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# Initial Private Offerings

*An empirical study of the short-run performance of initial private placements on the Euronext Growth Oslo marketplace*

**Audun Flatebakken & Erik Mørch Bucher Johannessen**

**Supervisor: Tore Leite**

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# Abstract

This thesis investigates the short-run performance of initial private placements on the Euronext Growth Oslo marketplace from 2016 until March 1, 2021. Initial private placements differ from initial public offerings (IPOs) by providing a simpler and faster way of issuing capital and list on a marketplace. From a novel data set of 74 initial private placements followed by listings, we confirm the existence of the underpricing phenomenon on Euronext Growth with an average market-adjusted initial return of 21.43% and an average market-adjusted 30-day return of 32.15%.

We formulate four hypotheses about underpricing on Euronext Growth and test these using four different dummy variables and relevant control variables. A wave of new companies portraying themselves as environmentally friendly and sustainable have been listed on Euronext Growth throughout 2020 and the beginning of 2021. They are often referred to as "green" companies. We classify the sample into green and non-green companies based on the main activities presented in the information document at the time of listing.

Applying regression analysis, we find that companies classified as green have significantly higher underpricing, compared to non-green companies, even when controlling for company size, age and market volatility. Our finding counters previous research that has not found underpricing effects from green energy companies when controlling for other factors. However, green companies exhibiting higher underpricing is in line with previous IPO research indicating that firms with greater ex-ante uncertainty have higher underpricing. The 30-day underpricing factor is significantly larger than the initial underpricing factor, suggesting that the "green effect" may take some time to fully materialize. We also investigate whether tech companies, hot market issues in the post-covid period or issues with cornerstone investors, are associated with higher levels of underpricing, but find no evidence that any of these factors are consistently significant on the Euronext Growth Oslo marketplace.

***Keywords*** – initial private placement, underpricing, green, tech, cornerstone investors.

# Preface

This thesis is written as the final part of our master's degree in economics and business administration with specialization in financial economics at the Norwegian School of Economics.

We would like to thank our families for support along the way. We also would like to thank our friends and fellow students in Bergen for numerous interesting lunch discussions, both on and off the topic of finance, during the spring of 2021. We also thank Ingvild Rooth for her support.

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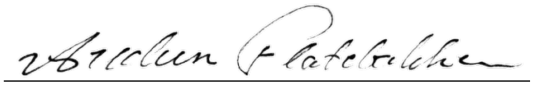

Audun Flatebakken

Erik Mørch Bucher Johannesssen

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# 1. Introduction

Going public is one of the most important hallmarks in a company's life. In recent years, the emergence of Euronext Growth as one of three marketplaces on the Oslo Stock Exchange has facilitated the process of going public with fewer barriers to entry.

The Euronext Growth Oslo marketplace has had an extraordinarily active period in 2020 and the first quarter of 2021. A bulk of young companies in a growth phase, several of them tech companies and many considered to contribute towards a green economy, have listed on the marketplace. The listing process for most companies on the marketplace deviates from those on traditional stock exchanges since they usually do not perform a traditional initial public offering of shares. Instead, many companies have had an initial *private* offering or placement[1], prior to listing. In this thesis, we will study underpricing from a sample of 74 companies that have listed following such an initial private placement on Euronext Growth Oslo since the beginning of the marketplace in 2016, until March 1, 2021.

The phenomenon of underpricing, i.e., when the first day closing price is higher than the subscription price in the preceding offering, is a well-documented phenomenon in the IPO literature. If it is assumed that the issuer could have gotten a higher subscription price, underpricing "leaves money on the table" since the company does not capture all the price potential in its offering. Yet, the phenomenon has been empirically observed over long time periods and across different markets. Underpricing has spurred the interest of researchers resulting in a large emergence of IPO literature that accelerated from the 1980s and 1990s.

Previous literature has shed light on many aspects of IPO underpricing, across different time periods and markets. At the time of writing, however, we are not aware of any existing studies on underpricing of companies listed after private placements. The aim of this thesis is to study underpricing among companies that have listed after conducting an initial private placement. The covid-19 outbreak in February-March 2020 marked a significant change in market conditions, with a subsequent wave of new companies being listed from the second half of 2020. Thus, we test whether the hot market period following the covid outbreak exhibits significantly higher

[1] The terms initial private offering and initial private placement will be used interchangeably in this thesis.

underpricing than the previous cold market period. A sizable portion of the new listings have been in the green and tech sphere. As these are typically young and rely on growth options, they have greater ex-ante uncertainty. Consequently, we test whether the green or tech label is positively related underpricing. Lastly, we study the effect on underpricing from cornerstone investments, in which investors pre-commit to purchase shares in the offering, and thus provide a signal for the quality of the issue to aftermarket investors.

We find an average initial abnormal return of 21.43% in the 2016-2021 period for companies listed after private placements on Euronext Growth. The average 30-day abnormal return over the same period is 32.15% for the sample. This level of underpricing is high compared to previous studies of IPO underpricing in Norway (e.g. Emilsen, Pedersen & Sættem (1997), Fjesme (2011) and Ritter (2021)), which find IPO underpricing to be close to or less than 10%, depending on the time period. We further find that companies labelled as green have significantly higher underpricing, on average having 26.2 percentage points higher initial abnormal returns, controlling for company age and size. We find no evidence of significantly higher or lower underpricing for the hot market after the covid outbreak. We also do not find any evidence that companies labelled tech companies, or issuers using cornerstone investors, are associated with significantly higher or lower underpricing.

# 2. About Euronext Growth

## 2.1 Brief history of Euronext Growth

Euronext Growth was opened in January 2016 as part of the Oslo Stock Exchange, then by the name of Merkur Market. The marketplace changed its name from Merkur Market to Euronext Growth in September 2020, following Euronext's acquisition of Oslo Børs VPS in 2019. It was intended as the marketplace on Oslo Stock Exchange best suited for small and medium sized companies. Fewer and less strict requirements and regulations were meant to attract companies aiming to raise public capital, while lacking the requirements for doing so on the Oslo Stock Exchange's main marketplace.[2]

Since the beginning in 2016 until March 1, 2021, a total of 104 companies have listed[3] on Euronext Growth, while 19 companies have delisted. As of March 1, 2021, 85 companies were listed on the marketplace. Euronext Growth grew slowly in the first years after its opening before it expanded substantially in 2020 with 49 new companies being listed in that year.[4] 2020 marked a green shift on the Oslo Stock Exchange in general with the addition of many renewable energy and cleantech companies, especially on Euronext Growth. As of January 2021, so called green shares represented more than 10% of the total market capitalization on the Oslo Stock Exchange marketplaces (Euronext, 2021).

## 2.2 Requirements for listing

Euronext Growth is a multilateral trading facility and therefore largely falls outside the scope of the Norwegian Securities Trading Act (Abrahamsen & Sveen, 2021). The listing process on Euronext Growth is meant to facilitate an easily obtainable listing on the marketplace. It deviates from the main list's listing process by having less strict requirements.

The rules for listing on a Euronext marketplace are extensive. The exact rules for each marketplace can be found on Euronext's website. The rules for the marketplaces are comprised of three components: i) Rulebook I: Harmonized rules for all Euronext marketplaces, ii) Rulebook II:

[2] Oslo Stock Exchange refers to both the market operator and the main marketplace.
[3] This includes one merger, one conversion of bonds to shares and five temporary listings of shares.
[4] See Euronext's website for an overview of recent listing on Euronext Growth: *https://live.euronext.com/en/ipo-showcase*

Norwegian-specific rules, and iii) Notices: Processing rules and regulations for how the rulebooks shall be used.

After Euronext's acquisition of Oslo Stock Exchange in 2019, the rules were to a large extent harmonized across the three marketplaces in 2020 (Fagervik & Ausland, 2021). There have also been some prior changes since the beginning of the marketplace in 2016. We want to draw attention to the requirements that currently differ between the marketplaces and that we believe are most important for companies' listing decision and potential underpricing effects. Table 1 gives an overview of notable differences in requirements for listing on the three marketplaces on the Oslo Stock Exchange.

**Listing requirements**

| | *Euronext Growth* | *Euronext Expand* | *Oslo Stock Exchange* |
|---|---|---|---|
| **Spread of share ownership** | 15% | 25% | 25% |
| **Number of shareholders** | 30, with at least NOK 5000 holding value at the time of admission. | 100, with at least NOK 10,000 holding value at the time of admission. | 500, with at least NOK 10,000 holding value at the time of admission. |
| **Market capitalization** | No requirement | NOK 8 million | NOK 300 million |
| **Financial history** | At least one financial report, either interim or annual. | At least one financial report, either interim or annual. | At least three years of financial history. Dispensation can be applied for. |
| **Prospectus** | Information document which is less extensive than an EEA compliant prospectus. | Requires EEA compliant prospectus, supervised by the Norwegian Financial Supervisory Authority (Finanstilsynet). | Requires EEA compliant prospectus, supervised by the Norwegian Financial Supervisory Authority (Finanstilsynet). |
| **Financial reporting standard** | IFRS, Norwegian GAAP or other recognized accounting standards. | IFRS | IFRS |
| **Liquidity** | Not necessary to demonstrate sufficient liquidity for 12 months of operations. | Must demonstrate sufficient liquidity for 12 months of operations. | Must demonstrate sufficient liquidity for 12 months of operations. |
| **Financial reporting** | Every half year. Four months publication deadline after the end of the financial period. | Every half year. Three months publication deadline after the end of the financial period. Quarterly reporting is recommended. | Every half year. Three months publication deadline after the end of the financial period. Quarterly reporting is recommended. |

*Table 1: Listing requirements on Norwegian Euronext marketplaces.*

### 2.2.1 Share requirements

One of the most prominent differences between the three marketplaces is the lower requirement for public ownership. At least 15% of the shares need to be spread out among the public on Euronext Growth, while the requirement is 25% on Euronext Expand and Oslo Stock Exchange. For private placements, given Rulebook I rule 3.1.1 and 3.2.1, an issuer on Euronext Growth needs a private placement of at least € 2.5 million during the preceding 12 months prior to the planned listing date.

### 2.2.2 Financial history and reporting

Newly started companies can list on Euronext Growth. The main requirement is currently that companies seeking to be listed have two years of audited consolidated, or pro forma financial reports (Fagervik & Ausland, 2021). However, the stock exchange can provide an exemption for companies with at least one financial report at the time of listing, such that companies can list on Euronext Growth as soon as the first half year report has been written and revised. The requirement of financial history is identical on Euronext Expand, while it is required at least three years of financial history on the main list on the Oslo Stock Exchange.

### 2.2.3 Information document

Prior to listing on Euronext Growth, companies need to submit an information document, or a presentation document, describing the company. The information document is similar to an EEA[5] compliant prospectus, required by companies listing on Euronext Expand and the Oslo Stock Exchange. However, there are less regulations on how the information documentation shall be presented and what the document must contain, compared to an EEA compliant prospectus. The information document must contain certain liability disclaimers, as well as a description of the issuers' business, among many other requirements. The information document is controlled by the issuer's investment bank in charge of the listing. The investment bank advising the issuer needs to be authorized by Euronext as a Euronext Growth Advisor.

## 2.3 Admission to trading and listing process

Companies that fulfill the requirements for listing on Euronext Growth may apply for admission to trading. There are three main ways of admission to the Euronext Growth marketplace. The first option is through an IPO and a subsequent listing. A second option is to go through a private placement, before listing on the marketplace. The final way of admission to trading is to do a direct listing, where there is no prior public offering or private placement prior to listing. The foremost effect of a direct listing is the elimination of the investment banks' role as underwriter.

[5] European Economic Area.

There have been one IPO, 17 direct listings and 79 private placements ahead of listing on Euronext Growth from 2016 until March 1, 2021.[6] We are interested in the subset of private placements for this thesis.

The listing process on Euronext Growth is meant to be swift, with few hurdles. Before initiating the process of admission to trading on the marketplace, the issuer needs to fill in a standard application form, as well as a draft for a presentation document in consultation with the underwriter. The application form must be received by Euronext at least ten trading days before the first day of admission to trading. There also exists a fast-track option for companies that are already listed on a recognized exchange.

The typical listing process on Euronext Growth lasts ten business days (Fagervik & Ausland, 2021). This corresponds to our observed duration between publication of application to listing, and when the company starts trading. The normal duration for a listing process on the Oslo Stock Exchange and Euronext Expand is eight weeks in comparison.

The exact listing process depends on which type of admission the issuer undertakes. For private placements, according to rules set by Euronext, the placement must have been made during the year prior to the scheduled date of first admission. At least three entities, not counting key insiders, must take part in the private placement, unless granted an exemption. The private placement can be conducted either through the issuance of new shares, or via a sale of shares from insiders or large shareholders with a share ownership of more than 20%.

The most common approach taken by companies in our study is to announce a private placement in relation to the announcement about applying for admission to trading on Euronext Growth.

[6] Additionally, there were one merger, one conversion of bonds to shares and five temporary listings of shares.

# 3. Theoretical and empirical framework

This section will cover relevant literature about reasons to go public, IPO pricing and the underpricing phenomenon. We will describe reasons for choosing a private placement instead of a traditional IPO. Relevant theories of short-run IPO performance will also be presented. After thoroughly searching through the underpricing literature, we have not come across research describing the performance or underpricing of initial private placements. However, we argue that the comprehensive literature describing IPO performance to a large extent is applicable to private placements ahead of listing. An initial private placement can be viewed as a simpler form of an IPO, and we argue that the effects and incentives at play in pricing the securities are for the most part identical for both types of offerings.

## 3.1 Reasons for going public

Many reasons have been identified for why companies choose to go public. The textbook story for going public is to provide greater liquidity for the company's shares and better access to capital (Berk & DeMarzo, 2020). After going public, the company has access to capital markets with the possibility to raise funds through equity and bond offerings in the future.

Early academic reasoning for the motivation for going public can be found in the cost of capital literature (e.g., Modigliani & Miller (1963) and Scott (1976)). From the cost of capital argument, the reason for going public can be explained by external additions of capital funding yielding a lower cost of capital for the company, thereby increasing the enterprise value. The *pecking order of financing* is another early theory which highlights the question of raising public capital. Pecking order suggests that the cost of financing increases with information asymmetries, hence companies prefer to raise capital from insiders when there is little or no information asymmetries involved (Meyers & Majluf (1984) and Myers (1984)). Given this viewpoint, the decision of going public is used as a final option of raising capital, after the possibility of raising internal equity and debt has already been fully utilized.

Publicly traded companies further have the option of using publicly traded shares as a payment method in acquisitions. Companies looking for more flexibility to perform acquisitions, especially in consolidating industries, may thus want to go public (Brau, Francis, & Ninon, 2003). This was confirmed as a primary reason for going public in a US survey of 336 CFOs (Brau & Fawcett,

2006). It was in fact the single most important reason for going public, according to the CFOs' answers. Moreover, Brau, & Fawcett (2006) found in their survey of CFOs, that going public was broadly viewed as a strategic reputation building move. This view was especially prominent among high-tech firms.

Another motivation to go public is simply for insiders and entrepreneurs to "cash out" on their stake in the firm (Zingales, 1995). Ang & Brau (2003) find that there are strong incentives for doing so. They describe how insiders employ several strategies to conceal their intentions of selling shares to avoid sending adverse signals to potential investors, since cashing out can send a negative signal about the firm's prospects to outside investors.

An empirical study of Italian companies found that the main factor affecting the probability of an IPO is the market-to-book ratio at which firms in the same industry trade (Pagano, Panetta, & Zingales, 1998). The authors point to two simultaneous explanations: the first being higher investment needs in sectors with high growth opportunities, and the second being companies trying to time the market when comparable companies receive high market valuations. In 2020 and the beginning of 2021, there has been an avalanche of companies entering Euronext Growth. With a highly priced market, low barriers to entry, and a quick listing process on the marketplace, the timing explanation could be the most plausible reason for why so many companies have chosen to list on Euronext Growth recently.

## 3.2 Private placement as an alternative to IPO

The initial public offering (IPO) has been the traditional way of going public for many years, across marketplaces. However, it is the least common way of listing on Euronext Growth. Since the opening of the marketplace, only one company, Teco 2030, has had an IPO process in relation to its listing on Euronext Growth. The remaining companies have had private placements ahead of listing or have been directly listed without any primary or secondary issuance of shares.

An IPO involves the public sale of shares to a large group of dispersed investors. The IPO is carried out with the assistance of an investment bank that acts as an underwriter for the firm and acquires buyers for the firm's equity guaranteeing that all shares will be sold. There are three general types of price setting mechanisms for IPOs: book-building, auctions, and fixed price setting. Book-building is the most common form of price setting, where the investment bank markets the

company to potential investors and sets the offer price after gauging the demand for the stock. Shares are then sold at a fixed price to the public.

