010) where the first day returns are statistically significant higher than zero. This hints that initial pricing on an MTF is made with different incentives and/or intentions in mind, compared to traditional exchanges. This is further discussed in the *Discussion* Chapter.

The final perspective to returns distribution is the long-term returns. (Guo et al., 2006) and (Vismara et al., 2012) use 3 to 5 years to define long-term returns which is the basis of this horizon. The 5 year cumulative return distributions can be seen in Figure 4.

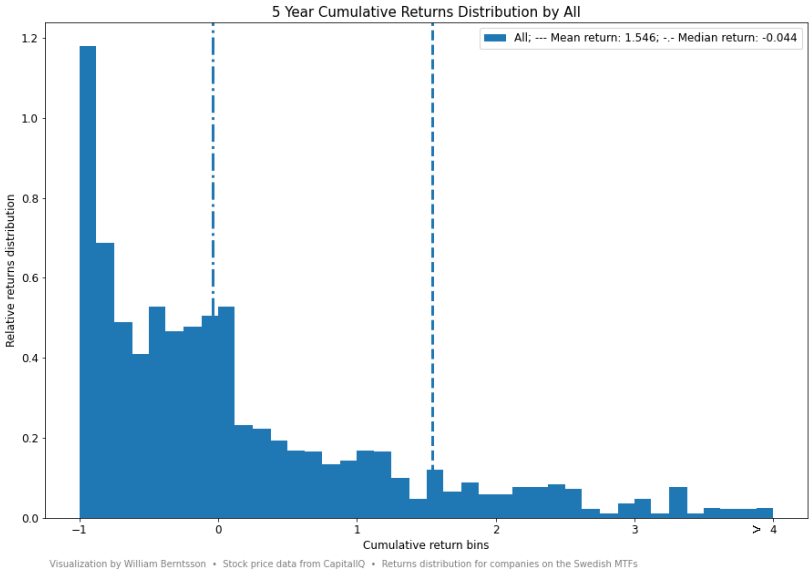

Figure 4: Returns distribution for all companies, 7 years after their IPO.

Figure 4 display the cumulative returns distribution for all companies on the Swedish MTFs. The figure hints at two important pieces of information: (I) the median cumulative return for a company on these MTFs after 5 years is negative and (II) the mean return is positive and heavily outlier driven. The mean return in this figure is also demonstrated in Figure 10 as the mean return. The highest bin in this distribution contains a big part of all observations which include companies that have multiplied their stock prices by more than 4x. This information shows the outlier-driven nature of this sample and hints at important insights from the perspective of an investor. The figure also displays a pattern of diverging long-term returns. It shows that more than half of all companies have negative cumulative returns after 5 years of trading, but a small fraction has very high returns. The stratifications in *Results* chapter further investigate which companies constitute the top-returners.

The Figures 2,3, and 4 give insights that the returns on the Swedish MTF markets are unevenly distributed with a negative median, positive mean and long positive tails. This insight will be further discussed in the Discussion Chapter as it heavily relates to research question II.

5.4 Sampled Distributions

The MTF IPO sample is divided into the 3 Swedish MTFs with an exchange distribution seen in the Introduction Chapter. There is a wide range of differences between them, which was alluded to in Figure 1 above. Below is Figure 5 which illustrates how the sampled companies are distributed in four dimensions. This figure presents the category sizes visually.

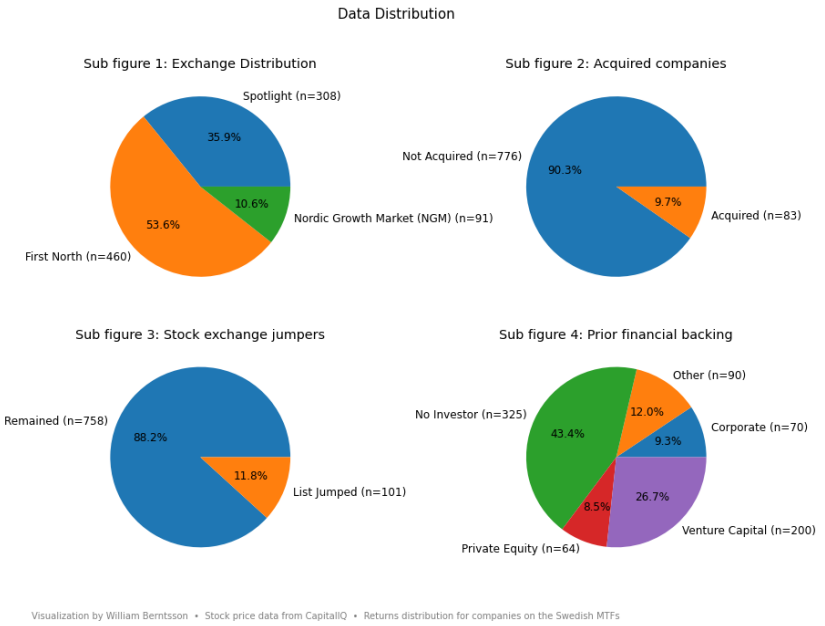

Figure 5: Distribution of: IPO exchange, stock exchange jumpers, acquired companies, prior ownership status.

Figure 5 displays the distribution in the underlying data in the four dimensions: IPO exchange; Acquired vs non acquired; Stock exchange jumpers; first financing deal class. The distributions in this figure give context insignificant and significant findings since it highlights the group sizes within each analysis.

Sub Figure 1: IPO Exchange

Sub Figure 1 demonstrates the number of IPOs on each of the three Swedish MTFs. It is noteworthy that First North accounts for more than 50% of these

IPOs. First North is a subsidiary to Nasdaq (Nasdaq, 2022).

Sub Figure 2: Acquired Companies

Sub Figure 2 shows the frequency for companies that are acquired after they have IPOd on any of the MTFs. The distribution between companies which stay listed or are acquired is approximately 10% vs 90%, i.e. 10% of the companies which once IPOd on these exchanges have been acquired and since been delisted. Since only 10% of the companies are ever acquired, finding statistical significance is harder due to increased standard errors in this sub-group.