On Euronext Growth, a common alternative to an IPO is a private placement prior to listing, sometimes referred to as an *initial private offering*. Private placements involve a private issuance of shares and is a way for the firm to raise capital. Private placements are directed towards pre-determined categories of institutional investors (e.g., insurance companies, banks, investment funds, pension funds), but also high-net-worth individuals. A private placement may be chosen if the issuer wants to avoid the complexities of a public offering. The focus of this thesis is on private placements conducted in relation to the listing of a company's shares on a marketplace, as opposed to private placements after listing, which belong to the realm of seasoned equity offerings (SEOs). Most research on private placements relates to SEOs. Fjesme & Norli (2011) point out that this can be due the fact that there is more available data on publicly listed companies. SEOs and initial private placements are notably different because of the context in which they are conducted. SEOs are a form of capital raising by a public company, while an initial private placement also raises capital, but most importantly it serves as a way of listing. Literature on SEOs is thus deemed less relevant for our thesis.

The process of conducting an initial private placement on Euronext Growth consists of several steps. Firstly, the firm publishes a press release announcing its intention to list on Euronext Growth in addition to a private offering of new and/or existing shares.[7] The firm also notifies the market if so-called cornerstone investors have pre-committed to purchase shares in the placement. In either the existing message, or a new one, the firm lays out the terms for the offering including the number of shares offered, the subscription price, whether a greenshoe option (GSO) is included and the application period[8] with time of opening and close during which professional investors can submit bids for number of shares. A fixed price in advance of the application period is the most common price setting mechanism. Once the application period is over, the firm announces if the offering was successfully completed, the final subscription price and number of shares sold. The firm typically also says whether the private placement was oversubscribed (meaning there were bids for

[7] In some cases, the private placement has already been conducted when the company informs the public about its intention to list on the marketplace.

[8] Some firms call it the bookbuilding period or the subscription period. Either way, they refer to the period when investors can submit bids for the number of shares they want to purchase.

more shares than the company was planning to sell) and to what extent. We find that most of the private placements were oversubscribed, and phrases such as "significantly", "substantially" or "multiple times oversubscribed" is commonly used. Some firms also state how many times the placement was oversubscribed.[9] The information document laying out the firm's history and plans is published in the days following the completion of the private placement.

To our knowledge, there is little literature evaluating the choice between a private and public offering for companies that aim to list on a public marketplace. However, the less stringent set of rules is a likely explanation for why initial private placements are more frequent than initial public offerings on Euronext Growth. Euronext Growth has a minimum shareholder requirement of 30 compared to 500 at the Oslo Stock Exchange, and a minimum share spread of 15% compared to 25% on the OSE. Companies listing on Euronext Growth can satisfy these requirements from a private offering, and do not have to go through the much more complicated and costly process of doing an IPO. It should be noted that many companies that list on Euronext Growth, view it as a steppingstone to list on either Euronext Expand or OSE's main marketplace and are explicit about these ambitions.[10] Nine companies have been transferred to either of these marketplaces since 2016.[11]

## 3.3 The underpricing phenomenon

Underpricing is the phenomenon when the subscription price is given at a discount compared to the realized market price after the security has started trading. The most common way of measuring underpricing is the initial return, which measures the return from the subscription price to the closing price at the first day of trading.

Underpricing can be seen as an indirect cost to the firm and other shareholders that sell their shares in the IPO, or initial private placement, since they are "leaving money on the table". The amount lost by the issuing firm can be calculated as the difference between the first day closing price and the offer price, multiplied with the number of shares issued, if it is assumed that the company could

[9] The private placement of videoconferencing company Huddly was oversubscribed more than 15 times excluding cornerstone investors.
[10] As an example, Aker Horizons, a holding company for renewable investments, expressed this ambition when it listed on Euronext Growth in January 2021.
[11] In 2017: Fjord1 and Songa Bulk. In 2018: MPC Containerships. In 2019: Okeanis Eco Tankers and Seabird Exploration. In 2020: Atlantic Sapphire and Bewi.

have obtained the first day closing price as its offer price. The cost of underpricing was estimated at $27 billion for companies going public in the United States in the years 1990 to 1998 (Loughran & Ritter, 2002).

The occurrence of underpricing was first documented by Reilly & Hatfield (1969). The phenomenon has since been extensively researched, especially since the 1980s and 1990s, and it is perhaps the most studied in the IPO literature. Reilly & Hatfield based their study on 53 American stock issues in the period 1963-1966 and found a short-term (the Friday following the offering) average underpricing of 9.9% compared to an average market return of 0.3%. Loughran & Ritter (2004) have shown that underpricing varies over time. Average initial returns in the US doubled from 7% during 1980-1989 to around 15% during 1990-1998, and then jumped up to 65% during the dotcom bubble in the short period of 1999-2000 and then down to 12% in the next three years. In general, Ritter has found that the average initial return of offerings during "hot issue" markets are significantly higher than during "cold issue" periods. The former is defined as periods in which the average first month performance of new issues is abnormally high (Ibbotson & Jaffe, 1975).

While underpricing varies over time, it also varies greatly between countries, as documented by Loughran, Ritter, & Rydqvist (1994). They put together findings from several studies conducted in 25 different countries and find evidence of short-run underpricing in all of them, from 4.2% in France to 80.3% in Malaysia. These findings have since been updated by Jay Ritter, who currently maintains a website with data on IPOs worldwide. A selection of the most recent compilation from Ritter's database is displayed in Table 2. Ritter has shown that underpricing varies greatly between different industries: in 2020, the average underpricing for US companies was 41.6% in general and 63.7% for tech companies specifically (Ritter, 2021).

| Country | Source | Sample size | Period | Avg. initial return |
|---|---|---|---|---|
| Argentina | Eijgenhuijsen & van der Valk; Dealogic | 30 | 1991-2018 | 5.70% |
| Australia | Lee, Taylor & Walter; Woo; Pham; Dealic | 2 069 | 1976-2018 | 19.80% |
| Austria | Aussenegg; Dealogic | 106 | 1971-2018 | 6.20% |
| | Ushisima; Dealogic | | | |
| Canada | Jog & Riding; Jog & Srivastava; | 758 | 1971-2017 | 6.40% |
| | Kryzanowski, Lazrak & Rakita; Ritter | | | |
| Chile | Aggarwal, Leal & Hernandez; | 88 | 1982-2019 | 6.80% |
| | Celis & Maturana; Dealogic | | | |
| Denmark | Jakobsen & Sorensen; Ritter | 173 | 1984-2017 | 7.40% |
| Germany | Ljungqvist; Rocholl;Vismara; Dealogic | 840 | 1978-2020 | 21.80% |
| India | Marisetty and Subrahmanyam; Dealogic | 3 202 | 1990-2020 | 84.00% |
| | Seth using Chittorgarh.com | | | |
| Italy | Arosio, Giudici & Paleari; | 413 | 1985-2018 | 13.10% |
| | Cassia, Paleari & Redondi; Vismara; Dealogic | | | |
| Japan | Fukuda; Dawson & Hiraki; Hebner & | 3 849 | 1970-2020 | 48.80% |
| | Hiraki; Pettway & Kaneko; Hamao, Packer, | | | |
| | & Ritter; Kaneko & Pettway; Kaneko; Dealogic | | | |
| Norway | Emilsen, Pedersen & Saettem; Liden; Dealogic; Fjesme | 266 | 1984-2018 | 6.70% |
| Sweden | Rydqvist; Schuster; de Ridder | 405 | 1980-2015 | 25.90% |
| United Kingdom | Dimson; Vismara; Levis; Doukas & Hoque | 5 185 | 1959-2016 | 15.80% |
| United States | Ibbotson, Sindelar & Ritter; Ritter | 13 409 | 1960-2020 | 17.20% |

*Table 2: Equally weighted initial returns in different countries and time periods.*[12]

### 3.3.1 Underpricing in the Norwegian market

The level of underpricing in Norway, seen in Table 3, covers the period 1984-2018 and is partly based on findings from Emilsen, Pedersen, & Sættem (1997). The authors studied the Norwegian market in the period 1984-1996 and found an average underpricing of 12.5%. In a working paper by Fjesme (2011), the initial return for 1993-2007 is estimated at 8%. From these findings we can infer that the level of underpricing has been going down over the years, which is also seen in other countries. Ritter (2021) has compiled data from different studies and time periods and finds the average underpricing in the Norwegian market to be 6.7% from 1984 to 2018, shown in Table 3.

[12] The statistics was first compiled by Loughran, Ritter and Rydqvist (1994) and since been updated over time by Ritter (2021). Found at: *https://site.warrington.ufl.edu/ritter/files/International.pdf*

| Authors | Time period | Average underpricing |
|---|---|---|
| Emilsen, Pedersen, & Sættem (1997) | 1984-1996 | 12.5% |
| Fjesme (2011) | 1993-2007 | 8% |
| Banerjee, Dai, & Shrestha (2011) | 2000-2006 | 4.33% |
| Ritter (2021) | 1984-2018 | 6.7% |

*Table 3: Prior research on short-run IPO performance in the Norwegian market.*

It should be noted that the mean values of underpricing are almost always higher than median values. The reason is that a few IPOs have extreme levels of underpricing, which increases the mean of the sample. The Oslo Stock Exchange still exhibits a very low degree of underpricing relative to markets in other countries. The theory of asymmetric information influencing underpricing of IPOs have been argued to also hold up on a country-level (Banerjee, Dai, & Shrestha, 2011). Countries with higher levels of information asymmetry between company insiders and outsiders experience higher levels of underpricing.

## 3.4 Theories of short-run IPO performance

As there have been limited research on the short-run performance of initial private placements, the following section will explore theories of short-run IPO performance that are conjunctly relevant to explain the performance of initial private offerings.

Ljungqvist (2007) reviews the principal theories that have been proposed to explain IPO underpricing and related empirical evidence. He divides theories of underpricing into four main categories: asymmetric information, institutional explanations, control theories, and behavioral explanations. There is a large body of evidence that suggests that information asymmetries have a first-order effect on underpricing (Ljungqvist, 2007). However, the different theories of short-run IPO performance are not mutually exclusive, and can thus all be part of explaining underpricing, and they have all been well covered in the literature. Given the large body of research in this domain, we will only briefly touch on the latter theories.

### 3.4.1 Asymmetric information

Models of asymmetric information have been recognized as the most established of the four broad explanations mentioned above. According to Ljungqvist (2007), there is substantial evidence that

information frictions, including conflicts of interest between the issuing company and the investment bank, have a primary effect on underpricing.

The key parties in an IPO transaction are the issuing firm, the underwriter (investment bank) and the investors. Asymmetric information involves some of these parties having more or superior information compared to the others. For example, the underwriter can be better informed about the demand for the issue relative to the issuer itself. On the other hand, the issuer can be better informed about the true value of the company compared to outside investors. Lastly, outside investors can hold different levels of information, which can lead to the so-called winner's curse problem.

### *Winner's curse*

Perhaps the most well-known model of asymmetric information for explaining underpricing is the winner's curse theory first proposed by Rock (1986). Rock assumes that some investors are better informed than others about factors affecting the value of the issuing firm, and as such can avoid participating in overvalued IPOs.

Rock's model can be viewed as an application of Akerlof's (1970) lemons problem. Rock (1986) distinguishes between investors who are informed about the true underlying value of the shares on offer, and others who are not. Informed investors only participate in IPOs that are deemed to be attractively priced, while uninformed investors, on the other hand, will bid indiscriminately. This leads to the winner's curse for the uninformed investors: in unattractive offerings they receive all shares they have bid for, while in attractive offerings they receive less as shares are rationed due to also informed investors participating. Rock's model assumes that none of the groups have sufficient demand to subscribe the entirety of the offering alone. Uninformed investors will thus demand a discount on the subscription price in the IPO to be willing to participate in the offering.

Ljungqvist (2007) argues that the implication of the winner's curse model is that uninformed investors will on average only receive the risk-free rate, which is just enough to keep them participating in the market. Furthermore, he points out that it is difficult to test empirically which investors are informed and which are not. A traditional and simplified view has been that institutional investors are more informed than retail investors. There is, however, conflicting evidence on whether institutional investors receive larger allocations in underpriced issues relative to retail investors. Aggarwal, Prabhala, & Puri (2002) find evidence of the latter in U.S. offerings.

There are further empirical problems with Rock's original winner's curse model. For example, underpricing is shown to be positively related to market returns prior to the IPO. This finding seems to suggest that IPO pricing is only partially adjusted to public information (see Logue (1973) and Hanley (1993)). In Rock's original model, the informed investors are all perfectly informed about the value of the issue while the rest is uninformed, and the partial adjustment phenomenon cannot be explained. To tackle such confounds, there have been further elaborations on Rock's (1986) winner's curse model. For example, Leite (2007) generalizes the assumptions of Rock's model and shows that the assumptions are consistent with the partial adjustment phenomenon. Leite (2007) constructs a model where investors are not either perfectly informed about the underlying value or uninformed, but rather hold information of variable precision. In addition to each investor's private signal, Leite (2007) models a public signal that is either favorable or unfavorable and can vary in precision across issues. Each investor rationally forms an estimate based on both his own and the public signal for the allotment of shares and the aftermarket value of the issue. Leite finds that with such a setup, the generalized assumptions of the winner's curse model can be consistent with seeming empirical confounds, such as the partial adjustment phenomenon.

### *Information revelation from bookbuilding*

One of the main roles of investments banks prior to issuing shares is to elicit investor demand from bookbuilding. In the bookbuilding phase, the investment bank probes potential investors' demand for the issue at hand, as input to set the price of the issue. In the scenario that the investment bank perfectly captures the willingness to pay from all investors, information asymmetries should not contribute to underpricing since the price is set correctly to capture the demand of both well- and underinformed investors. The problem for the underwriter, however, is that in the absence of inducements, investors have no reason to reveal their true willingness to pay (Ljungqvist, 2007). The well-informed investors' incentive is rather to downplay their interest in the security with the aim to reduce the underwriter's perceived investor demand, so that the issue is set at a lower price.

Benveniste & Spindt (1989) set up an argument where the underwriters have methods to elicit more truthful information about investors' demand from the bookbuilding, such that the resulting underpricing is reduced. Benveniste and Spindt show that the investment bank can reduce underpricing by selling issued shares repeatedly to the same group of investors. The underwriter can then use their discretion to exclude investors who tend not to reveal their true preferences in

the bookbuilding process, making it less attractive to downplay demand over the long term, and conversely reward investors who give truthful signals. By allotting more shares to investors who bid aggressively, the underwriter mitigates investors' incentive to misrepresent positive information. The methods Benveniste and Spindt present to reduce underpricing still requires some degree of underpricing for the truth telling incentives to be intact, such that bookbuilding can only reduce underpricing from investor information asymmetries given their argument.

### *Connecting and elaborating the winner's curse and bookbuilding arguments*

Leite (2006) synthesizes Rock's (1986) winner's curse theory and Benveniste & Spindt's (1989) bookbuilding arguments. Leite shows that in a setting with different investor information precision, investors' bids fully reveal their information. He models that well-informed investors get more profitable allocations compared to uninformed investors, as they submit more informative bids, consistent with the bookbuilding argument. Moreover, Leite (2006) shows that underpricing still can remain as compensation to less-informed investors for participating in a disproportionally large share of overpriced issues, like Rock (1986) described, opposed to being a reward for well-informed investors giving up valuable information. That is, underpricing may still occur if the investment bank perfectly captures the investor demand in the bookbuilding phase.

### *Principal-agent theory*

Investment banks serve an important role in IPOs, handling the bookbuilding and marketing of the issue on behalf of the issuing firm. Loughran & Ritter (2002) highlight the potential for agency problems and misalignments of incentives between the underwriter and the issuer of the IPO. Outside investors benefit from being allocated underpriced shares and may therefore have an incentive to compete for such allocations by offering hidden side-payments to the underwriter (Loughran & Ritter, 2002). Additionally, investment bankers have an incentive to engage in spinning: allocating underpriced shares to executives of other companies with the aim to attract them as clients in the future. As underwriting fees are a function of IPO proceeds, typically in the form of a given percentage fee, one might think that investment banks would want to minimize underpricing. However, the loss of lower underwriting fees can be countered by the bank's private benefits of underpricing, if large enough (Ljungqvist, 2007).

*Signaling theory*

A third group of asymmetric information models suggest that firms use underpricing to signal firm quality. The argument goes that if the managers possess more information about the true value of the firm, they can use underpricing to signal that the firm's prospects are particularly good. It rests on the assumption that investors believe only the most promising firms have the luxury to do so. Firms issue underpriced shares "to leave a good taste in investors' mouth", which may allow them to sell equity on better terms at a later stage (Ibbotson, 1975, p. 264).

Ljungqvist (2007) points out that firms also have other signals to choose from, such as picking reputable underwriters, auditors, or venture capitalists. He questions whether the issuer would really choose the underpricing signal given other alternatives. Signaling theory largely does not hold up when faced with empirical testing. Speiss & Pettway (1997) for example, find no difference in insider selling at the time of the IPO between more or less underpriced firms. In contrast to what signaling theory would predict, insiders do not seem to wait with realizing the benefit of their underpricing signal by delaying selling personally held shares.