Sub Figure 3: Stock Exchange Jumpers

Showing the frequency of companies listing their equities on another exchange. Note that 11.8% of companies do a stock exchange jump for their equity. This sub-set of companies is investigated further since such a stock exchange jump can correlate with other parameters such as long-term returns. If there are differences, then this is might support that the companies which change exchange for their equity have better or worse stock price returns compared to their peers. Just as acquired, the small sub-sample size of *list jumpers* leads to larger standard errors and thus lower statistical significant results.

Sub Figure 4: Prior Financing Backing

This sub-chart displays the distributions in all companies' previous financing status. The data is categorized into 5 different categories, each with different background. The figure shows big differences in the number of companies in the categories. About 40% of the companies have no investor. Private equity and corporate-backed companies constitute the smallest categories which make significant conclusions in these 2 categories hardest.

6 Time series analysis

The time series analysis includes a short- and long-term returns analysis. Each analysis consists of the aggregate data and the stipulated stratifications. Following is the short-term analysis. All time series figures present mean returns combined with 95% confidence bands (CB). The confidence bands constitute a student's t-test in each period. Confidence bands which lay outside each other are statistically significant (Lyon et al., 1999).

6.1 Short-term returns

The literature review revealed an IPO environment with high short-term results on the regulated stock exchanges. This is now investigated on the secondary-tier exchanges, the MTFs, first in aggregate. This can be seen in Figure 6 below.

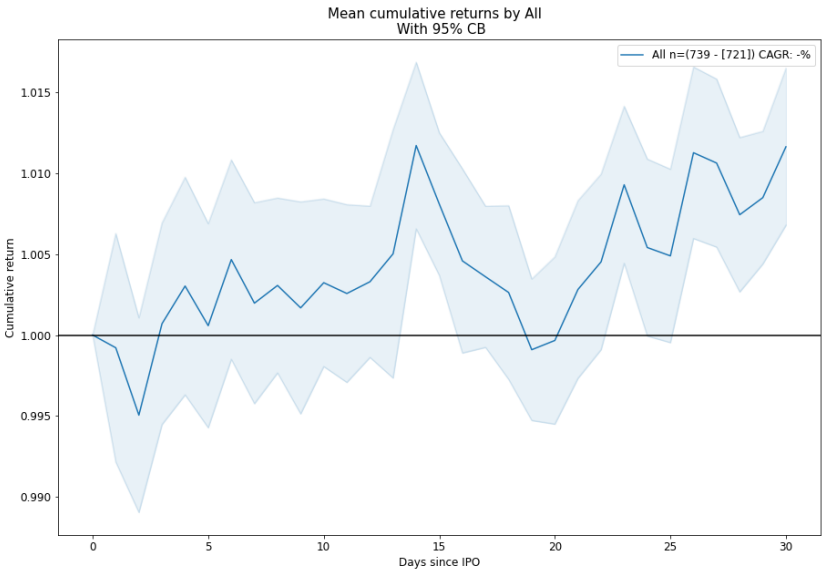

Figure 6: short-term returns for all companies in 30 days since IPO. With 95% CB based on daily data.

Figure 6 shows the mean cumulative return for all companies in their 30 first days of trading. There is a negative mean first-day return when investigating all companies. This initial negative mean return is however offset in the coming days. On day 3 the returns have been rectified. The standard errors in the daily returns out-weights the mean returns until day 12. This shows that the short-term returns for all companies are not caused by a miss-pricing in the IPO but rather is a cumulative effect in the coming 2 weeks of trading. The negative mean and high variability of the first day returns in also investigated in Figure 3. The insights from Figure 6 and 3 show that there is no excess returns in the IPOs for the MTF companies in aggregate. This strongly contradict previous research on first-day returns in IPOs (Lowry et al., 2010), (Ritter & Welch, 2002), (Loughran & Ritter, 2004) which found that initial IPO returns range from several percentages to double digit returns. These differences are

discussed in the discussion of research question I. The insignificant first-day returns make the substrate break down even more relevant. The first substrate is *first financing deal class*. This can be seen in Figure 7 below.

First financing deal class

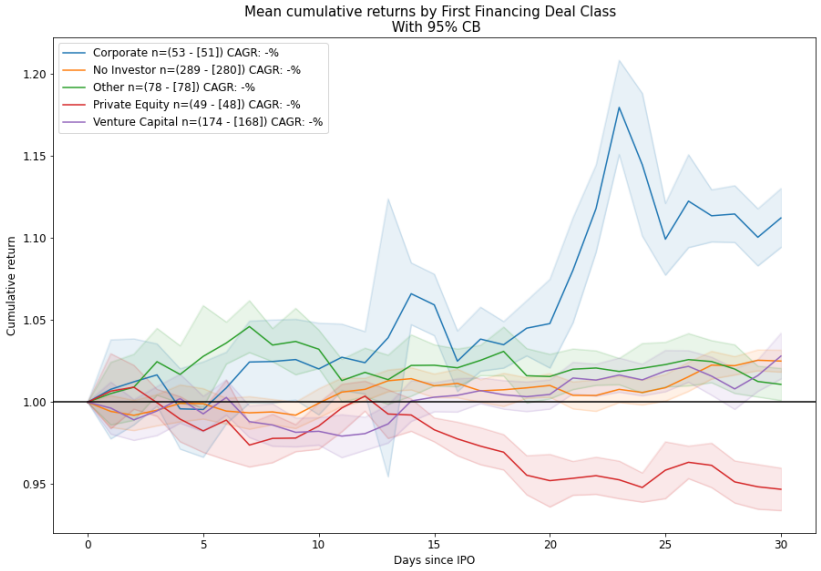

Figure 7: short-term returns stratified by first financing deal class in 30 days since IPO. With 95% CB based on daily data.