### 3.4.2 Institutional explanations

Within the institutional framework, the legal liability hypothesis is perhaps the most notable. It suggests that underpricing is used to the reduce the likelihood of lawsuits from investors, with lawsuits being less likely to happen when investors see their share value appreciate. Early theories of investment bankers' underpricing for making favor with investors and mitigating risks, go back to at least Logue (1973) and Ibbotson (1975). Tiniç (1988) argues that deliberate underpricing serves as a form of insurance against legal liability. Lowry & Susan (2002) found that 5.8% of the 1,841 U.S. firms that had an IPO in the period between 1988 and 1995 were sued relating to the IPO. On average, settlement costs equaled 10% of proceeds raised, or 13% excluding dismissed cases. One should keep in mind that the legal liability hypothesis literature is strongly U.S. based, and it is naturally less applicable in markets with lower liability risks.

Tax issues (see Ruud (1993)) and price stabilization measures (see Rydqvist (1997)) have also been proposed as alternative institutional explanations for underpricing.

### 3.4.3 Ownership and corporate control

Going public is often associated with the separation between ownership and control since the managers running the firm see their equity stakes drastically reduced as outside investors are invited in as shareholders. The incentives of the managers may change as a result of this dilution.

Brennan & Frank (1997) argue that underpricing, through the creation of excess demand, gives managers an opportunity to ration investors by reducing the block size of new shareholdings. Large stakes imply higher levels of external monitoring. Managers who want to retain private benefits of control will therefore prefer many small stakes that involve less monitoring. Brennan and Frank (1997) find that in the seven years following an IPO, managers sell very few shares, while other insiders are virtually eliminated. This is taken as evidence that managers are able to retain control and avoid external monitoring. Stoughton & Zechner (1997) take a completely different approach and suggest that underpricing may be used to minimize agency costs by encouraging monitoring. To the extent that managers own stakes in the firm, they themselves bear the costs of non-profit-maximizing behavior. It can be argued that managers who own large bulks of shares should therefore seek to reduce these costs. Managers can use underpricing to allocate a large stake to an investor to encourage better monitoring.

### 3.4.4 Behavioral explanations

Behavioral theories aim to describe underpricing as the result of the presence of either irrational investors, or issuers suffering from behavioral biases, leading them to not put sufficient pressure on underwriters to reduce underpricing (Ljungqvist, 2007).

Behavioral biases have become a popular explanation for different asset-pricing phenomena which are hard to reconcile with rational decision making. Ritter & Welch (2002) propose that overenthusiasm among retail investors may explain the high first day returns often observed among IPOs and subsequent weak long-run returns. However, as Cornelli et al. (2006) point out, the difficulty of identifying the demand curves of different investor groups makes it hard to test this theory. They study European IPOs completed in 1995-2002, and by using prices from the grey market (pre-IPO market) as proxy for small investors' valuations, they find that high grey market prices, which indicates overoptimism, serve as a strong predictor of initial day prices. Conversely, low grey market prices, which indicates excessive pessimism, are not. Cornelli et al. conclude that

small investors are irrational in that they overweight their information causing IPOs to trade 40.5% higher, on average, than in the absence of sentiment demand. It is further argued that even in countries where such grey markets do not exist, overoptimism among sentiment investors will generate short-run price patterns. Ljungqvist, Nanda, & Singh (2006) argue that underpricing may be due to "exuberant investors" leading to long-run underperformance. Ofek & Richardson (2003) show that during the internet bubble in the US, high initial returns occurred when institutions sold IPO shares to over optimistic retail investors on the first day of trading in the presence of short-sale restrictions.

Another notable behavioral theory is related to information cascades, which occur when people make the same decision sequentially. Welch (1992) showed that information cascades can develop in IPO settings if shares are sold sequentially in the offering process. In Welch's model, the value of the issued security is uncertain for any individual investor holding private information. However, when aggregated, the individual investors hold perfect information. If this assumption holds water, the buying decision of other investors will affect the buying decision of any investor. High initial sales indicate that the other investors have favorable information on the issued share, while low initial demand conversely indicate that other investors have negative information on the issued share. Welch thus argues that given the initial performance of an offering, the sale will either remain low because of low initial interest or accelerate if investors are affected by strong initial demand. In such a scenario, where the initial performance of an offering is critical for the following performance, underpricing can be a rational strategy to secure a good initial performance. If the issued shares are not priced at a discount, the issuer runs the risk of having a low initial interest.

Another behavioral theory is prospect theory, which point to behavioral biases on the part of the issuers. Loughran & Ritter (2002) utilize Kahneman & Tversky's (1979) prospect theory and argue that issuing firms' perceived loss of leaving money on table is not that great, since the loss is netted against the much greater value gain of the retained shares' market price jump in the case of an underpriced issue.

## 3.5 Factors influencing short-run IPO performance

Several characteristics both on the firm and deal level have been shown to be related to underpricing. This section will cover the characteristics that are most relevant to our thesis, namely

the classification of the firm as either a green company or a tech firm and the significance of cornerstone investments in IPO deals. Lastly, IPO market cycles will be considered.

### 3.5.1 Green and tech firms

Green and tech firms are considered to have several similarities being young, often in a growth phase and having uncertain future earnings. Lowry et al. (2010) write that greater pricing errors, which can be measured as higher volatility of initial returns, is to be expected when highly uncertain firms constitute a larger fraction of the sample of firms going public. This follows from asymmetric information theories, presented earlier. Building on the work of Rock (1986), Beatty & Ritter (1986) predict that companies characterized by greater ex ante uncertainty, meaning that the true value of the issue is uncertain, tend to be more underpriced on average and point to the winner's curse problem being intensified by greater uncertainty. Other researchers also posit that underpricing follows from the difficulty of valuing private companies with uncertain prospects (see Benvinste & Spindt (1989) and Welch (1992). Lowry et al. (2010) find that when the types of firms going public are especially difficult to value[13] both the mean and the variability of initial returns are relatively high. For example, tech firms are considered difficult to value because they depend so much on growth opportunities.

The performance of tech stocks sparked the interest of researchers during the dotcom bubble in 1999 and 2000 when IPO underpricing reached astronomical levels.[14] Michael & Denis (2004) find that technology firms have greater underpricing after controlling for other determinants in their sample of IPOs between 1993 and 2000. Evidence of higher underpricing among tech firms is supported by Walker et al. (2015), who study the relationship between litigation risk and underpricing for IPOs filed in the US between 1996 and 2008. Similar to Lowry et al., they find that tech firms have significantly higher underpricing than non-tech firms and attribute this to greater ex ante uncertainty.

We suggest that that the difficulty associated with valuing tech stock can also be extended to so-called green companies, since both groups typically consist of young companies depending on

[13] For example because the firms are young, small, or tech-oriented.
[14] See the discussion in section 3.5.3 IPO Market Cycles.

future growth options.[15] There is relatively little research on the IPO performance of green companies, given their relative recent emergence. Anderloni & Tanda (2017) are the first to analyze underpricing and stock performance of green energy companies, characterized as companies that produce and distribute alternative energy, using a sample of energy IPOs in the European market between 2000 and 2014. They find that green companies have significantly lower underpricing than non-green companies. However, when controlling for other firm and market specific factors, the difference disappears, and the green dummy does not take on a significant value. According to Anderloni & Tanda, their results show that the market is apparently not able to differentiate between green and non-green companies.

### 3.5.2 Cornerstone investors

In recent years, a new phenomenon known as cornerstone investors has become prevalent in European IPO markets. McNaughton & Cole (2015) define a cornerstone investment as an agreement between the investor, usually a large institutional or sovereign investor, and the issuer that the investor will subscribe for a fixed monetary amount of shares in the IPO. The investment typically comes with a lock-up period preventing the investor from selling its shares in a given period after the IPO. From the investor's perspective, a cornerstone investment guarantees a certain share allocation in the issue, while for the issuer it increases the chance of the IPO being fully subscribed, as it reduces the number of shares to be sold in the bookbuilding process. McNaughton & Cole (2015) argue that the presence of cornerstone investors can help drive market momentum for the issue by providing a level of endorsement for the IPO. McGuinness (2012) studies the IPO market in Hong Kong and finds that issues with cornerstone agreements have significantly higher underpricing than issues without such agreements. This finding provides evidence that cornerstone agreements stir up subscription interest, but the possibility exists that "underpricing itself draws-in cornerstone investment", according to McGuinness (2012, p. 1542). Furthermore, recent master theses[16] have found cornerstone backed IPOs in Scandinavia to have higher levels of underpricing than IPOs without cornerstone involvement.

[15] Later in this thesis, we define green companies as those whose main described activities are targeted towards directly reducing pollution, greenhouse gases, creating or facilitating renewable energy production.
[16] Grepp & Sørensen (2017) and Engman & Pehrson (2017).

### 3.5.3 IPO Market Cycles

The IPO literature has found that cycles exist both in the volume and the average initial returns of IPOs. The notion of "hot issue" markets has been a topic in finance since the 1960s and was first academically studied[17] by Ibbotson & Jaffe (1975). A hot issue market refers to periods with unusually high underpricing. Ritter (1984) in his study of the 1980 hot issue market in the US, hypothesizes that these market period returns can be explained by changing risk compositions, meaning that hot issue periods are characterized by riskier issues resulting in higher underpricing. However, Ritter (1984) finds that changing risk composition alone cannot explain the unusually high average returns in 1980. He instead argues that the effect can be attributed to a single industry for that particular year: oil and gas stocks. Lowry et al. (2010) find that hot markets are also characterized by large volatility of returns, and that there is a strong positive correlation between the mean and volatility of initial returns over time.

Ibbotson & Ritter (1995) propose 'positive feedback' strategies as another possible explanation for hot issue markets, in which investors assume positive autocorrelation in the first-day returns of IPOs. Investors can be willing to bid up the price of a new issue if other recent issues have risen in price. If enough investors follow this strategy, the result may be the positive autocorrelation of initial returns they assumed. Additionally, the difficulty of taking a short position in a new issue immediately after the offering, when few shares are available for short sale, may prevent other investors from making money at the expense of positive feedback traders (Ibbotson & Ritter, 1995)

Among the most well-known hot issue markets in recent history is the dotcom bubble of 1999 and 2000. In a sample of 2,178 US IPOs completed from 1996 to 2000, Ljungqvist & Wilhelm (2003) find initial day average returns to have been 73% in 1999, and 58% in 2000 for all companies. Internet IPOs had an average initial return of 89% in 1999 and 2000. Ljungqvist & Wilhelm (2003) find that the most important underpricing drivers were firm characteristics during this period. More specifically, they found that pre-IPO ownership structure and insider selling behavior changed during the dotcom period, which reduced incentives to control underpricing for decision makers. Unlu et al. (2004) take the study of the dotcom bubble to the UK and find higher levels of underpricing for technology IPOs relative to others, but the differences are not statistically

[17] Hot issue markets were covered extensively in the financial press from the 1960s. The U.S. Securities and Exchange Commission (1963) made the first well-known investigation of the hot issue phenomenon in the *Report on the Special Study of Security Markets.*

significant. This suggests that the magnitude and the effect of the dotcom bubble was larger in the US than elsewhere.

Helwege & Liang (2004) define hot and cold markets based on the total number of IPOs completed per month in their study of non-financial firms going public in the US between 1975 and 2000. They find that periods of high IPO volume include more firms from the same industries that also appear in cold markets, pointing out that the share of internet-related IPOs during the 1990s was about the same for hot and cold markets. The authors also consider hot and cold IPOs as defined by initial returns, and find that high underpricing IPOs are younger, raise more funds, and invest more. It is suggested that the presence of hot markets reflect greater investor optimism and is not driven by changes in adverse selection costs, managerial opportunism, or technological innovation.

Loughran et al. (1994) show that the volume of IPOs in the U.S. and other countries tend to be high following periods of high stock markets returns. This general finding is complemented by Lowry & Schwert (2002), who find a significant positive relation between initial returns and future IPO volume. More companies go public after observing IPOs being underpriced by the greatest amount, however the level of initial returns at the time of filing contains no information about the company's eventual underpricing.

## 3.6 Hypotheses of underpricing on Euronext Growth

Given the theoretical and empirical framework presented above, we have established four hypotheses we want to explore with regards to underpricing of initial private placements on Euronext Growth.

*Hypothesis 1: Private placements post covid outbreak are associated with higher levels of underpricing than private placements before the covid outbreak.*

The covid-19 outbreak in March 2020 marked a transition from a cold to a hot market for listings on Euronext Growth. Stock markets in general have exhibited strong sentiment since stocks rebounded after the initial slump in mid-March, and there have been a record number of listings on the Euronext Growth marketplace from June 2020 and onwards. According to the definition of hot and cold markets presented above, we define the post covid outbreak period as a hot market and the pre covid period as a cold market. In line with the literature, we hypothesize that the hot market will have a higher level of underpricing than the preceding cold market.

*Hypothesis 2: Private placements of green companies are positively related to underpricing*

2020 and the beginning of 2021 has seen a wave of new companies listed on Euronext Growth that present themselves as environmentally friendly and sustainable companies. This is sometimes called the "green wave" or the "green shift" in the media. These companies are typically young, with a limited track record and depend largely on growth options. Contrary to the limited literature on green energy companies, we expect there to be higher underpricing due to greater ex-ante uncertainty of such firms, making it more difficult for underwriters to value them. Furthermore, we also expect higher underpricing as a result of strong investor sentiment for the green sector the last years.

*Hypothesis 3: Private placements of tech companies are positively related to underpricing*

In addition to the green wave on Euronext Growth, several technology companies have been listed on the marketplace. We hypothesize that tech companies will have more underpricing for the same reason as green companies, due to greater ex ante uncertainty and investor sentiment. In 2020, technology stocks saw a large surge in value evidenced by the technology heavy Nasdaq Composite

Index, which registered its largest gain since 2009 with an increase of 43.6%.[18] We suspect that this strong investor sentiment also was present for Norwegian technology offers.

*Hypothesis 4: Initial private placements including cornerstone investors are positively related to underpricing*

Many of the recent initial private placements on Euronext Growth have included cornerstone investors. Based on the theoretical review of cornerstone agreements, we hypothesize that the presence of cornerstone investors in initial private placements is associated with higher underpricing.

## 3.7 Long-run IPO performance

Since we are studying the performance of initial private placements on Euronext Growth, where most companies have only been recently listed, we are only able to look into the short- to medium-term performance for most of the companies in our dataset. Studying long-term performance (>1 year) is thus not of primary interest for this thesis. Over a long-term period, IPOs have been found to underperform comparable firms. Ritter (1991) studied 1,526 US IPOs in the period 1975-1984 and found that issuing firms consistently underperformed matching firms by size and industry three years after going public. There has also been subsequent literature on the matter of long-term performance, however, the proper interpretation of the poor long-run return of shares following an IPO remains unclear (Eckbo, Masulis, & Norli, 2007). Thus, we do not consider it to be a considerable shortcoming to only focus on the shorter-term performance of initial private placements.

[18] Information found from Marketwatch: *https://www.marketwatch.com/story/dow-sp-500-close-out-historic-2020-at-records-nasdaq-composite-clinches-best-annual-return-in-11-years-2020-12-31*

# 4. Data

So far, we have presented background and details about the Euronext Growth marketplace, the process and requirements related to listing, in addition to a theoretical and empirical framework on private placements and underpricing of IPOs. We have also presented our hypotheses for the thesis. We will now proceed with presenting and describing the data that will be used for analyzing underpricing on Euronext Growth.

## 4.1 Choice of the Euronext Growth Oslo marketplace

The year 2020 and the beginning of 2021 has been a remarkable active period on the Euronext Growth Oslo marketplace. During a short timeframe there has been many private placements with subsequent listings. This makes it possible to study the price performance of private placements and listings for many companies in a similar market condition. The avalanche of listings on Euronext Growth in 2020 has gotten much public and media attention, describing how new growth companies get access to abundant supplies of capital. To our knowledge there has been no study of the short-term performance prior to listing of new issues on the marketplace. With the uniqueness of the number of private placements, the novelty of the dataset, and the relevancy of the topic, we find it very interesting to study the price performance of recent private placements and listings on Euronext Growth.

### 4.1.1 Data collection

The collected data is all gathered from publicly available sources. Data for listing time and industry classification is gathered from Euronext's webpage. To find other company specific information for each private placement prior to listing, we have used the prospectus or information document of each company in our sample. We have also collected information from mandatory stock exchange announcements relating to the private placements on the Oslo Børs' Newsweb webpage and other press releases from the companies.

For price data, we have gathered information from Euronext Live Markets, Bloomberg and Infront. The subscription prices have been converted to NOK by using exchange rates for the relevant date gathered from the Central Bank of Norway's (Norges Bank) webpage if given in a different currency. We encountered a minor data conversion problem as some companies have had share

splits since the listing date, thus the share price is not comparable to the offer price of the private placement. To adjust for the effects of share splits, we have calculated an adjusted offer price that is comparable to the available price data following the share split when needed.