Figure 7 shows the cumulative daily returns for the sampled companies, stratified by their first financing deal class. The categorization definition is outlined in *Data Variables* sub-chapter. The figure shows that *PE* backed companies have significantly negative short-term returns. This implies that the PE-backed companies which IPO on the MTFs are over-priced in their IPO. Approximately the same pattern hold for *VC* backed companies. Both these groups have statistically significant negative returns, about 6 days after trading began. VC-backed companies later return around 0% cumulatively. Companies in the *other* category perform best in the short-term returns. These companies return significantly higher than all sub-groups (except *corporate backed*) in the first week of trading. The *corporate* and *no investor* groups perform with mostly insignificant returns the first 2 weeks of trading. *Corporate* to later out-return all other categories after around 3 weeks of trading. Figure 7 shows that companies with

institutional financial backing (PE & VC) are over-priced in the IPO with negative first-week returns. The IPO over-pricing means that the prior investors who can liquidate their stakes at the IPO might be the winners in these companies. This finding relates to research question I and is further discussed in this context in the *Discussion* chapter. Further, I investigate the relationship between companies which are later *acquired* and those which are not. This can be seen in the figure below.

Acquired and non-acquired companies

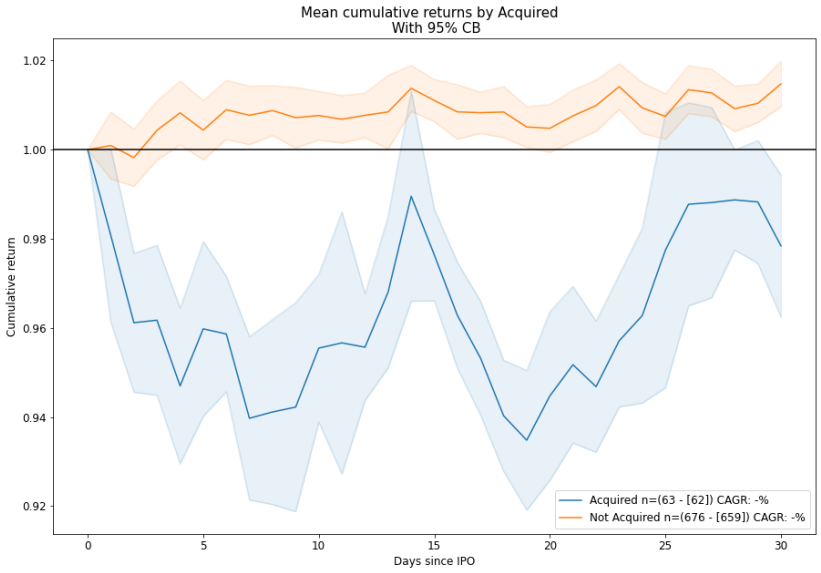

Figure 8: short-term returns stratified by acquired companies in 30 days since IPO. With 95% CB based on daily data.

Figure 8 displays the significant differences in first-day returns when the sample is stratified by *acquired* and *not acquired* companies. This stratification has the largest differences in short-term returns as the *acquired* companies return significantly below zero and the *non-acquired* companies on the first days of trading and inhibit large volatility for the whole sampled period. The findings that the later *acquired* companies under-return their *non-acquired* counterparts adds context to research question I and is further discussed in *Discussion* chapter. The final dimension of interest is to separate the companies which change

exchanges. Some companies will change exchange after a couple of years on the MTF (Figure 5). These companies can change from one MTF to another and others make a vertical leap to the regulated exchanges such as OMX NASDAQ. I investigate the differences between companies that never jump stock exchange to those who jump in Figure 9 below.

Stock exchange jumpers and remaining companies

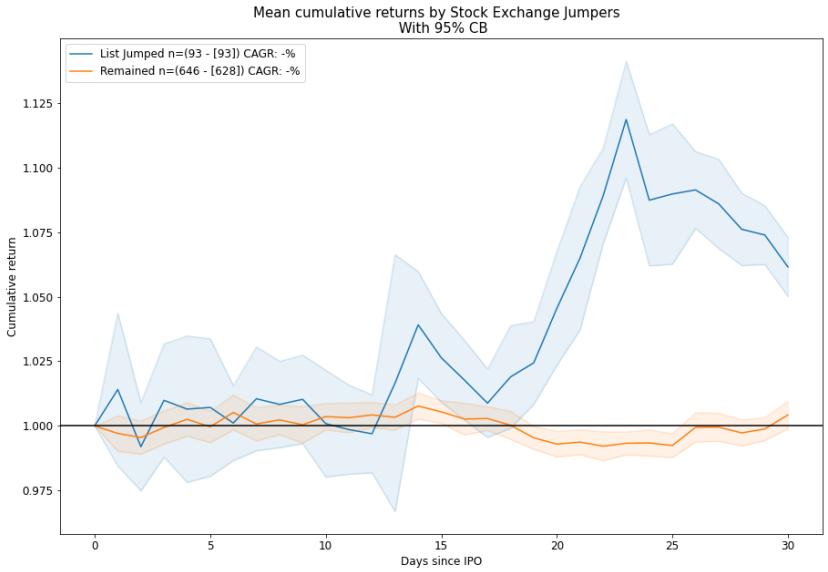

Figure 9: short-term returns stratified by stock exchange jumpers in 30 days since IPO. With 95% CB based on daily data.

Figure 9 shows the returns for companies that list jump and those which do not. Both groups have insignificant returns during the first two weeks of trading just like the aggregated Figure 6. The *list jumper* group later out-return the *remaining* group is all time periods after day 17 since IPO. These differences are significant at 95% significance level but rather show that these companies have cumulative returns rather than an initial miss-pricing in the IPO. The mean return is around 10% at max on day 22 which is later reduced to a lower level. This highlight initial high volatility which is much due to the lower sample size but also an effect of the initial mispricing and uncertainty among investors.

Figure 9 shows that the companies which eventually jump stock exchange outreturn their peers in the short-term.

6.2 Long-term returns

This section is dedicated to investigating the long-term returns on the 3 Swedish MTFs. The data is again stratified in the dimensions: All; first financing deal class; acquired and non-acquired; Stock exchange jumpers and remaining. The *long-term* is measured for 5 years. The cumulative returns and confidence bands follow the framework by (Lyon et al., 1999), (Vismara et al., 2012). Each period in these figures present a double sided t-test with 95% confidence level. Two confidence bands which lay outside another show 95% confidence that the means are different from another. The measures are based on weekly data thus the standard errors are larger compared to the estimates in the short-term analysis. I start by investigating the over-all aggregated returns which follow the measures of (Vismara et al., 2012) in Figure 10 below. The CARG for OMX Stockholm from 2011-12-31 and 2021-12-31 is 11.36% which should be viewed as a baseline for all figures in this section (CapitalIQ, 2022a).

All companies aggregated

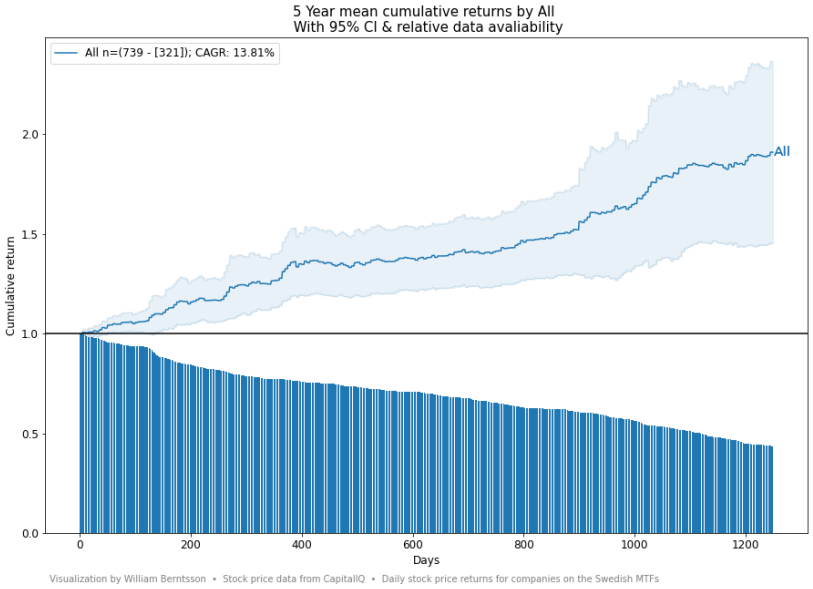

Figure 10: Cumulative returns for all companies, for 5 years with 95% CB and relative data availability. Based on weekly data.

Figure 10 displays the mean cumulative returns for all companies over 5 years from their IPO. The compounded annual growth rate (CAGR) is computed to 13.81% over the whole period and the cumulative return is around 180% and can also be seen in the 5-year cumulative returns distribution in Figure 4. The figure also displays the relative data availability, a decline over time, and is measured as a percentage of the initial data availability. The total initial data availability can be seen in the *(n=739)* in the legend. The second value in the legend displays the number of companies with data available at the end of the period (n=321) which render an approximate 55% data loss over 5 years. With the cumulative products and the data availability, the standard error increase over time as fewer companies have data (Lyon et al., 1999). The figure allows for analysis over any period and can quickly be compared with the data availability.
The CAGR of 13.81% for 5 years is statistically significantly different from zero for all long-term periods after year 1. The long-term mean growth hints that the mean growth for the sampled companies on the Swedish MTFs is similar to those of the regulated exchange OMX Stockholm. The 55% data loss must be

compared to to Figure 5, subfigure 1. A significant portion of the companies IPOd in the last 5 years, which give rise to the data loss. This shows that the data loss is much due to late IPOs which occurred in the last five years, compared to liquidations occurring within the 5-year data window. The data loss increases the standard errors in the estimation in the long run which increases the uncertainties in the estimations.

Acquired and non-acquired companies

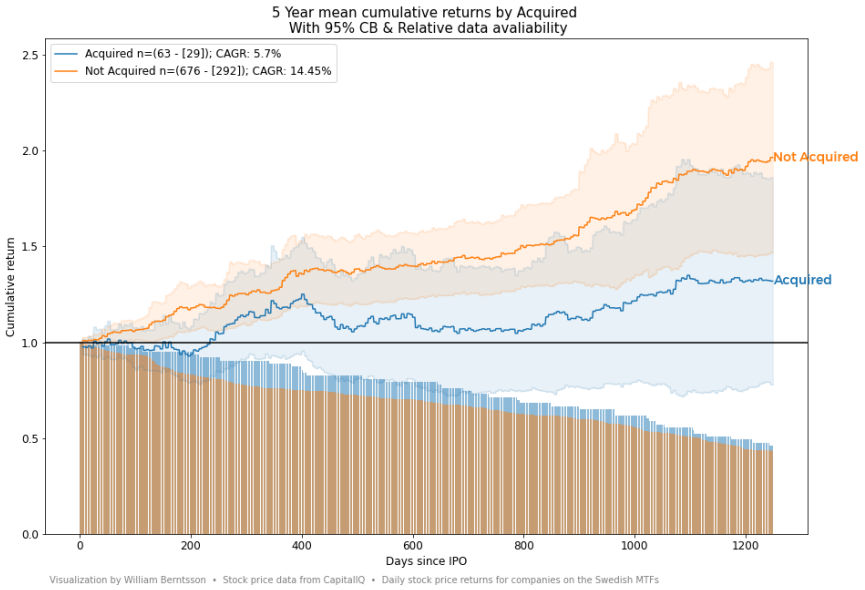

Figure 11: Cumulative returns stratified by acquired vs non-acquired companies, for 5 years with 95% CB and relative data availability. Based on weekly data.