### 4.1.2 Determining the private placement sample

To determine our private placement sample, we first obtained a list of all listing changes on Euronext Growth from 2016 to the last update, which was November 6, 2020.[19] We expanded this list to include all listings until March 1, 2021.[20] The list of new issues was matched with press releases and information documents from the Newsweb database to narrow the sample down to only private placements in conjunction with listing and no other types of listings. We thus excluded any initial public offering and direct listings where no new shares were issued, as well as issues that involved temporary listings of shares of companies that were already listed on Euronext Growth or other marketplaces. An overview of all types of listings on Euronext Growth since the opening of the marketplace until March 1, 2021 is shown in Table 4.

**All listings on Euronext Growth from 2016 to March 1st 2021**

| *Type of listing* | *Entries* |
|---|---|
| Initial private placements | 79 |
| Initial public offering | 1 |
| Conversion of bonds to shares | 1 |
| Direct listing | 17 |
| Merger | 1 |
| Temporary listing of shares | 5 |
| *Total number of listings* | *104* |

*Table 4: Type of listings and number of entries on Euronext Growth Oslo from 2016 until March 1, 2021.*

To be eligible to list through a private placement on Euronext Growth, the private placement must have been completed during the year prior to the listing, according to Euronext's own rules. Since we are interested in studying the price development from the private placement issue price and the listing price, using Euronext's criteria of 12 months is quite long. If the private placement occurred close to a year prior to the listing, the analysis of the price development from the placement to the

[19] The raw list of listing changes was obtained from the old Oslo Børs website: *https://www.oslobors.no/Oslo-Boers/Statistikk*
[20] New listings on Euronext Growth are found at: *https://live.euronext.com/en/ipo-showcase*

listing will be severely affected by company-specific events in the interim period. Thus, for our sample, we will only consider private placements that were completed a maximum of six months prior to the day of admission to trading, similar to the approach of Fjesme & Norli (2011). For most companies, this is not an issue since the private placement is usually completed a few days or weeks prior to listing. The shortest duration between the subscription and listing in the final sample was one day, while the longest was 177 days, counting non-working days. The mean number of days between private placement[21] and listing in our dataset is 18.5. The mean number is skewed by a few observations with a longer period between placement and listing, such that the median of 10 days is more representative for most companies.

Among the remaining initial private placements, we excluded a few companies before we arrived at our final sample, shown in Table 5. Two companies were already listed on a different stock exchange at the time of listing on Euronext Growth, which meant the companies were already priced in the market. For one company, we were not able to find the subscription price in the private placement ahead of listing. Two other companies were excluded due to missing price data after the listing. The final sample consisted of 74 private placements.

| **Final sample of initial private placements** | |
|---|---|
| Initial private placements | 79 |
| Excluded: Already listed on different stock exchange (Zenith Energy & Envipco Holding) | 2 |
| Excluded: No subscription price given (Lavo.tv)[22] | 1 |
| Excluded: Missing price information (Brabank, TargetEveryOne) | 2 |
| *Final sample of initial private placements* | *74* |

*Table 5: Final sample of initial private placements from 2016 until March 1, 2021.*

Among the companies in the final sample, there were three companies[23] that we could not find closing prices for at the listing day. They all had very low trading volumes in the period after listing, including days with zero trades. We decided to keep them in the sample, since the closing price of the day after listing was available. We used the close prices of the day after listing as proxies for

[21] The private placement date was determined using preferably the last day of the subscription period, when available, or the announcement of the completion of the private placement.
[22] Lavo.tv did not indicate private placement size or subscription price in its admission document dated June 18, 2018.
[23] These were Gentian Diagnostics, Sunndal Sparebank and J.P. Kenny Petroleum.

the initial day. Prices were relatively stable in the period after listing for these companies, thus we argue that using second day closing prices is not likely to skew the results notably.

### 4.1.3 Sample statistics

Table 6 shows descriptive statistics for the final sample including company age, company valuation, placement size, and time between the placement and the listing.

**Descriptive statistics on the sample**

| | *Mean* | *Median* | *Std dev* | *Min* | *Max* |
|---|---|---|---|---|---|
| *Full period (74 obs.)* | | | | | |
| Company age at listing (years) | 15.69 | 4.98 | 36.90 | 0.08 | 176.26 |
| Valuation at listing (NOK million)* | 1,770 | 931 | 2,952 | 38 | 19,911 |
| Size of private placement (NOK million)** | 486 | 295 | 673 | 3 | 4,160 |
| Duration between placement and listing (days) | 18.5 | 9.5 | 29.2 | 1.0 | 177.0 |
| *Post covid outbreak (56 obs.)* | | | | | |
| Company age at listing (years) | 6.50 | 4.98 | 6.87 | 0.08 | 31.50 |
| Valuation at listing (NOK million)* | 2,091 | 1,097 | 3,296 | 206 | 19,911 |
| Size of private placement (NOK million)** | 581 | 425 | 737 | 6 | 4,160 |
| Duration between placement and listing (days) | 11.8 | 8.0 | 17.6 | 1.0 | 134.0 |
| *Pre covid outbreak (18 obs.)* | | | | | |
| Company age at listing (years) | 44.28 | 6.38 | 67.47 | 0.26 | 176.26 |
| Valuation at listing (NOK million)* | 773 | 332 | 935 | 38 | 3,040 |
| Size of private placement (NOK million)** | 191 | 88 | 253 | 3 | 833 |
| Duration between placement and listing (days) | 39.2 | 21.5 | 45.3 | 3.0 | 177.0 |

Notes:

*Calculated as subscription price multiplied by total number of shares at listing

**The calculation includes both primary and secondary offerings of shares

*Table 6: Descriptive statistics on the final sample.*

The company age is measured as the time between incorporation and listing, measured in years with one decimal. We used a measure for valuation at listing where the subscription price was multiplied with the total number of shares following the placement, similar to market capitalization. The private placement size is the number of issued shares in the private placement multiplied by the subscription price. The duration between the placement and listing is measured as the number of days between the subscription date and the date for the listing. The subscription date was measured as either the end of the subscription period, when available, or the announcement of the completion of the private placement.

*Annual overview*

Euronext Growth grew slowly in the first years after its opening in 2016 under the name of Merkur Market, before expanding rapidly in 2020. Figure 1 shows this growth, by presenting the number of initial private placements in each year, including 2021 until March 1. There were 42 private offerings in 2020 in our sample, with most of them occurring in the second half of the year. The beginning of 2021 has also been a remarkably active period on Euronext Growth, with 14 private placements followed by listings until March 1. Previous research has found IPO volumes to be positively related to both companies' demand for capital and the level of investor sentiment (Lowry, 2003), which indicates that the volume of offerings is affected by the general economic sentiment. According to Ritter & Welch (2002), the evidence shows that firms go public in response to favorable market conditions. This can help explain the large increase in volume during the latter part of 2020 and the beginning of 2021, as the stock market bounced back after the initial crash caused by the coronavirus pandemic in February-March, with interest rates at historic low levels making equity investments, and growth companies in particular, relatively more favorable.

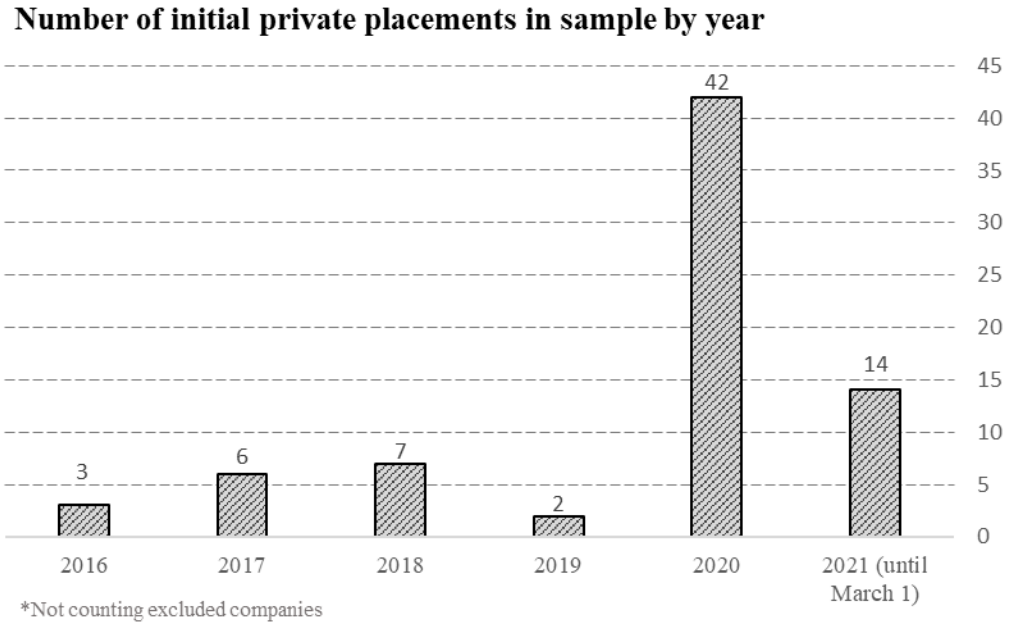


*Figure 1: Development in the number of initial private placements on Euronext Growth.*

*Industry overview*

The International Benchmark Classification (ICB) is used as the industry taxonomy to assign all the initial private placements in the sample into different industries and sub-sectors. The ICB is an industry classification taxonomy launched by Dow Jones and FTSE in 2015. For companies that are no longer listed on Euronext Growth, either their current classification on a different marketplace was used, or we used our best judgement to classify the company based on its core activities and how comparable companies are classified. The industry classification is mostly used for descriptive purposes.

Among the companies that have conducted a private placement in relation to listing, some industries stand out. Table 7 shows industry statistics on the private placement sample. The share of the total private placement volume is dominated by three almost evenly large industries: consumer staples (22.3%), industrials (20.7%) and energy (20.6%).

**Industry overview of sample**

| *Industry ICB* | *Placements* | *Share of placements* | *Volume (NOK Million)* | *Share of volume* |
|---|---|---|---|---|
| Basic Materials | 1 | 1.4% | 925 | 2.6% |
| Consumer Dicretionary | 8 | 10.8% | 3,608 | 10.0% |
| Consumer Staples | 13 | 17.6% | 8,034 | 22.3% |
| Energy | 10 | 13.5% | 7,407 | 20.6% |
| Financials | 8 | 10.8% | 612 | 1.7% |
| Health Care | 5 | 6.8% | 1,531 | 4.3% |
| Industrials | 12 | 16.2% | 7,454 | 20.7% |
| Technology | 7 | 9.5% | 3,731 | 10.4% |
| Telecommunications | 3 | 4.1% | 907 | 2.5% |
| Utilities | 7 | 9.5% | 1,742 | 4.8% |
| Total | 74 | 100.0% | 35,951 | 100.0% |

*Table 7: Industry overview of our sample of private placements on Euronext Growth.*

The difference between the industry share by volume and number of placements, indicates that the energy and consumer staple industries tend to have relatively large placements, since these industry shares are smaller when measured in number of placements, versus volume. The financial industry deviates particularly when measured by issue size and number of placements, from 10.8% when measured by number of placements, to 1.7% when measured by volume. This is primarily because many of the savings banks listed were small compared to other companies in the sample.

*Firm age*

As Euronext Growth is a marketplace directed towards growth companies, the typical age at the time of listing is relatively low. The average age is 15.7 years, while the median age is about 5 years.[24] The average age falls to 6.1 years in the hot market period in 2020 with a median age at 4.8 years. This development is similar to Loughran & Ritter's (2004) finding that more young firms went public in the years preceding the internet bubble when the median age was 5 years. Figure 2 shows the age distribution of the sample. A sizeable proportion (16 out of 74) of the firms in the sample were less than 1 year old at the time of listing.


*Figure 2: Distribution of company age at the time of listing.*

[24] Savings banks that issue equity certificates have been included in this calculation. All of them are more than 100 years. This can to a large extent explain the difference between average and median age.

## 4.2 Potential biases

Before moving on the with the methodology and analysis part, certain potential biases can be pointed out in the gathered data on initial private placements on Euronext Growth.

### 4.2.1 Errors in data

Most of the data, for example the price data, is extracted manually. Despite typing in the data with much care, and cross checking the values, there might still be typing errors. Additionally, another possible error source is failing to correct for all share splits. If any share splits have been missed, the apparent underpricing will be inaccurate, as the prices given in the databases will not be comparable to the subscription prices from the information documents. However, we have been cautious to search for share splits for all companies and correct the subscription price when discovered.

### 4.2.2 Source inconsistencies

For the price data on newly listed companies, prices from the Euronext Live Markets website were used. The website only provides prices for the last two years, consequently both Bloomberg and Infront was used to extract older price data, since neither platform gave a complete overview of all prices. The prices have identical formatting across all platforms; hence it is unlikely that the use of the different sources caused any problems in the price data. For the subscription prices and the number of issued shares, data was taken from Newsweb and the respective information documents from the companies attached to messages on Newsweb. Although the risk of source inconsistencies affecting the data values is minimal, we cannot exclude the possibility.

# 5. Methodology

The subsequent section will describe how the initial and 30-day abnormal returns are calculated. Furthermore, it will present the independent variables and introduce the econometric strategy with regression models and econometric concerns.

## 5.1 Calculation of abnormal returns

### 5.1.1 Initial abnormal return

The existing literature differs when it comes to how underpricing is measured. Recall that underpricing has been defined as when the closing price after the first day of trading is higher than the issue price of the private placement. The difference is known as the initial return of the stock, and underpricing indicates a positive initial return.

McGuinness (1992), Ritter & Welch (2002), as well as Loughran and Ritter (2004), argue that stocks issues are efficiently priced after the first day of trading, and that initial returns therefore is an accurate measure of underpricing. Lowry, Officer, & Schwert (2010), on the other hand, rely on first-month initial returns to circumvent the potential effects of post-offer price support by underwriters. For this thesis, both first day and 30-day initial returns will be used as measures of underpricing.

A second question is whether to adjust stock returns for interim market movements. Beatty & Ritter (1986) find the daily average market return to be less than 0.1% in their research period (1977-1982) and conclude that adjusting for market movements in calculations of initial abnormal returns would only result in minor changes. Other researchers choose to adjust for market returns by subtracting the market return for the same period using a representative index.[25] In the absence of an index consisting of shares listed on Euronext Growth, the Oslo Stock Exchange All-share Index (OSEAX) is preferred. It is a broad index that includes all listed shares on the Oslo Stock Exchange.[26] Initial returns are adjusted for market movements from the time the subscription price is set and presented to investors, until the day of listing.[27]

[25] Logue (1973) were among the first scholars to adopt this approach.
[26] Not including shares listed on Euronext Growth or Euronext Expand.
[27] In cases where we could not find when the subscription price was set, we used the date when the private placement was completed.

Initial abnormal returns will be calculated as:

$$Inital\ Abnormal\ Return = \left(\frac{Close\ price_1 - Offer\ price_0}{Offer\ price_0}\right) - \left(\frac{OSEAX_1 - OSEAX_0}{OSEAX_0}\right) \quad (1)$$

Here, the subscript 0 denotes the time of subscription of the private placement, while subscript 1 denotes the listing day. The first day abnormal return, or initial abnormal return (IAR), will be primarily used for descriptive purposes since it is easy to interpret directly.

For the regression analysis, abnormal returns are natural log-transformed to reduce the effect of outliers on the results. Since the dataset contains companies with negative abnormal returns, 1 is added to the abnormal returns to calculate the logged variable:

$$ln\ (Inital\ Abnormal\ Return + 1) \quad (2)$$

$(Inital\ Abnormal\ Return + 1)$ can be thought of as the *underpricing factor*, as the subscription price multiplied by this factor is equal to the close price, adjusted for market movements. When describing the regression results, we will refer to $(Inital\ Abnormal\ Return + 1)$ as the initial underpricing factor.

### 5.1.2 30-day return

For the 30-day returns, the exact same method used to calculate initial returns is applied.

30-day returns will be calculated as:

$$Abnormal\ Return_{30\ days} = \left(\frac{Close\ price_{30} - Offer\ price_0}{Offer\ price_0}\right) - \left(\frac{OSEAX_{30} - OSEAX_0}{OSEAX_0}\right) \quad (1)$$

Here, the subscript 0 denotes the time of subscription of the private placement, while subscript 30 denotes the close price 30 days after listing day. If the 30$^{th}$ day after listing was not a trading day, or if there were no trading the relevant day, the last available close price is used.

We will use a natural logged variable for the regression analysis:

$$ln\ (Abnormal\ Return_{30\ days} + 1) \quad (2)$$

Where $(Abnormal\ Return_{30\ days} + 1)$ will be referred to as the 30-day underpricing factor, similar to the initial underpricing factor.

## 5.2 Independent variables relevant for the hypotheses

The independent variables follow from the hypotheses as the ones we want to investigate. We are interested in whether certain variables are related to the level of underpricing.