Figure 11 shows the differences in long-term returns between companies that are acquired from the public markets compared to companies that remain listed. The companies which are not acquired return a CAGR of 14.45% which is significantly different from zero for all long-term periods. The group which is acquired returns a CAGR of 5.7% which is not statistically significant from zero for any period. The confidence bands for the *acquired* group are large due to the few acquisitions (n=63) from these MTFs in this period. The *non-acquired* group's confidence bands are always above the *acquired*'s mean levels, in the long run. It is, however, due to the large uncertainty in *acquired*'s CB never outside its

acquired's CB. For this reason, there is no strong evidence that *non-acquired* companies out-return *acquired* companies as the results are not statistically significant at 95% in the long-term. It is only weak evidence that *not acquired* out returns *acquired non-acquired* companies return above 0 whilst *acquired* companies does not.

This evidence hints that a company's stock price returns negatively correlate with being acquired. It hints that it is rather the worse performing companies that are acquired and later delisted from the Swedish MTF markets. The returns should also be compared to the groups' data loss. Figure 11 shows that both groups have around the same data loss for the sample but the *acquired* group has higher relative data availability for all periods. This hints that the companies which are acquired have more longevity compared to the *non-acquired* group. The findings in this figure should be compared to the IPO yearly distributions in Figure 5 sub-figure 4. That figure displays patterns that *acquired* companies are older, compared to their *non-acquired* counterparts. The evidence of differences in returns and age is further discussed in the *Discussion* Chapter as it has implications for the corporate life cycles of companies which list on the Swedish MTFs.

First financing deal class

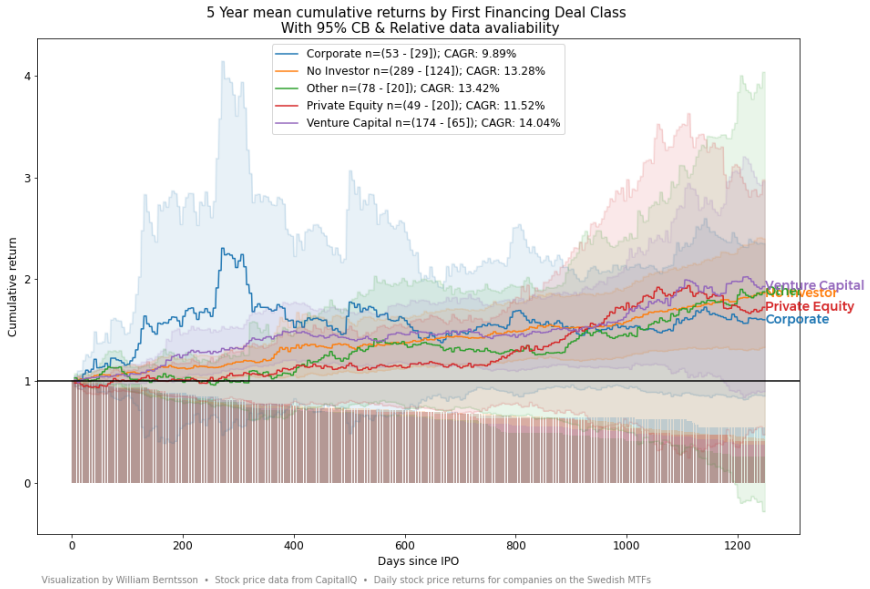

Figure 12: Cumulative returns stratified by first financing deal class, for 5 years after their IPO. With 95% CB and relative data availability. Based on weekly data.

Figure 12 shows the mean cumulative returns for companies based on their first financing deal class the first 5 years after their IPO, based on the weekly share price. The figure shows that all first financing deal classes correlate and there are no clear differences in the first 5 years of trading. The mean cumulative returns differ but are never outside each other's corresponding 95% confidence bands. Corporate-backed ventures out-return their peers in the short-term, around 1.5 years from their IPO. In the long-term, no groups particularly out-return another. This hints that the predictability of the first financing deal class alone bears low information when predicting long-term stock returns and there is no clear evidence that the first financing deal class determines the long-run returns for the companies on the Swedish MTFs. The insignificant differences between companies, based on their first financing deal class must also be compared in the context of IPO yearly distribution, seen in Figure 5 sub-figure 3. This sub-figure tell me that there are no big differences between the groups, in terms of IPO date distribution. This further solidifies the similarities i.e. insignificant differences between the groups and show that data availability bias is not a big

determinant for this substrate. The results from this figure tells me that first financing deal class is a poor correlator with the long-term success of the companies which IPO on a Swedish MTF.

Stock exchange jumpers and remaining companies

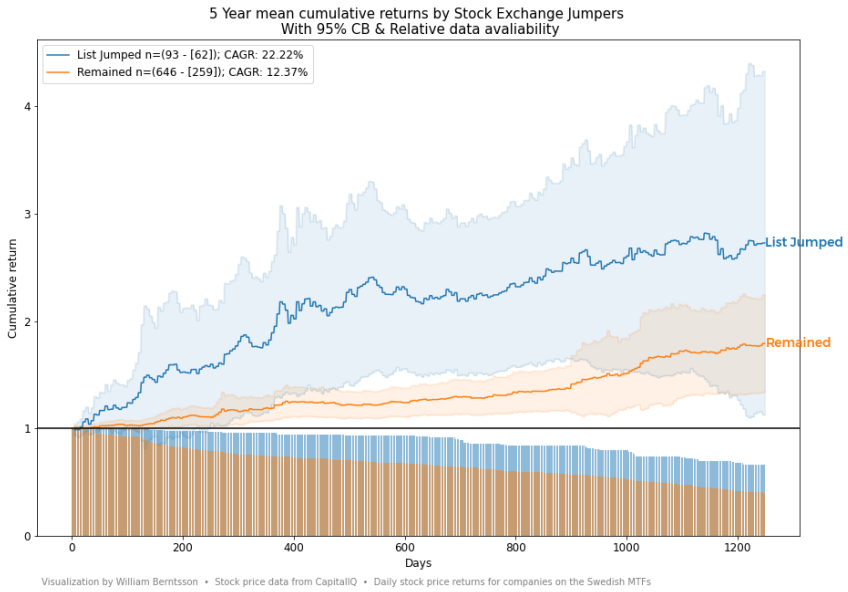

Figure 13: Cumulative returns stratified by stock exchange jumpers, for 5 years with 95% CI and relative data availability. Based on weekly data.

Figure 13 shows the mean returns for 5 years and displays the differences between companies that "jump" from one stock exchange to another, and those that do not, an effect which (Vismara et al., 2012) found central to the secondary equity markets. The groups differ in standard errors, due to differences in subsample sizes rather than the cross-sectional standard deviation. The *list jumpers* have a mean CAGR of 24.87%, significantly larger than the total sample mean CAGR of11%, remaining companies' 9.59%, and OMX Stockholm's 11.78%. These differences hint that the companies which change exchange greatly outreturn those that stay on their IPO MTF. This pattern of excess returns is true for almost all periods after the 2nd year of trading until about the 4th year. The statistically significant differences are extinguished post year 4 due to data availability and increased standard errors in the *list jumpers* sub-group. The

mean returns are however always higher for the *list jumping* group compared to the *remaining* group which hints that the longest term insignificance stems from data loss, rather than changing mean returns and standard deviations. The *remaining* group is statistically significant above 0 for all years beyond 1-year post IPO. The data loss for the *list jumping* companies is lower than the *remaining*, which is due to longer longevity in *list jumping* companies which I demonstrated in Figure 5.

The data-availability in Figure 13 must be compared to the IPO yearly distribution from Figure 5 sub-figure 2. This figure demonstrate that the differences in data availability in Figure 13 to a large extent stems from the older age of *stock exchange jumpers* compared to their *remained* counterparts. This adds the context that the companies which jump exchange are often older than the other companies. This finding is further discussed in the *Discussion* Chapter. The findings give insightful evidence to research question III.

7 Discussion

The discussion chapter combine the findings from the descriptive statistics, results with those from the literature. The discussion is divided into each research question outlined in the *Research questions* sub chapter.

Research Question I. Are companies priced accurately when listing on the Swedish MTFs?

Figure 6,8,7, 9 show the short-term cumulative returns of the Swedish MTFs, based on the aggregate level and the stratifications. Several figures show significant differences in the short-term returns. The largest differences are those between companies which are later *acquired* and those which are not acquired (8). These differences show that the acquired companies return significantly lower than their counterparts. This measure is an ex-post perspective since these companies are acquired some time after their IPO. The ex-post perspective means that this information is non-tradable for an investor. These negative IPO returns have implications for research question III and the relationship between acquired and non-acquired companies are further discussed later.

There are also differences between companies based on their first financing deal class. Figure 7 shows that companies with PE and VC funding returned significantly lower at the IPO than their *corporate*, *other*, and *no investor* counterparts. This finding has interesting implications for the behaviours of the *VC* and *PE* investors. The findings contrast those of (Howton et al., 2001) and hint that there are underlying differences in incentives between these groups and their counterparts. Previous research by (Hulthén, 2019) suggest that these groups view an IPO on a secondary exchanges as a last resort when exiting

their ventures. This finding fit that explanation as it suggests that those companies which ultimately are listed on these secondary exchanges are there as a last resort from the *PE* and *VC* investor's perspective. The short-term negative returns hint that *PE* and *VC* investors over-price their portfolio companies in the IPO. What sets these investors apart from some of the other categories of investors are the lockup period. This lockup period hinders these investors from selling equity stakes before the lockup period is over. This means that any stock price returns within this period do not affect these locked up investors. Such explanation could partly or fully describe the differences in IPO pricing for these investors. The differences in returns for these companies are known ex-ante the IPO. This means that the low returns amongst these institutional investors should be taken into account when an investor contemplates investing in an IPO from company with these financial backing. Based on the findings in my sample, an investor should avoid having long position in these companies in the short-term as these are over-priced in the IPO.

There are also differences between the returns of companies which *list jumped* and those which *remained* listed on their IPO exchange. These differences solidify after 2 weeks of trading. The lagged differences give only weak hints miss-pricing in the IPO for these groups as the effect could be due to cumulative returns rather than IPO miss-pricing. The stock exchange jumping information is also gathered ex-post and does not present tradable opportunities for investors as the *list jumping* occurs long after the IPO.

The overall sample mean for first day returns have no evidence to follow the literature on the first-tier exchanges (Loughran & Ritter, 2004). Loughran and Ritter found significant positive short term returns on the first-tier exchanges, something which seems to be inversed on the Swedish MTFs. The short-term returns are statistically insignificant different from zero, which I presented in Figure 6. However, all-though not statistically significant, the first day distributions from Figure 3 insignificantly hints that the mean 1st day return is negative. Future research on first day returns on MTFs should investigate a larger sample to potentially reduce standard errors. The insignificant negative first day returns do however hint at different motivations for listing equities on the MTF markets, as the first tier returns of around 7% (Loughran & Ritter, 2004) can be compared to my sample mean of -0.1%. The differences in means between these exchanges hint of different motives when listing a company on an MTF or traditional stock exchange. I find no final evidence to what these motives are, but as different previous investors presented difference mean returns, it seams that the differences stem from information asymmetries and differing incentives.

There are no evidence that the companies in aggregate miss-priced their equities in their IPO since the valuation before and after the IPO align. However, when stratifying the sample in the three dimensions, there are evidence to support sub-groups are miss-pricing their equities. The financial backing of a company, which is known ex-ante present tradable opportunities for for investors. The

investor should trade with short positions on *PE* and *VC* funded companies to trade this opportunity.

Research Question II. Do MTF's constituent companies' returns distributions conform to first tier exchange returns?