### 5.2.1 Post covid outbreak dummy

Since the beginning of Euronext Growth, the stock market has been through periods of variable investor sentiment and market conditions. The sample is separated into two distinct periods: before and after March 2020, named pre covid outbreak and post covid outbreak, respectively. To test for differences between the periods, we construct a dummy variable that takes the value 1 if the listing happened after the covid outbreak, and 0 otherwise.

The pre covid period is characterized by a relatively stable stock market, following the years after the oil crisis. However, the first period also includes the more volatile market period in the fall of 2018 until the covid outbreak. Only two companies were listed in this more volatile market situation, in 2019, at the end of the first period. No companies were listed in the volatile market of January-March 2020. Most of the companies in the dataset were listed in the hot issue period when markets started to rebound after the collapse in mid to late March 2020.

We characterize the pre covid outbreak period as a cold market, with a small listing volume (18), and the post covid period as a hot market, with a high listing volume (56).

### 5.2.2 Green dummy

The media has given much attention to the fact that the Euronext Growth marketplace has attracted many renewable and clean-energy companies, often viewed as so-called “green” companies. Because of the relevancy of the marketplace for these green, or environmentally friendly companies, we are interested in studying the effect of being a green company on underpricing. A major problem for studying the effect of being green on listing performance, is that the label is not well defined. At the time of writing there is no consistent and agreed upon classification system for labeling companies that are environmentally friendly or “green”.[28]

[28] The EU is currently in the implementation phase of a taxonomy for environmental activities and reporting requirements for the EEA. This system is not fully implemented and ready to be used in the spring of 2021.

To capture the potential pricing effects of being a green company, we have created our own classification for green companies, described in Appendix 1: Classification of green and tech companies. The classification is applied using a dummy variable, similar to how dummies have been used for tech companies in previous research (see (Lowry & Schwert, 2002) and (Loughran & Ritter, 2004)).

Since there is no agreed upon method of categorizing companies as green, we have intentionally tried to keep the classification as simple and transparent as possible. The classification uses the main activities of the firm as stated in the information document as the basis for deciding whether a company is green or not. Companies whose main described activities are targeted towards directly reducing pollution, greenhouse gases, creating or facilitating renewable energy production have been categorized as green. Companies that have main activities in other areas have been excluded, even if these activities are conducted in an environmentally friendly way. For example, it could be argued that the company Okeanis Eco Tankers should be labelled as green, since the company prioritizes vessels with low carbon footprint for its shipping activities. We have, however, chosen to only label companies with main activities solving environmental problems as green, with the intention to avoid grey areas and not to make the classification overly complex. Even though this approach might exclude some companies that arguably could be labelled green, we believe that our method will capture the price effect of green companies well, since the companies labelled green are clear cut cases in our opinion. The variable is constructed as a dummy and is equal to 1 if the company is classified as green, and 0 otherwise. Table 16 in Appendix 1 provides an overview of the classification of each company in the dataset.

### 5.2.3 Technology dummy

As previously described, we also want to investigate the effect of being a technology company on the level of underpricing. A dummy variable for companies classified as tech companies is used to capture this effect, similar to the approach taken by Lowery & Schwert (2002) and Loughran & Ritter (2004). Tech companies are identified by applying a similar method as Loughran and Ritter (2004), who used SIC codes to identify tech companies. Subsector ICB codes are used to identify tech companies. A further description of the classification, as well as an overview of all companies classified as tech companies is given in Table 15 and Table 16 in Appendix 1.

### 5.2.4 Cornerstone dummy

To test the hypothesis on the effect of cornerstone investors, we have examined press releases of all the companies in our sample.[29] It should be noted that not all press releases use the term 'cornerstone investors' explicitly. Issues have been marked as having a cornerstone agreement whenever it is stated that certain outside investors have pre-committed to subscribe for a given monetary amount in the offering. We have only been able to confirm whether cornerstone agreements were present in the different issues, and not invalidate their presence in other issues. In order to keep the analysis simple, we include a dummy variable that takes the value 1 if the offering involved a cornerstone agreement, and 0 otherwise. Other details of cornerstone agreements, such as cornerstones' share of total offer size and existence and length of lock-up period, are excluded since this theme does not constitute the main scope of the thesis.

## 5.3 Independent variables for control purposes

The following independent variables will be used to control for company attributes that are likely to influence underpricing. The variables are chosen based on the theories of short-term IPO performance.

### 5.3.1 Company size

Company size at the time of listing is used as a proxy variable for information asymmetry and risk, in line with Corwin (2003). To estimate the company size, we use a variable for the company equity valuation, given by the subscription price. The company valuation is calculated using the subscription price in the private placement multiplied with the total number of outstanding shares after the offering. The valuation measure is similar to how market capitalization is calculated, although we do not call it market capitalization since the measure is calculated before listing. Natural logged values are used to assure linearity.

$$\ln value = \ln (subscription\ price \cdot shares\ outstanding)$$

Beatty & Ritter (1986) use offer size as a proxy of ex ante uncertainty of the firm and argue that smaller issues are associated with greater uncertainty and thus higher underpricing. However, due

[29] We were only able to find information on cornerstone investments in press releases prior to listing and not in the information documents the companies are obliged to publish.

to high multicollinearity[30] between company valuation and private placement size, only the former measure is included as a variable.

### 5.3.2 Firm age

Firm age is a control variable to serves as a proxy for risk derived from the fact that younger companies have more information asymmetries and investor risk than older companies (see Loughran & Ritter (2004) or Ritter (1984)). Firm age is calculated as the time from the incorporation date to the date of admission to trading and is measured in years with two decimals. To assure linearity and reduce the effect of outliers, firm age values are logged.

### 5.3.3 Market volatility

Lowry, Officer, & Schwert (2010) conclude that IPO initial returns appear to be affected by secondary market volatility. However, they find that the effects are small compared to other known factors influencing underpricing. We used standard deviations of daily returns on the OSEAX index over the 30 trading days ending 11 days prior to listing as our measure of volatility. This is similar to the approach taken by Corwin (2003) in his investigation of the determinants of underpricing of seasoned equity offerings.

### 5.3.4 OTC

The Norwegian over-the-counter (NOTC) is an information system for unlisted shares where a security dealer enters buy and sell interests in the system on behalf of customers who want to buy or sell shares.[31] Other securities dealers are notified by these entries and can thus establish contact and agree on a transaction if they have a customer who has entered a reciprocal order.

We construct a dummy variable for whether the company was traded on the NOTC before conducting the private placement and being listed on Euronext Growth. It takes the value 1 if the firm was on the NOTC-list, and 0 otherwise. There is likely less asymmetric information between investors and companies listed on NOTC than companies that have not been listed on NOTC, since past price and accounting information is available for the former firms. Other things being equal, a general assumption is that these companies should exhibit less underpricing.

[30] The correlation coefficient for company valuation (logged) and private placement size (logged) is 0.796.
[31] Information about the NOTC was found at the NOTC website: *https://www.notc.no/eng/About-NOTC*

### 5.3.5 Greenshoe option

A greenshoe option (GSO) is an over-allotment option, which makes it possible for the underwriter in an IPO or private placement transaction to sell to investors more shares than was initially planned by the issuer (called over-allocation), typically 15%.[32] The underwriter borrows the shares from some investor and short-sells them in the offering. The GSO is normally exercised by the underwriter if the demand for the issue post-listing proves to be higher than expected and the shares trade above the offering price. The underwriter exercises the GSO by buying shares from the issuer at the offering price, returning them to the investors they were borrowed from. The offer size increases with the extra amount bought from the issuer. Conversely, if the price falls, the underwriter does not exercise the GSO but covers its short position by buying back shares at a price below the offer price in the market and returns them to the investors. The GSO functions as a price stabilization mechanism, and typically either the entire option or a part of it is exercised. In cases where a GSO is included in the private placement, we expect to see less underpricing.

To examine possible GSO-effects, we create a dummy variable that takes the value 1 if the private placement included a GSO, and 0 otherwise.

## 5.4 Summary statistics for independent variables

Table 8 shows descriptive statistics for all variables grouped by continuous variables and dummy variables. The values are separated into post covid outbreak, pre covid outbreak and the full period.

**Descriptive statistics on independent variables**

| *Continuous variables* | Full period (74 obs.) | | | Post covid outbreak (56 obs.) | | | Pre covid outbreak (18 obs.) | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Mean* | *Median* | *Std dev* | *Mean* | *Median* | *Std dev* | *Mean* | *Median* | *Std dev* |
| Company valuation (NOK mill.) | 1770 | 931 | 2952 | 2091 | 1097 | 737 | 773 | 332 | 935 |
| Firm age at listing (years) | 15.7 | 5.0 | 36.9 | 6.5 | 5.0 | 6.9 | 44.3 | 6.4 | 67.5 |
| Volatility | 1.0% | 0.9% | 0.4% | 1.0% | 0.9% | 0.4% | 0.7% | 0.7% | 0.2% |
| *Dummy variables* | Full period (74 obs.) | | | Post covid outbreak (56 obs.) | | | Pre covid outbreak (18 obs.) | | |
| | *Frequency* | % | | *Frequency* | % | | *Frequency* | % | |
| Post covid outbreak dummy | 56 | 75.7% | | 56 | 100.0% | | 0 | 0.0% | |
| Green dummy | 16 | 21.6% | | 16 | 28.6% | | 0 | 0.0% | |
| Tech dummy | 20 | 27.0% | | 19 | 33.9% | | 1 | 5.6% | |
| Cornerstone dummy | 33 | 44.6% | | 33 | 58.9% | | 0 | 0.0% | |
| OTC dummy | 11 | 14.9% | | 6 | 10.7% | | 5 | 27.8% | |
| GSO dummy | 11 | 14.9% | | 11 | 19.6% | | 0 | 0.0% | |

*Table 8: Descriptive statistics on independent and control variables*

[32] The explanation of the workings of the greenshoe option was found at:
*https://www.euromoney.com/article/b1jhjnrn2psn2l/this-is-how-an-ipo-greenshoe-works*

From the continuous variables it is evident that company valuations are larger for listings after the covid outbreak than before. Firms listed after the covid outbreak are on average younger than firms listed before. The difference is however small when comparing median values. The discrepancy between mean and median values can be explained by some very old companies which skew the average age in the sample upwards. Furthermore, all companies classified as green or tech, with the exception of one, were listed in the post covid period. There was only one private placement with cornerstone investors and greenshoe option in the pre covid period.

Table 9 shows a correlation matrix for all independent variables described in the previous section.

**Correlation matrix of independent variables**

| | *Ln placement size* | *Ln value* | *Ln age* | *Volatility* | *Post covid dummy* | *Green dummy* | *Tech dummy* | *Cornerstone dummy* | *OTC dummy* | *GSO dummy* |
|---|---|---|---|---|---|---|---|---|---|---|
| Ln placement size | 1.000 | | | | | | | | | |
| Ln value | 0.796 | 1.000 | | | | | | | | |
| Ln age | -0.117 | -0.145 | 1.000 | | | | | | | |
| Volatility | -0.038 | -0.035 | 0.019 | 1.000 | | | | | | |
| Post covid dummy | 0.465 | 0.427 | -0.214 | 0.357 | 1.000 | | | | | |
| Green dummy | 0.186 | 0.195 | -0.207 | 0.054 | 0.298 | 1.000 | | | | |
| Tech dummy | 0.101 | 0.091 | 0.110 | 0.145 | 0.274 | -0.172 | 1.000 | | | |
| Cornerstone dummy | 0.545 | 0.498 | -0.044 | -0.042 | 0.509 | 0.189 | 0.189 | 1.000 | | |
| OTC dummy | 0.112 | 0.247 | 0.042 | -0.119 | -0.206 | -0.035 | -0.169 | 0.007 | 1.000 | |
| GSO dummy | 0.373 | 0.336 | 0.089 | -0.072 | 0.237 | -0.127 | 0.088 | 0.313 | 0.039 | 1.000 |

*Table 9: Correlation matrix of all independent variables*

There are several noteworthy relationships in the correlation matrix. As expected, there is a strong positive correlation between company valuation (ln value) and placement size (ln placement size), with a correlation coefficient of 0.796. Larger firms in terms of company valuation at the time of subscription also have larger offers in absolute terms. Furthermore, these two variables have a medium strong positive correlation to both the post covid dummy and the cornerstone dummy. Firms listed after the covid outbreak are larger and have larger placements. Resultingly, there is also a medium strong correlation between the post covid dummy and the cornerstone dummy. Multicollinearity is further detected through the calculation of the variance inflation factor (VIF). The relatively high correlation between company valuation and placement size is confirmed by VIF values of 2.77 and 2.73 (see Table 18 in Appendix 3).

The problem of multicollinearity is avoided by not including placement size as a variable in the regression. We deem company valuation to be a better proxy for company size. Lastly, firm age and the post covid outbreak are negatively correlated, which is to be expected given the discussion above.

## 5.5 Econometric strategy

So far in section 5 we have identified and defined the dependent and independent variables central to our analysis. We are interested in whether private placements conducted after the covid outbreak are positively related to underpricing, and whether companies classified as either green or tech are associated with higher levels of underpricing. Additionally, we want to investigate the effect of cornerstone investors.

To test our hypotheses, we perform regressions with the independent dummy variables we have constructed, as well as a set of control variables. In our analysis we will use the method of linear regression and ordinary least squares (OLS), which minimizes the sum of squared vertical distances between the observed responses in the sample and the responses predicted by the linear approximation.

### 5.5.1 Regression models

We estimate the following regression for first day abnormal returns and include different sets of control variables (Table 10) to find the most solid fit.

$$ln(IAR + 1) =$$
$$\beta_0 + \beta_1 d_{post\_covid} + \beta_2 d_{green} + \beta_3 d_{tech} + \beta_4 d_{cornerstone} + \beta_5 \ln value + \beta_6 \ln firm\ age +$$
$$\beta_7 volatility + \beta_8 d_{OTC} + \beta_9 d_{GSO} + u$$

We do the same for 30-day abnormal returns:

$$ln(AR_{30-day} + 1) =$$
$$\beta_0 + \beta_1 d_{post\_covid} + \beta_2 d_{green} + \beta_3 d_{tech} + \beta_4 d_{cornerstone} + \beta_5 \ln value + \beta_6 \ln firm\ age +$$
$$\beta_7 volatility + \beta_8 d_{OTC} + \beta_9 d_{GSO} + u$$

| Variable | Description |
|---|---|
| $IAR$ | Abnormal return by close price first day of listing |
| $AR_{30-day}$ | Abnormal return by close price 30 days after listing |
| $d_{post\ covid}$ | = 1 if listed after March 2020, 0 otherwise |
| $d_{green}$ | = 1 if classified as green, 0 otherwise |
| $d_{tech}$ | = 1 if classified as a tech company, 0 otherwise |
| $d_{cornerstone}$ | = 1 if at least one cornerstone investor participated, 0 otherwise |
| $Value$ | Company equity valuation given by subscription price |
| $Firm\ age$ | Age of firm in years at time of listing |
| $Volatility$ | Standard deviation of daily OSEAX returns in the 30-day period ending 11 days prior to listing |
| $d_{OTC}$ | = 1 if traded on OTC before listing, 0 otherwise |
| $d_{GSO}$ | = 1 if greenshoe option included in placement, 0 otherwise |

*Table 10: Dependent and independent variables used in the regression models.*

### 5.5.2 Econometric concerns

To justify the use of the OLS method in our regressions, the five Gauss-Markow assumptions need to be satisfied (Wooldridge, 2016):

1. Linearity in the parameters
2. Random sampling
3. No perfect collinearity in the independent variables
4. Exogeneity of the independent variables
5. Homoscedasticity (constant variance in the error term)

The first assumption is that the model in the population needs to be linear in the parameters. As mentioned earlier, we ln-transform all variables except the dummy variables and the volatility measure. The justification is to obtain as normally distributed variables as possible and to reduce the effect of outliers. The normality of returns is discussed in section 6.1 and 6.2. The second assumption is a random sample of observations. Given that we have included all initial private placements on Euronext Growth up until March 1, 2021 (including some with missing information), this should not be a problem. Thirdly, there can be no exact linear relationships among the independent variables. The issue of multicollinearity has been discussed above and led us to exclude offer size as a variable in the regression models.

The fourth assumption relates to exogeneity, meaning that the independent variables should not be correlated with the error term *u*. It assumes the error term *u* has an expected value of zero given any values of the independent variables. At first glance, the residual plots of both initial abnormal returns (Figure 12) and 30-day abnormal returns (Figure 13) appear to be normally distributed around zero (see Appendix 3: Residual plots). If any of the independent variables are correlated with some unobserved factor that also affects the dependent variable, there is an endogeneity problem. It can be due to omitted variable bias, functional form misspecification, measurement error or simultaneity (when one or more independent variables is determined jointly with the dependent variables). We do not judge the latter to be a problem in our dataset since all the independent variables can be observed prior to listing. Measurement error is discussed in section 4.3. The functional form of the independent variables differs from the level-form only in cases where we want to obtain normal distributions. We have included variables deemed as relevant to explain abnormal returns based on the literature, but we cannot be assured that no omitted variables bias exists. There might be other variables that better explain the differences in returns than the ones we have included in our models.