The Figures 2,3, and 4 display the returns distributions for daily-, first-day, and 5-year cumulative returns. The first day-, and daily returns distributions present similar parameters with respect to variability and mean. First day returns have slightly greater variability than the the overall daily returns. Both figures have a strong clustering around zero, but also the occurrence of large outliers. Both distributions loosely follow a normal distribution with high mean clustering and symmetric distributions but too large positive and negative outliers. The first day returns have, as described in research question I, a mean of -0.1% and a median of -0.5%. The daily returns for the whole 5 years have a mean of 0.002 and a negative median return which round to -0.000. The differences in mean and median highlight the asymmetries and inequalities in the returns. In the long-term distributions found in Figure 4. This figure show the distributions between all companies cumulative returns in 5 years from the IPO. This distribution follow more a Pareto-Lévy distribution with heavy negative clustering (Mandelbrot, 1960). The median company has cumulatively returned -4.4% for 5 years whilst the mean return is 154.6%. This is strong evidence that the returns on the Swedish MTFs are heavily driven by outliers since over half of companies return negatively whilst other multiply several fold in stock price. The pattern of the long-term distribution follow that of (Greene & Fielitz, 1977)´s approximation for long-term distributions.

This observation is important to the investor perspective on these companies, as the median company performs negatively over 5 years. This has important implications for diversification on these exchanges since an under-diversified portfolio would potentially forgo risk-adjusted returns if invested in the poorly performing companies. It also give context to the short-term returns in research question I. The long-term returns distributions also have implications for the the purpose of the MTFs. The diverging returns hint at the conclusions of (Vismara et al., 2012) that the MTFs primary function is to facilitate companies to future growth, rather than a long-term placement for the companies. It hints that the MTFs are mostly a source of growth capital for companies to eventually implode or explode. This finding leads to research question III below. Vismara et al. also found that the median long-term returns on the European MTFs are negative. This finding is repeated in my sample on the Swedish MTFs. This show that the majority of all companies return below 0%, cumulatively for 5 years.

Research Question III. Are there correlators with long-term stock returns?

This research question is extensively investigated in the *Results* chapter. The results show the historic cumulative returns for all companies, in aggregate and in the 3 stratification's.

Figure 11 display the long-term returns for *acquired* and *non-acquired* companies. The figure display interesting findings as the *acquired* companies under-return in the long-term, compared to the companies which remained listed on any exchange. This finding is interesting when compared to the IPO yearly distribution in Figure 5 which show that the acquired companies are older than their counterparts. These pieces of information combined show that the acquired companies are on average older and lower returning, compared to their *non-acquired* counterparts. These findings are in line with the findings of (Malone, 1989) who find that buyouts often occur in companies with stable cash flows and in industries with lower growth, compared to other industries. The findings must also be analyzed in the context of the findings of (Haugen & Udell, 1972) who find that the shareholder value addition from an acquisition is recorded in the share price. The findings that older, worse returning companies are acquired have implications for the life cycle of the companies on the MTFs. The findings hint that companies which under-return on the MTFs may later be acquired. In this context, being acquired from an MTF is more often occurring in companies with lower long term returns. The finding that acquired companies under-return their peers make more sense when compared to the findings of (Hulthén, 2019) who found the second-tier IPO is a last resort for institutional investors and is typically performed when a first-tier IPO and domestic and foreign M&As have already been exhausted. If this pattern is extrapolated to all investors, then the outlooks for *successful* M&As become small for companies which have already listed on a MTF since these companies were unable to be acquired before being listed. Another explanation why the lower returning companies are being acquired might be bad long-term stock returns lead to lower capitalized companies. This means that the companies equities are *cheaper* for an acquiring party to acquire.

Figure 13 show the cumulative returns for 5 years, stratified by companies which made at least one stock exchange jump from their initial IPO exchange, compared to those which did not. The difference in cumulative returns between these groups provide the largest divergence in this investigation. The group which list jumped returned way above both the total sample mean and their peers which did not change exchange but also OMX Stockholm mean yearly return for the last 10 years (CapitalIQ, 2022a). This finding that the list jumpers are the top returners, on the Swedish MTFs is in line with the literature on the European secondary exchanges (Vismara et al., 2012). The finding has interesting implications for multiple perspectives. Firstly, it adds a dimension to the value these MTFs provide the financial markets as an incubator of companies

to grow and eventually jump to a first-tier exchange or a different MTF. This facilitation could add efficiencies to the public financial markets in Sweden, since traditional exchanges are tailored to initially larger companies for IPOs, partly due to the legal reguirements and underwriting fees (Statista, 2022). Similar studies of market efficiencies was conducted on the Great Brittain markets by (Buckle, Chen, Guo, & Li, 2018) found evidence of increased market efficiency in terms of market making through price discovery as a result of the implementation of the MTF framework. This means that smaller companies are able to list on an MTF and in the event of major success, will later list their equity on a first-tier exchange. Since these companies out-return both the sample average and the OMX Stockholm average return, the companies that are eventually part of the stock exchange jumping group belong to a small and very high returning sub-strata. In this context, the MTFs are crucial part of the stock markets since only 30% of the listed companies fulfilled all requiremetns to list on a first-tier exchange (Vismara et al., 2012). This means that without secondary-tier exchanges, the public markets would forgo these very high returning companies. The *acquired* and *list jumping* perspectives are measured ex-post which are unknown until occurring and does not allow for tradable opportunities to an investor, at least not provided by the methodology of this investigation.Figure 12 displays the returns for the companies, stratified by their first financing deal class. There are periods where there are differences between the groups, but no group is statistically significant from another in the long turn. There are no evidence that first financing deal class is a predictor for long-term returns on the MTFs.