The fifth assumption is homoskedasticity, which has important implications for the efficiency of the model. It assumes that there is constant variance in the error term (i.e., the unobserved factors) for different independent variables. Heteroskedasticity occurs when the variance of the unobserved factors changes across different segments of the population. While heteroskedasticity does not result in biased estimators, the standard errors and subsequent statistical tests cannot be trusted. The Breusch-Pagan test is used to test for heteroscedasticity in our sample, while also running regressions with robust standard errors to see if this affects the significance of the variables. If the Gauss Markov assumptions hold, using OLS results in the best linear unbiased estimators (BLUE).

Lastly, we include the assumption of normality in the residuals. In practice we ask whether the distribution of the residuals is close to being normal. This condition is discussed for both initial and 30-day regressions (see Appendix 3). In total, these six conditions constitute the classical linear model (CLM) assumptions.

# 6. Analysis

The following section lays out the analysis of the thesis. Previously we have presented our dependent and independent variables that form our regression models. In this chapter, we will test our hypotheses about underpricing and identify relationships between the variables of interest and abnormal returns. Firstly, we will present descriptive statistics on initial abnormal returns and 30 days abnormal returns, before discussing the regression results. Finally, we will address important limitations of our work and provide suggestions for future research.

## 6.1 Initial abnormal returns

Descriptive statistics on initial day underpricing for the sample have been summarized in Table 11. The observations are broken down into three periods: pre covid outbreak, post covid outbreak and the full period.

**Descriptive statistics on inital day underpricing**

| | Full period (74 obs.) | | | Post covid outbreak (56 obs.) | | | Pre covid outbreak (18 obs.) | | |
|---|---|---|---|---|---|---|---|---|---|
| | *IR* | *IAR* | *ln(IAR+1)* | *IR* | *IAR* | *ln(IAR+1)* | *IR* | *IAR* | *ln(IAR+1)* |
| Mean | 22.12% | 21.43% | 0.149 | 22.70% | 22.44% | 0.154 | 20.31% | 18.31% | 0.1339 |
| Std dev | 43.66% | 43.98% | 0.280 | 46.49% | 46.62% | 0.290 | 34.44% | 35.50% | 0.2558 |
| | | | | | | | | | |
| Min | -26.67% | -22.62% | -0.256 | -26.67% | -22.62% | -0.256 | -13.67% | -15.79% | -0.1719 |
| 25th percentile | -3.16% | -5.59% | -0.058 | -4.04% | -5.23% | -0.054 | 0.14% | -5.59% | -0.0576 |
| Median | 13.25% | 12.75% | 0.120 | 14.41% | 13.58% | 0.127 | 4.93% | 6.24% | 0.0604 |
| 75th percentile | 32.59% | 28.70% | 0.254 | 33.00% | 31.21% | 0.272 | 30.38% | 24.11% | 0.2158 |
| Max | 231.58% | 236.17% | 1.212 | 231.58% | 236.17% | 1.212 | 121.53% | 121.59% | 0.7957 |
| | | | | | | | | | |
| Kurtosis | 9.825 | 10.449 | 3.507 | 9.918 | 10.693 | 3.924 | 3.524 | 3.510 | 1.603 |
| Skewness | 2.780 | 2.894 | 1.551 | 2.848 | 2.986 | 1.599 | 1.866 | 1.893 | 1.369 |

*Table 11: Descriptive statistics on initial day underpricing. It includes marked-adjusted initial return and the log-transformed variable of the market-adjusted initial return used in the regressions. All returns are equally weighted.*

The difference between simple initial return and the initial abnormal return is small with regards to mean, standard deviation, and other measures. This suggests that market movements from the time of the subscription until the day of the offering are of little significance when we analyze underpricing from initial returns. This is unsurprising, as the subscription date tends to be close to the offering dates.

We conduct a simple one-sample t-test to test the significance of the 21.43% average underpricing in the overall sample and find that it is significant with a p-value less than 1%. We thus reject the null hypothesis of zero underpricing.

Adjusting for offer size, we obtain an average value-weighted abnormal return of 14.42%. A lower value-weighted than equally-weighted return is unsurprising given that we expect offer size to be negatively correlated with underpricing. Larger firms (with larger offers) typically have less underpricing.

The median observation indicates that half of the placements have an initial underpricing of more than 12.75%. The 25$^{th}$ and 75$^{th}$ percentiles give an indication of the spread in returns. The 25% least underpriced placements exhibit overpricing, meaning negative first-day abnormal return of 5.59% or more. The 25$^{th}$ most underpriced placements are underpriced by at least 28.70%. The median return is almost half the size of the mean indicating that the sample is skewed to the right. This is further confirmed by a skewness value of 2.894 and a kurtosis value of 10.449.[33] The latter indicates a sharp distribution with fatter tails, also known as leptokurtic distribution. The most notable takeaway is the substantial mean underpricing (21.43%) and large variations within the sample, especially towards the higher end of the scale. The average in our sample is much larger than what has been found in previous time periods for the Norwegian market (see section 3.3.1). The highest level of underpricing in our sample is 236.17%.[34] On the opposite side, the highest overpricing is 22.62%.

An overview of the distribution of the dependent variables is found in Appendix 2. Figure 4 and Figure 5 shows histograms of the distribution of initial abnormal returns, for the different time periods. Even though our sample is relatively small, Figure 4 has bell-shaped distribution, skewed somewhat to the right especially when considering outliers. By using natural logged values of initial abnormal returns we obtain a more smooth distribution with less pronounced outliers. From Table 11 we see that the kurtosis and skewness values are substantially reduced when using natural log values. Figure 6 and Figure 7 in Appendix 2 displays Kernel density plots for the three periods. The pre-covid period has a denser distribution, while the post covid period has a fatter tail to the right. The latter period consists of more observations with extreme levels of underpricing. The error term looks to satisfy the condition of normality with an expected value of zero (see discussion below Figure 12 in Appendix 3).

[33] A normal distribution has skewness value of 0 and a kurtosis value of 3.
[34] This observation was the alternative energy company Horisont Energi, which is engaged in the production of blue hydrogen.

There seems to be only a slight difference between average underpricing before and after the covid outbreak, with the latter period having marginally higher underpricing. As reference, the average underpricing post covid outbreak is just half the size of underpricing among US IPOs in 2020 which Ritter (2021) found to be 41.6%.[35] The difference in underpricing before and after covid is not statistically significant.[36] Regression (1) in Table 13 further shows that the post covid-outbreak coefficient is not significantly different from zero. Thus, we do not find support for our first hypothesis of higher underpricing for companies listed after the covid outbreak.

## 6.2 30-day abnormal returns

Since we observe a relatively high level of initial abnormal returns, it is also worth investigating whether underpricing persists over a longer period that can still be considered short-run performance. Table 12 summaries descriptive statistics on abnormal returns by using the share price 30 days after listing.

**Descriptive statistics on 30-day underpricing**

| | Full period (74 obs.) | | | Post covid outbreak (56 obs.) | | | Pre covid outbreak (18 obs.) | | |
|---|---|---|---|---|---|---|---|---|---|
| | *30d R* | *30d AR* | *ln(30d AR+1)* | *30d R* | *30d AR* | *ln(30d AR+1)* | *30d R* | *30d AR* | *ln(30d AR+1)* |
| Mean | 36.29% | 32.15% | 0.185 | 36.79% | 32.74% | 0.193 | 34.76% | 30.33% | 0.1588 |
| Std dev | 70.87% | 71.55% | 0.397 | 68.02% | 69.06% | 0.394 | 81.21% | 80.92% | 0.4154 |
| | | | | | | | | | |
| Min | -37.15% | -34.90% | -0.429 | -37.15% | -34.90% | -0.429 | -13.67% | -14.74% | -0.1594 |
| 25th percentile | -0.62% | -7.79% | -0.081 | -0.17% | -9.03% | -0.095 | -1.89% | -7.09% | -0.0736 |
| Median | 13.13% | 10.41% | 0.099 | 14.89% | 11.93% | 0.113 | 3.46% | 0.95% | 0.0095 |
| 75th percentile | 40.78% | 38.76% | 0.335 | 47.17% | 43.22% | 0.359 | 23.87% | 17.49% | 0.1611 |
| Max | 315.75% | 309.51% | 1.410 | 285.03% | 289.37% | 1.359 | 315.75% | 309.51% | 1.4098 |
| | | | | | | | | | |
| Kurtosis | 6.275 | 6.447 | 2.067 | 5.819 | 6.288 | 1.765 | 8.956 | 8.758 | 4.480 |
| Skewness | 2.496 | 2.527 | 1.467 | 2.366 | 2.445 | 1.283 | 2.934 | 2.893 | 2.176 |

*Table 12: Descriptive statistics on 30-day returns. It includes marked-adjusted 30-day return and the log-transformed variable of the market-adjusted 30-day return used in the regressions. All returns are equally weighted.*

The difference between initial and abnormal returns is larger for mean, standard deviation, and other measures, compared to what was found for first day returns. This suggests that market movements have a larger effect when the time horizon is more stretched out.

We focus on the abnormal return columns. The sample mean is 32.15%, a substantial 30-day abnormal return which is larger than the average initial day return previously found. The difference

[35] Equal-weighed first day return.

[36] Two-sample t-test assuming unequal variances gives a one-sided p-value of 0.35, indicating a non-significant difference.

in sample means is however not found to be statistically significant.[37] Thus, we do not find that 30-day underpricing is statistically larger than initial day underpricing. Adjusting for offer size, the average 30-day abnormal return is 19.04%, again lower than the equally-weighted average.

The median observation indicates that half of the placements have an underpricing of more than 10.41%. The 25$^{th}$ and 75$^{th}$ percentiles also indicate a greater upside than downside similar to what was found for initial day returns. 30-day returns have a larger standard deviation than initial day returns, but with a somewhat smaller skewness and kurtosis. The median is smaller than the mean, indicating a distribution skewed to the right, with the highest underpricing being 309.51%. An overview of the distribution of the dependent variables is provided in Appendix 2. Similar to the initial day return, the post covid outbreak period has a slightly larger 30-day abnormal return than the pre covid period. The difference is however not found to be statistically significant.[38] The error term looks to satisfy the condition of normality with an expected value of zero (see discussion below Figure 13 in Appendix 3)

### *Industry differences*

The industry classification reveals differences in average initial and 30-day abnormal returns between industries, as seen in Figure 3. When comparing the two return measures, it is evident that some industries exhibit larger underpricing after 30 days than after the first day, while it is the opposite for other industries. The energy sector especially stands out, with an average underpricing of respectively 57.35% and 95.40%. It should be noted that some industries consist of very few observations. Hence the industry differences may not be statistically significant and should be interpreted with care.

[37] Two-sample t-test assuming unequal variances gives a one-sided p-value of 0.14, indicating a non-significant difference.

[38] Two-sample t-test assuming unequal variances gives a one-sided p-value of 0.46, indicating a non-significant difference.

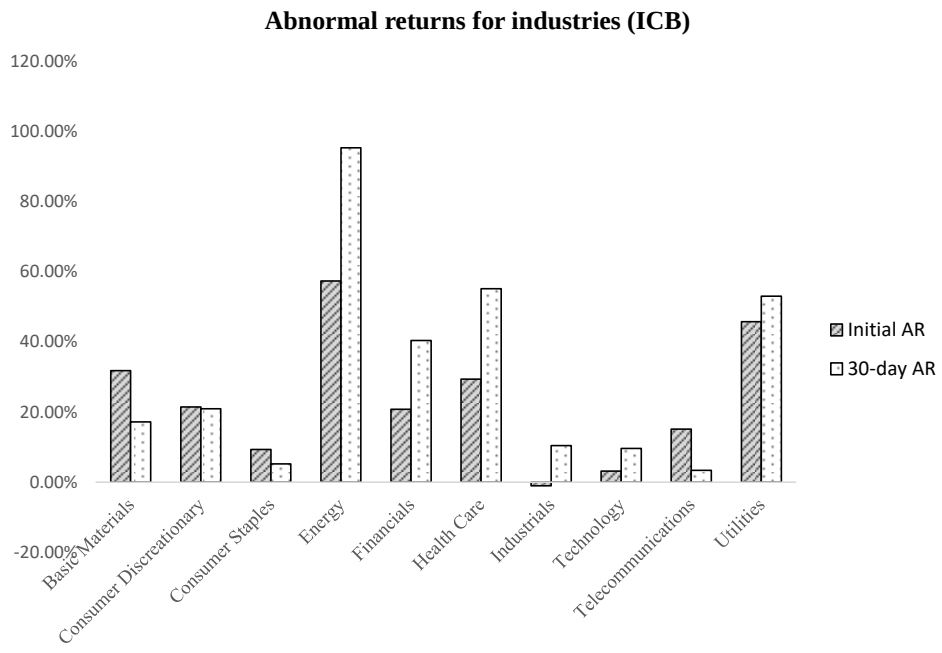


*Figure 3: Industry differences in initial and 30-day underpricing from the sample.*

# 6.3 Regression results

The following section will present and interpret the regression outputs for initial abnormal return and 30-day abnormal return.

### 6.3.1 Initial abnormal returns

Table 13 shows five different OLS regressions on the natural logged initial abnormal return variable. The first regression only includes the post covid dummy variable which is not significant. The first regression has close to zero explanatory power, given the low $R^2$ value. The coefficient for the post covid dummy is not significant, which means that we find no evidence in the regression results that abnormal returns were statistically larger after the covid outbreak compared to before.

**Regression results (OLS)**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | ln (IAR+1) | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| **Post covid outbreak (dummy)** | 0.02 | 0.084 | 0.082 | 0.079 | 0.063 |
| | (0.076) | (0.082) | (0.078) | (0.077) | (0.082) |
| **Green (dummy)** | | 0.235*** | 0.226*** | 0.233*** | 0.249*** |
| | | (0.076) | (0.071) | (0.070) | (0.073) |
| **Tech (dummy)** | | -0.150** | -0.134** | -0.161** | -0.159** |
| | | (0.070) | (0.066) | (0.067) | (0.068) |
| **Cornerstone (dummy)** | | -0.160** | -0.060 | -0.033 | -0.034 |
| | | (0.066) | (0.068) | (0.069) | (0.070) |
| **ln Value** | | | -0.075*** | -0.076*** | -0.082*** |
| | | | (0.025) | (0.025) | (0.029) |
| **ln Firm age** | | | -0.041** | -0.030* | -0.032* |
| | | | (0.017) | (0.017) | (0.018) |
| **Volatility** | | | | 23.331* | 24.646* |
| | | | | (12.997) | (13.205) |
| **OTC (dummy)** | | | | | -0.007 |
| | | | | | (0.085) |
| **GSO (dummy)** | | | | | 0.079 |
| | | | | | (0.084) |
| **Intercept** | 0.134** | 0.142** | 1.703*** | 1.482*** | 1.589*** |
| | (0.066) | (0.058) | (0.511) | (0.518) | (0.573) |
| Observations | 74 | 74 | 74 | 74 | 74 |
| $R^2$ | 0.001 | 0.27 | 0.387 | 0.416 | 0.424 |
| Adjusted $R^2$ | -0.013 | 0.227 | 0.332 | 0.354 | 0.343 |
| F Statistic | 0.070 (df = 1; 72) | 6.367*** (df = 4; 69) | 7.057*** (df = 6; 67) | 6.710*** (df = 7; 66) | 5.233*** (df = 9; 64) |
| *Note:* | | | | | *p<0.1; **p<0.05; ***p<0.01 |

*Table 13: Regressions on initial abnormal returns.*

*The accompanying table presents the results of linear regressions assessing the effect of different variables on initial abnormal returns in initial private placements on Euronext Growth. The dependent variable (ln (IAR+1) is the logged underpricing factor. The four independent variables are all dummy variables: a post covid outbreak dummy, a green company dummy, a tech firm dummy and a cornerstone investors dummy. The control variables include logarithmic transformations of company value at time of listing and firm age, a market volatility measure, as well as dummy variables for OTC listing and GSO. Standard errors are reported in parentheses below each coefficient. All regressions are tested for heteroskedasticity using the Breusch Pagan test (see Table 19 in Appendix 5). None of the regressions display autocorrelation in the residuals (see Table 17 in Appendix 3).*

When adding dummies for green, tech and cornerstone in regression (2), the adjusted $R^2$ increases, and the model now captures about 22% of the variation in the logged abnormal returns. In regression (2) the green variable is significant with a p-value less than 1%. The green dummy coefficient has a positive sign, which means that companies categorized as green tend to have more underpricing, in line with our hypothesis. The tech dummy variable coefficient has a negative sign while being significant with a p-value less than 5%. The cornerstone variable coefficient also has a negative sign, and it is significant with a p-value less than 5%. The sign of the tech and cornerstone dummies indicate that tech companies and companies with cornerstone investors are associated with less underpricing, which goes against our hypotheses. Regression (2) exhibits heteroskedasticity from the Breusch Pagan test at a 1% significance level, thus we do not prefer this model (see Table 19). Using robust standard errors does not alter the significance of the different variables in any substantial way (see Table 20), suggesting that heteroskedasticity is not a major problem in the model.

In regression (3) control variables for firm size and firm age are added. Adding these variables increases the adjusted $R^2$ to 35%, which means that about 35% of the variation in the dependent variable is captured by the model. In regression (3), the cornerstone dummy variable is not significant, which could be explained by the cornerstone dummy being partially correlated with firm size and age, as seen from the correlation matrix in Table 9. The dummy variable for green companies is significant at the 1% level, with a positive sign. Regression (3) exhibits heteroskedasticity from the Breusch Pagan test at the 5% level, thus we reject this model.

In regression (4) market volatility before listing is added as a control variable. We find no evidence of heteroscedasticity from the Breusch Pagan test at the 5% level. Regression (4) further has the highest adjusted $R^2$, leading us to prefer this model thus far. The negative sign of the tech dummy breaks with our hypothesis that tech companies would have more underpricing.

The green dummy variable is still significant at a 1% level in regression (4). The coefficient is a little more complex to interpret directly. It denotes that on average, green companies have a $e^{0.233} - 1 = 26.2\%$ larger underpricing factor, i.e. *(IAR+1)*, is increased by 26.2%. For most companies, this translates to an expected increase in abnormal return of more than 26.2 percentage points if the company is green, since the mean abnormal return is greater than zero.

The company value, firm age and volatility variables all have the signs we would expect. The negative sign of company value and firm age indicate that larger and older companies have less underpricing. For company value, the coefficient of -0.076 for ln value, indicates that a 1% increase in company value is associated with a decrease of the underpricing coefficient of 0.076%. For most companies, this translates to a decrease of more than 0.076 percentage points in the abnormal return for a 1% company value increase. Similarly, for company age, the coefficient of -0.03 for ln firm age, indicates that a 1% increase in company age gives a decrease of the underpricing coefficient of 0.03%. For most companies, this translates to a decrease of more than 0.032 percentage points in the abnormal return for a 1% increase in company age. The volatility variable is positively correlated with underpricing. This is to be expected as higher uncertainty close to the subscription time should give higher underpricing. The coefficient of 23.331 indicates that if the volatility[39] increases by 1 unit (meaning 100 percentage points), the underpricing factor increases by an extremely large factor. Note that the volatility ranges between 0.51% and 3.13% for our dataset, such that a more suitable interpretation is that a 1 percentage point increase in the volatility prior to listing increases the underpricing factor on average by about 23.3%.[40] It should be noted that the sample is likely to be self-selected with observations that only have low volatility prior to listing, as companies tend to not list during periods of high market volatility (Dicle & Levendis, 2018).[41]

When adding the remaining control variables in regression (5), there is no increase in explanatory power. The dummy variables for greenshoe option or NOTC listing are not significantly different from zero in regression (5). We find no evidence of heteroskedasticity in regression (5) either. Since the added control variables do not yield a higher $R^2$ than regression (4), and the added control variables are not significant, our preferred model is regression (4). We note that the coefficient for the green dummy variable is not reduced when including additional control variables, suggesting that the underpricing premium among green companies is not related to firm age, size, market volatility or other characteristics.

[39] The volatility measure used is the standard deviation for the daily percentage OSEAX price movements in the 30-day period ending 11 days prior to listing.
[40] The exact effect for a 1 percentage point increase is $e^{0.2331} - 1 = 26.2\%$
[41] We also see such a tendency in our dataset, with no listings in the first quarter of 2020 or during the fall of 2018. Both of these periods had relatively high market volatility.

### 6.3.2 30-day abnormal returns

We run similar regressions for the logged 30-day abnormal return variable, shown in Table 14.

**Regression results (OLS)**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | ln (30d AR+1) | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| **Post covid outbreak (dummy)** | 0.034 | 0.035 | 0.026 | 0.022 | -0.008 |
| | (0.108) | (0.119) | (0.117) | (0.114) | (0.121) |
| **Green (dummy)** | | 0.430*** | 0.416*** | 0.429*** | 0.431*** |
| | | (0.109) | (0.106) | (0.100) | (0.107) |
| **Tech (dummy)** | | -0.042 | -0.021 | -0.07 | -0.078 |
| | | (0.101) | (0.099) | (0.098) | (0.100) |
| **Cornerstone (dummy)** | | -0.200 | -0.092 | -0.040 | -0.044 |
| | | (0.095) | (0.102) | (0.101) | (0.103) |
| **ln Value** | | | -0.080** | -0.081** | -0.069* |
| | | | (0.038) | (0.037) | (0.042) |
| **ln Firm age** | | | -0.050** | -0.030 | -0.029 |
| | | | (0.025) | (0.026) | (0.026) |
| **Volatility** | | | | 43.356** | 42.946** |
| | | | | (19.137) | (19.464) |
| **OTC (dummy)** | | | | | -0.106 |
| | | | | | (0.125) |
| **GSO (dummy)** | | | | | 0.022 |
| | | | | | (0.124) |
| **Intercept** | 0.159* | 0.161* | 1.825** | 1.415** | 1.212 |
| | (0.094) | (0.084) | (0.763) | (0.762) | (0.844) |
| Observations | 74 | 74 | 74 | 74 | 74 |
| $R^2$ | 0.001 | 0.245 | 0.32 | 0.369 | 0.376 |
| Adjusted $R^2$ | -0.012 | 0.201 | 0.259 | 0.302 | 0.288 |
| F Statistic | 0.101 (df = 1; 72) | 5.595*** (df = 4; 69) | 5.243*** (df = 6; 67) | 5.505*** (df = 7; 66) | 4.287*** (df = 9; 64) |
| *Note:* | | | | | *p<0.1; **p<0.05; ***p<0.01 |

*Table 14: Regressions on 30-day abnormal returns.*

*The accompanying table presents the results of linear regressions assessing the effect of different variables on 30-day abnormal returns in initial private placements on Euronext Growth. The dependent variable (ln (30dAR+1) is the logged underpricing factor. The four independent variables are all dummy variables: a post covid outbreak dummy, a green company dummy, a tech firm dummy and a cornerstone investors dummy. The control variables include logarithmic transformations of company value at time of listing and firm age, a market volatility measure, as well as dummy variables for OTC listing and GSO. Standard errors are reported in parentheses below each coefficient. All regressions are tested for heteroskedasticity using the Breusch Pagan test (see Table 19 in Appendix 5). None of the regressions display autocorrelation in the residuals (see Table 17 in Appendix 3).*

From the 30-day abnormal return regressions, we do not find any significance for the post covid dummy, like for the IAR-regressions. The different 30-day regressions also exhibit similar patterns of heteroskedasticity as the first day regressions (1) to (3) (see Table 19). However, regression (4) does not exhibit heteroskedasticity at the 5% level from the Breusch Pagan test, and thus we will focus our attention on this one. It has an adjusted $R^2$ of 30%, which means that the independent variables capture about 30% of the variation in the dependent variable. Compared to regression (4) from the initial regressions in Table 13, the $R^2$ is about 5 percentage points lower.

Test statistics from the Breusch Pagan test are available in Appendix 5 for all five regression models for the 30-day regression as well, in addition to regressions with robust standard errors. Using robust standard errors does not alter the significance of the different variables in any substantial way, suggesting that heteroskedasticity is not a major problem in the 30-day model either.

In regression (4), we have added the green, tech and cornerstone dummies, as well as control variables for firm value and age, as well as the volatility variable. Again, we find a negative sign for the tech dummy, but for the logged 30-day returns we do not find it to be significant. Similar to what was found in the regressions on logged initial abnormal returns, the cornerstone dummy has a negative coefficient but is not significant in any of the regressions.

The perhaps most interesting observation from the logged 30-day abnormal return regressions is that the green dummy coefficient has almost twice the magnitude compared to the initial abnormal return regressions. The green coefficient is highly significant with a p-value less than 1% for all regressions where the variable is included. From regression (4), the green dummy coefficient of 0.429 denotes that on average, green companies have a $e^{0.429} - 1 = 53.6\%$ larger 30-day underpricing factor, meaning (30d AR+1) is increased by 53.6%. This translates to an increase in the 30-day abnormal return of more than 53.6 percentage points for most companies. This contrasts to the initial abnormal return regression, where we found that green companies had on average a 26.2% larger initial underpricing factor.

The company value variable in regression (4) has a negative sign as expected, similar to the initial abnormal return regression. The negative sign indicates that companies that are older have less underpricing. However, the coefficient for the control variable for firm age is no longer significantly different from zero. For company value, the coefficient of -0.081 indicates that a 1%

increase in company value is associated with a *decrease* of the underpricing coefficient of 0.081%. For most companies, this translates to a decrease of more than 0.081 percentage points in the abnormal return for a 1% company value increase.

The volatility variable is somewhat different from the initial abnormal return regressions. It is still positively correlated with underpricing, but the coefficient is larger at 43.356. It is statistically significant with a p-value less than 5%. The coefficient of 43.356 indicates that if the volatility increases by 1 percentage point, then the underpricing factor increases by about 43.36%.

Adding the OTC and GSO dummy variables does not increase the explanatory power of the model similar to what was found in the regressions on initial abnormal returns.

## 6.4 Discussion of results

Based on the descriptive statistics and findings from the regressions, we can further discuss the overall results and the implications for our hypotheses.

Our main finding is that green companies are associated with higher levels of underpricing on Euronext Growth. From the descriptive statistics we find that that the green companies have an average initial abnormal return of 54.6%, and an average 30-day abnormal return of 86.18%. This could suggest that green companies experience a positive stock price momentum for some period after listing. The regression results confirm the strong investor sentiment among renewable and environmentally friendly companies that has been widely reported in the Norwegian business press. The associated effect of green companies on underpricing on Euronext Growth is strong. We find that green companies are associated with a 26.2 percentage points higher initial abnormal return, and a 53.6 percentage points higher 30-day abnormal return, controlling for other factors. Despite a limited sample size of only 16 green companies out of a total sample of 74 companies, we obtain highly significant results.

Our findings can be contrasted to that of Anderloni & Tanda (2017), who studied energy IPOs between 2000 and 2014 on the main European markets and found that green energy companies have lower first day returns than non-green companies. When Anderloni & Tanda controlled for firm and offer characteristics, as well as the economic cycle, the difference between the two groups disappeared. In our sample, being a green versus non-green company is, as mentioned, on average associated with 26.2 percentage points more initial underpricing, and 53.6 percentage points when

considering 30-day abnormal returns, derived from the coefficients of the green dummy variables. From a one-sided t-test of the difference between the effect of the green dummy on the underpricing factors, we find that the effect for the 30-day underpricing factor is significantly larger.[42] This finding suggests that the price premium on green companies on Euronext Growth takes some time to be fulfilled.

The positive underpricing effect for green companies found in this thesis, breaks with some previous research on green energy companies (Anderloni & Tanda, 2017), that have not found significantly higher underpricing when controlling for other factors. However, our findings are in line with Ritter's (1984) work on the 1980 hot issue market in the US. Ritter found that almost all the underpricing in that year could be attributed to a single industry, the oil and gas sectors. Additionally, the green underpricing effect can also be explained by green companies have higher ex-ante uncertainty, as explained below.

We argue that there are two competing explanations for the greater underpricing among green companies. The first one deals with the uncertainty related to the pricing of green companies in the private placement, while the second separates between how primary and secondary market investors value issues. As mentioned in section 3.5.1 Green and tech firms issues with greater ex-ante uncertainty (uncertainty about the true value of the issue per share) will have greater expected underpricing, according to Beatty & Ritter (1986). We judge the green companies in our sample to have greater ex-ante uncertainty than the average company in our sample, given their limited track-record and valuations largely depending on growth options. Consequently, we should expect these issues to be more underpriced, which is also what we find. It also may be that the winner's curse is intensified by higher ex-ante uncertainty, as Beatty & Ritter (1986) argue (underpricing compensates investors for the greater cost of being informed), which can perhaps explain the higher underpricing on Euronext Growth in general (compared to the main list on the Oslo Stock Exchange in other periods) and green companies in particular. It can be seen as more costly for an investor to become fully informed about the prospects of Euronext Growth companies, thus they demand a discount in the offer price to be willing to participate in the initial private placement.

Furthermore, issues with higher ex-ante uncertainty, also have larger pricing errors since they are more difficult to value (see Lowry et al (2010)). The initial abnormal return of the green companies

[42] A one-sided independent t-test of the difference in the green coefficients gives a t-statistic greater than 13.

in our sample averages 54.7% and ranges from -11.4% to 198.1%, illustrating underwriters' difficulty in valuing companies characterized by high ex-ante uncertainty. The standard deviation of the initial abnormal returns is 44% for the full sample (see Table 11) but only 26% when excluding the green companies, confirming the positive relation between mean and volatility of underpricing.

A second plausible explanation is that the investors who participate in the initial offering of shares in the private placement, tend to be more modest in their valuations, compared to the secondary market investors that begin trading the issued shares after listing. The tendency of professional investors participating in the bookbuilding to have lower valuations compared to retail investors in the secondary market, may be due to the professional investors relying more on fundamental valuation techniques, compared to retail investors. It can also be the result of professional investors holding different quality information compared to other investors, in line with information asymmetry arguments, such as in Rock (1986) or Leite's (2006) elaborated model.

The differences in valuation between retail investors and professional investors can also be a result of overoptimism among retail investors. Such an explanation is in line with Ritter and Welch (2002). Overoptimism among retail investors who buy shares from institutional investors can drive up stock prices and explain the underpricing effect of green companies. It is plausible that retail investors get more influenced by the media attention and hype around green companies compared to investors participating in the bookbuilding. The placements on Euronext Growth are directed towards institutional and high net worth private investors, while smaller retail investors enter in the aftermarket after the issue has been listed. While we do not identify the demand curve of these investor groups, there is ample evidence that retail investors have entered the Norwegian stock market in large numbers after the market collapse caused by the coronavirus pandemic in March 2020 and many of them have bought shares in Euronext Growth companies.[43]

For the whole sample, we find the average underpricing measured as initial abnormal return and 30-day abnormal return to be respectively 21.45% and 32.15%. The relatively high level of underpricing can be seen in light of the seemingly strong sentiment among investors on Euronext

[43] According to figures from the non-profit foundation AksjeNorge and Euronext VPS, the Oslo Stock Exchange has absorbed more than 130.000 new private investors since before the coronavirus pandemic: *https://aksjenorge.no/aktuelt/2021/04/09/vekst_q1/*

Growth. Initial private placements on Euronext Growth from the second half of 2020 and onwards have sparked significant interest from investors with most recent placements being several times oversubscribed. A comparison can be made to IPOs on the Oslo Stock Exchange's main list in the same period, 2016-2021. The main list does not display the same hot market tendencies found on Euronext Growth. The underpricing among recent listings on the main list, is considerably more modest in comparison to Euronext Growth[44], which leads us to conclude that the existence of a hot market is limited to the latter marketplace. The comparison sample on the main list is small. In 2020, the most active year on Euronext Growth so far, there were only 9 new listings on the main list, of which only four were the result of IPOs and one was a private placement.[45] The remainder were transfers from Euronext Growth or Euronext Expand. At the time of writing thus far in 2021, three companies have transferred from Euronext Growth to the main list, and several are expected to those so in the months to come.

Differences in underpricing between Euronext Growth and the main list may be due to differences in the firm characteristics of the companies that list on the different marketplaces. Companies listing on Euronext Growth are typically young, in a growth phase and with limited track record. These factors should imply higher underpricing on Euronext Growth compared to the main list. Moreover, Euronext Growth is a smaller and less liquid marketplace than the main list. According to risk-return theory, issues with lower liquidity should be more underpriced as investors demand to be compensated for the liquidity risk of the shares they are buying. While we have not investigated the relation between liquidity and underpricing in this thesis, we observe that several of the most underpriced issues in our sample also had large share turnovers (a measure of liquidity) on the first day of trading. The three most underpriced issues in our sample – Horisont Energi (236%), Aker Carbon Capture (198%) and Aker Offshore Wind (133%) had turnovers on the first of trading of respectively 55 MNOK, 105 MNOK and 106 MNOK. Thus, we do not expect that including a liquidity measure would have affected our results substantially.

Amongst our other hypotheses, we find less significant results. We do not find support for the first hypothesis that listings after the covid outbreak have significantly higher underpricing compared to listings before the pandemic. That is: we find no evidence that the hot marked period following

[44] The exception here is Pexip (listed 14.05.20) which had a first-day return of 38.89% and 30-day return of 42.52% in comparison to its IPO price.
[45] New listings on Oslo Stock Exchange's main list are found at: *https://live.euronext.com/en/ipo-showcase*

the covid outbreak has significantly higher underpricing compared to the relatively colder market period before March 2020. This finding can be seen in light of the limited sample size of just 18 listings in the pre covid period.