The initial assessment from data availability bias was that the companies with missing data would bias the results with towards higher volatility but not in cumulative mean returns. This assessment is most likely incorrect since it hinges on the assumption that acquired companies are part of a out-returning substrate and the liquidated/bankrubted companies are part of an under-returning substrate. The assessment added these groups together and therefore the mean return for the missing companies should lie somewhere in-between the groups. Figure 11 shows evidence that the acquired companies are actually under-returning the sample mean. This flips the initial assessment and the missing data bias is now a combination of companies returning relatively low (*acquired*) and a group returning very low (*liquidated/bankrupt*). Therefore, it is highly likely that the missing data bias the results in the long-term returns upwards. This must be taken into account when evaluating the viability of companies on the Swedish MTFs. This new assessment put the overall long-term returns closer to the findings of (Vismara et al., 2012) on the European secondary exchanges which showed a very poor development. This missing data bias affect different groups differently. But since the data is missing, there is no hint of magnitude.

The *list jumping* group show higher stickiness in data-availability, i.e. companies which jump exchanges are less prone to being de-listed. It is possible that the missing data bias correlate with bad returns, i.e. the substrates which

remain and perform worse, might also be more related to other, even worse performing companies. For this reason, the missing data bias does not change the findings regarding *list jumpers* but might bias the sample mean returns positively for both groups equally. Swedish MTFs may in this context provide good long-term returns seen if Figures 10, which is most likely over-stated in magnitude as the missing data bias the mean returns upwards (Vismara et al., 2012). However as my investigation has shown, there are no reliable ex-ante predictors for which the winners are, 12. Swedish MTFs do provide an important societal function in providing financing for emerging growth companies that may later transition to first tier stock exchanges. In this function, MTFs act as both bridge financing and filter, as those firms that do not grow sufficiently remain listed on the MTFS are for the worst performers are acquired and delisted.

8 Conclusion

The short-term returns investigation shows no clear evidence that they differ from zero in aggregate. The Figures 6, 8, 9, 7 show that the lack of statistically significant findings may stem from a too-small sample size. However, when investigating the underlying distribution in first day returns, Figure 3 shows that the returns are heavily clustered around zero. This hints that an increased sample size would not change the conclusion in aggregate, given the underlying parameters[2] remained. The lack of evidence for short-term returns contrasts with the literature of first-tier stock exchanges which historically have returned several percentages at the IPO but fluctuating with time (Loughran & Ritter, 2004), (Lowry et al., 2010). These insignificant short-term returns show no evidence for IPO miss-pricing on the Swedish MTFs and hint that an IPO on a first and secondary exchange differs in terms of initial returns through miss-pricing. There are however significant differences in terms of short-term returns when the sample is stratified by previous financial backing. My investigation into the first day return groups shows that institutionally (VC & PE) backed companies have negative short-term returns on the Swedish MTFs. This finding aligns with prior literature which find that these investors see the secondary exchange IPOs as a last resort (Hulthén, 2019) when exiting their investments. In this context, these investors use the MTFs to exit their portfolio company which may explain the initial over-pricing at the IPO. This exiting of their companies contrast other groups of companies which often use the MTFs for further capital expansion. These differences in intentions might explain the over-pricing amongst the institutional investors. Another explanation for the initial mispricing for these companies relates to the lockup period these investors have after an IPO of around 180 days. In this context, all stock price movements before this date have only little effect on the investors who are locked up. This means that institutional investors re unaffected by the IPO price, which also might explain their greater mispricing. I also conclude that companies which are eventually *acquired*

[2]distribution, mean, median, skewness, kurtosis

under-return their *non-acquired* counterparts in the short run. This evidence supports that these companies under-return their peers from day one and that low returns correlate with future acquisitions. This under-return is recorded ex-post and is non-tradable but highlights that the under-return amongst these companies is present for the whole period after the IPO.

The returns distribution on the Swedish MTFs has components that follow the literature on first-tier exchanges and components which diverge. The first-day returns are diverge from the first-tier exchange literature which found high initial returns from 7% to 65% (Loughran & Ritter, 2004). I also note that despite being statistically insignificant, the mean first-day return is negative for the Swedish MTFs which strongly contrasts Loughran and Ritter finding on the first-tier exchanges. On the other hand, the daily returns distribution does follow the literature on first-tier exchanges with approximate Gaussian returns with too large variation for a true fit (Officer, 1972). The long-term returns in 5 years follow previous literature (Vismara et al., 2012). They note that the long-term returns for their sample on secondary tier exchanges are very poor. They find that the long-term returns are on average negative except for a few outliers which multiply their stock price several fold. I find evidence of similar patterns which show that the median company returns negatively but a few companies return with multiple folds in 5 years.

The long-term returns investigation shows that many of the out-returning companies change stock exchange for their equities. This was also found by (Vismara et al., 2012). I also find evidence of long-term under-returns amongst the companies which are later acquired. This means that there is strong evidence in the short-term, and weak evidence in the long-term that the acquired companies under-return their peers. The findings regarding both the acquired companies and the stock exchange jumpers combined have interesting implications for the corporate life cycles of companies on the Swedish MTFs. The findings show that the best-performing companies will often change stock exchange for their equity. The findings also show that companies that are average returners stay on the exchange and that those that under-return are more likely to be acquired and taken private. This constitutes a long-term pecking order on the MTFs where the best companies eventually change stock exchange for their equities, whilst the mean companies remain, and the worse are acquired. There is also a big part of the companies which are liquidated which constitute the worst of all. These findings extend those of (Vismara et al., 2012) who emphasized the changing from a secondary- to a first-tier exchange as a central function of secondary exchanges. My findings hint that being acquired is an alternative, less successful path for companies that under-return on the Swedish MTFs. The companies on the Swedish MTFs may provide good long-term returns, however as my investigation has shown there are no reliable ex-ante predictors for which the winners are. Swedish MTFs do provide an important societal function in providing financing for emerging growth firms that may later transition to a first-tier stock exchange. In this context, MTFs act as both bridge financing

and filter, since those firms that do not grow sufficiently remain listed on the MTFS, and the worst performers are acquired and/or de-listed.

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