We do not find evidence in favor of our third hypothesis that tech companies also have higher underpricing. Initial abnormal returns differ substantially for the tech companies in our sample with an average of 4.2%. When including control variables, we find the effect of being a tech firm to be significantly negative for initial returns and not significant for 30-day returns. This finding is in sharp contrast to the extreme levels of underpricing among tech stock IPOs in the US during the dotcom bubble and in 2020. Ritter (2021) finds an equally weighted average first-day return of 63.7% for tech companies in 2020, substantially above the first day return for non-tech companies at 34%. Again, it should be noted that our sample size is limited to only 20 tech companies. Neither can we draw the conclusion that tech in itself causes negative abnormal returns, also known as overpricing.

Likewise, we do not find support for the fourth hypothesis that cornerstone investments result in higher underpricing, for either initial or 30-day returns. This is in contrast to previous studies[46] of initial public offerings in Scandinavia, which found that the presence of cornerstone investments results in higher underpricing. Cornerstone investors sending positive signals to the market about firm quality, resulting in increased demand for the issue on the first day of trading, was presented as a possible explanation for the higher underpricing. We are not able to verify this proposed explanation for Euronext Growth. While McNaughton & Cole (2015) write that a lock-up period is a typical feature for cornerstone investments in Europe, we are not able to confirm the existence of lock-up periods in cornerstone agreements on Euronext Growth. Lock-up periods usually last at least six months and prevent investors from selling their shares in this period. They thus provide greater stability for the issue in the aftermarket and help drive demand since fewer free float shares are available for purchase (McNaughton & Cole, 2015). Additionally, the market can anticipate when a secondary exit from the lock-up is likely to occur. The apparent absence of lock-up on Euronext Growth can perhaps explain our finding that cornerstone investments in initial private placements have a non-significant effect on underpricing.

[46] Master theses by Grepp and Sørensen (2017), and Engman and Pehrson (2017).

## 6.5 Medium term performance

In addition to the regressions on initial and 30-day returns, we also looked into 90 and 180-day returns to investigate whether our findings also hold on a medium term. Increasing the time frame meant that we could not include all initial private placements since had firms had only been listed recently. For the 90-day returns we had 65 observations (see Table 22), while for the 180-day returns we had 49 observations (see Table 23). We focus our attention on the abnormal return column for both 90 and 180 days. The mean abnormal return for 90 days is 66.14%, while the median return is only 13.26%, suggesting that the large average return is driven by a few outliers. The standard deviation is 130.79%, which is much larger than for both initial and 30-day returns, indicating a wider distribution with larger outliers. Extending returns to 180 days, the mean abnormal return falls to 53.10% and the median falls 5.83%. The standard deviation increases further as some observations have very large abnormal returns, with the maximum 180-day abnormal return being 915.29%.[47]

We have further made similar regressions on the underpricing factor of the 90 and 180-day returns as for the initial and 30-day returns (see Appendix 6). We find that the green dummy is still significant on a 1% level, with a positive sign. As we increase the time horizon to 90-day and then 180-day returns, the green coefficient becomes larger, indicating that green companies are associated with a greater price increase on a 90-day and 180-day interval following listing. For example, the green dummy in regression (4) in Table 24 has a coefficient of $0.719$, which denotes that on average green companies have a $e^{0.719} - 1 = 105.2\%$ larger 90-day underpricing factor, meaning (30d AR+1) is increased by 105.2%. This translates to an increase in the 90-day abnormal return of more than 105.2 percentage points for most companies. Similarly, for 180-day returns, the green dummy coefficient of regression (4) (see Table 25) of 0.884 denotes that most green companies should have 142% higher 180-day underpricing.

The apparent medium term underpricing effect for green companies seem unintuitively strong. We are thus careful to conclude that this is a sign of underpricing. A natural explanation for the seemingly high effect of green companies is that green companies in general have increased in value over the period for our sample. Furthermore, the OSEAX, as our market adjuster, fails to

[47] The carbon capture company Aker Carbon Capture had a 180-day abnormal return of 915.29%.

correct for all the price increase on a 90 and 180-day period, since it is an index of the Norwegian stock market as a whole, and not the green sector. The greater magnitude of the green dummy coefficient on longer time horizons can thus be a result of the green industry having risen more than the rest of the market, opposed to being a result of underpricing.

## 6.6 Limitations and further research

Now that we have presented and discussed our findings, we also want to highlight the limitations of our study and provide suggestions for further research. The most important limitations are the small sample size and the short time frame, as well as the market adjuster used and the possibly biased classification of green companies.

Euronext Growth was established relatively recently, in 2016, and the majority of listings on the marketplace have come in 2020 and the beginning of 2021. On the basis of number of listings, we decided to separate our sample into two periods, before and after the covid outbreak, with the first period considered a cold market and the second period a hot market. Since the first period only consisted of 18 observations, it is hard to draw any definitive conclusion about our first hypothesis. We do not find any statistical difference in abnormal returns between listings before and after the covid outbreak. We could have characterized each individual month, as either hot, cold, or neutral depending on number of listings, but chose to not do so due to the limited sample size and time frame.

As mentioned in the previous section, the OSEAX index used to adjust for market returns, does not reflect the observations in our sample very well. Thus, we are not able to appropriately adjust for the price increase in different sectors when estimating abnormal returns. This has a greater effect on longer term returns, such as 30-day, 90-day, and 180-day. Initial returns are less affected by this limitation.

Furthermore, it should be noted that the sample of green companies is taken from a condensed time period spanning a few months. The significantly higher underpricing of green companies may not hold up for a larger sample size or when looking at a longer time frame. Our classification of companies as green was based on our best judgement of the main activities of the company. What the correct classification looks like is certainly up for discussion, and a different study could have come up with a different grouping of companies. Sequentially, the regression results on initial

abnormal returns would be different. Given our classification, "green" companies have statistically higher underpricing than non-green companies, also when controlling for relevant factors. It is important to emphasize that a statistically significant correlation does not prove a causal effect. It may be that the green companies we have classified also share some other unobserved characteristic that serve as the driver of higher underpricing (omitted variable bias). It should also be noted that the green dummy implies a binary outcome in which a company is either green or non-green, while in reality a company can be deemed as either more or less green on a continuing spectrum. However, for the purpose of our thesis we found using a dummy variable to be most appropriate.

Further, some firms had to be excluded from our final sample due to missing information, while for other firms we were not able to obtain first day returns and had to use second day returns instead. Both limitations may have resulted in biased results. Lastly, we did not include information on whether the initial private placements were venture-capital-backed or the underwriter characteristics of each offering, including quality and quantity of underwriters. These variables have previously been shown to be related to the level of underpricing.

Based on our study, we see several pathways for further research. As more companies get listed on Euronext Growth it would be interesting to study whether the green effect found in this thesis is present for a larger sample, in addition to factors found to be insignificant such as tech and cornerstone investments. It would also be worth studying the long-run performance (more than 1 year) of initial private placements on Euronext Growth in the future when more issues have been listed for a longer period. Such a study could shed light on the relatively sparsely studied long-run performance of initial private placements and whether they underperform similar to IPOs in relation to comparable firms. More initial private placements on Euronext Growth will also make possible a broader comparison with initial public offerings on the Oslo Stock Exchange.

# 7. Conclusion

Previous research has documented the existence of underpricing among initial public offerings, i.e., when the first day closing price (or 30-day closing price) is higher than the subscription price in the offering prior to listing. However, there has been little research on the underpricing of the alternative way of going public, through an initial private offering or placement prior to listing, in which only certain pre-determined investors are invited to participate.

We study underpricing among initial private placements on the rapidly growing Euronext Growth Oslo marketplace since its opening under the name of Merkur Market in 2016, until March 1st, 2021. Euronext Growth differs from a traditional stock exchange due to its less strict listing requirements, making it a more suitable marketplace for young growth companies, many of them being renewable or cleantech companies considered to be part of a green wave. To our knowledge, this is the first study of underpricing among listings on Euronext Growth.

We investigate underpricing with regards to both initial day and 30-day abnormal returns and find an average abnormal underpricing of 21.45% and 32.15% respectively for each measure. Based on previous literature, we identify four hypotheses about underpricing on Euronext Growth. The first hypothesis was that underpricing would be higher for the post covid-19 outbreak period, defined as a hot market with a high number of listings, compared to the cold market from 2016 until the covid-19 outbreak, which had relatively few listings. We do not find evidence that underpricing is significantly higher in the latter period with many listings, in contrast to previous research on hot markets.

Our second and third hypotheses were that green and tech companies respectively would be associated with higher underpricing. A company was classified as green if its main activities are targeted towards directly reducing pollution, greenhouse gases, creating or facilitating renewable energy, while the tech classification was based om ICB subsector codes. We find evidence of green companies having significantly higher underpricing than non-green companies, with a positive underpricing factor of 26.2 percentage points for initial abnormal returns and 53.6 percentage points for 30-day abnormal returns, using firm age, size, and market volatility as significant control variables. Tech firms, on the other hand, are found to have a weakly negative association with initial returns and the variable non-significant with respect to 30-day returns. The latter finding

stands in contrast to the high underpricing found in previous research among tech firms in the United States, especially during the dotcom bubble (see Michael & Denis (2004) and Walker et al. (2015)) and in 2020 (Ritter, 2021).

The fourth hypothesis was that the presence of cornerstone investors in initial private placements would be associated with higher underpricing since less shares need to be sold in the normal subscription period and having cornerstones sends a positive signal to the market of the company's prospects. Contrary to previous master theses focusing on Scandinavia (see Grepp & Sørensen (2017) and Engman & Pehrson (2017)), we do not find that cornerstone backed offerings are positively related to underpricing when controlling for other factors. This finding can possibly be explained by the apparent absence of lock up periods for cornerstone investors, which prevent investors from selling shares for typically six months or more, on Euronext Growth.

With this thesis, we extend the literature on IPO underpricing to a new segment of the Norwegian market, laying forth evidence of underpricing in initial private placements. Future researchers are encouraged to investigate whether the positive association between green companies and underpricing holds for a larger sample size and time frame, as well as look into the long-term performance of initial private placements on Euronext Growth.

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# Appendix

## Appendix 1: Classification of green and tech companies

As described in section 5.2.2 Green dummy, green companies are classified according to their main activities.

For identification of tech companies, we use specific ICB subsector codes, similar to Loughran and Ritter's (2004) method. The ICB subsector codes presented in Table 15 were used for identification of tech companies.

**ICB subsectors for tech identification**

| *Subsector ICB* | *ICB Code* |
|---|---|
| Consumer Electronics | 40203010 |
| Electronic Entertainment | 40203040 |
| Electronic Equipment: Gauges and Meters | 50202025 |
| Electronic Equipment: Other | 50202040 |
| Electronic Equipment: Pollution Control | 50202030 |
| Health Care Services | 20101025 |
| Professional Business Support Services | 50205020 |
| Recreational Services | 40501030 |
| Software | 10101015 |
| Telecommunications Equipment | 15101010 |

*Table 15: Subsector ICB codes used for tech identification.*

One can note from the table that subsector 20101025 (Health Care Services), 40501030 (Recreational Services) and 15101010 (Telecommunications Equipment) will not always include tech companies. However, for our dataset, the companies in these sectors were: CSAM Health Group, PatientSky Group, Skitude, Cyviz and Huddly. These are all clearly tech companies, such that these codes were included, even though this tech identification will not work for all datasets.

Table 16 shows an overview of all companies in the sample, with the tech and green classifications, as well as the companies' reported main activities at listing from the filed information document.

**Table of tech and green classifications**

| *Company* | *Tech* | *Green* | *Main activities* |
|---|---|---|---|
| ADS Crude Carriers | No | No | Owning and operating tanker vessels |
| Agilyx | No | Yes | Recycling of plastics into various products |
| Airthings | No | No | Provides air quality monitoring devices and software |
| Aker BioMarine | No | No | Harvests and processes krill to different products |
| Aker Carbon Capture | No | Yes | Develops carbon capture and storage solutions |
| Aker Horizons | No | Yes | Holding company for renewable investments |
| Aker Offshore Wind Holding | No | Yes | Source, develop and structure offshore wind projects |
| Andfjord Salmon | No | No | Salmon farming |
| Arctic Bioscience | No | No | Create dietary products from marine sources |
| Arctic Fish Holding | No | No | Salmon farming |
| Atlantic Sapphire | No | No | Land-based salmon farming |
| ayfie Group | No | No | Text analytics and machine learning services |
| BEWi | No | No | Distributes packaging and insulation solutions |
| Black Sea Property | No | No | Real estate investing. |
| Cambi | No | Yes | Thermal hydrolysis solutions of wastewater |
| Cloudberry Clean Energy | No | Yes | Produce renewable energy: Operate hydro- and wind power plants |
| CSAM Health Group | Yes | No | Provides e-health solutions |
| Cyviz | Yes | No | Video conferencing solutions |
| Elektroimportøren | No | No | Selling of electrical equipment |
| Elliptic Laboratories | Yes | No | Develops sensor solutions for electronic devices |
| ELOP | Yes | No | Develops device for scanning concrete structures |
| Everfuel | No | Yes | Offers hydrogen fueling solutions for various vehicles |
| EXACT Therapeutics | No | No | Develops an ultrasound therapeutic device |
| Flyr | No | No | Airline operator |
| Gentian Diagnostics | No | No | Developing health diagnostics reagents and materials. |
| Grong Sparebank | No | No | General banking and insurance services |
| Hexagon Purus | No | Yes | Develops hydrogen cylinders, battery storage systems and system integration solutions for fuel cell and battery electric drivetrains |
| Horisont Energi | No | Yes | Blue hydrogen production |
| House of Control Group | Yes | No | Develops business control software |
| Huddlestock Fintech | Yes | No | Financial software development |
| Huddly | Yes | No | Develops video conferencing cameras |
| HydrogenPro | No | Yes | Designs and supplies green hydrogen plants |
| Ice Fish Farm | No | No | Owns companies operating in different parts of the salmon farming value chain |
| Icelandic Salmon | No | No | Salmon farming |
| J.P. Kenny Petroleum | No | No | Oil and gas exploration and production |
| Kahoot | Yes | No | Educational technology |
| Kalera | No | No | Develops hydroponic production facilities for growing vegetables |

| | | | |
|---|---|---|---|
| Kingfish | No | No | Fish farming |
| Lifecare | No | No | Developing a glucose measuring device |
| Lillestrøm Sparebank | No | No | General banking services |
| Meltwater | Yes | No | Search engine and analytics development |
| Mercell Holding | Yes | No | E-tendering and procurement services |
| Mintra Holding | Yes | No | E-learning services |
| Monobank (Brabank) | No | No | Unsecured lending services |
| MPC Container Ships | No | No | Investing in maritime assets; mainly container ships |
| MPC Energy Solutions | No | Yes | Renewable energy projects (solar and wind) |
| Norcod | No | No | Cod farming |
| Nordic Aqua Partners | No | No | Land-based salmon farming |
| Nordic Unmanned | Yes | No | Delivers systems to remote control aircrafts |
| Nortel | No | No | Telecom provider |
| Ocean Sun | No | Yes | Provides water-based solar power plant technology |
| OHT | No | No | Heavy offshore transportation services |
| Okeanis Eco Tankers | No | No | Owning and operating tanker vessels |
| Otovo | No | Yes | Online marketplace for residential solar systems |
| PatientSky Group | Yes | No | Delivers e-health solutions |
| Play Magnus | Yes | No | Develops and owns chess playing platforms |
| Proximar Seafood | No | No | Land-based salmon farming |
| Pryme | No | Yes | Recycling of plastic to hydrocarbons, including fuel |
| Rana Gruber | No | No | Iron ore mining |
| River iGaming p.l.c | No | No | Online casino and lottery applications |
| Romsdal Sparebank | No | No | General banking services |
| Salmon Evolution Holding | No | No | Land based salmon farming |
| Sikri Holding | Yes | No | Provides archive software solutions |
| Skandia GreenPower | No | No | Electricity selling company |
| Skitude | Yes | No | Delivers and develops software for the ski industry |
| Sonans Holding | No | No | Private education provider |
| Songa Bulk | No | No | Shipping services |
| Sunndal Sparebank | No | No | General banking services |
| Surnadal Sparebank | No | No | General banking services |
| Tysnes Sparebank | No | No | General banking services |
| Volue | Yes | Yes | Develops software solutions targeted mainly towards renewable energy producers |
| Xplora Technologies | Yes | No | Develops smartwatches for children |
| Zaptec | Yes | Yes | Develops and sells electric vehicle chargers |
| Zwipe | Yes | No | Contactless and biometrics technology |

*Table 16: Overview of tech and green classifications based on main activities for the firms in the sample.*

## Appendix 2: Distribution of dependent variables

### *A: Initial return*

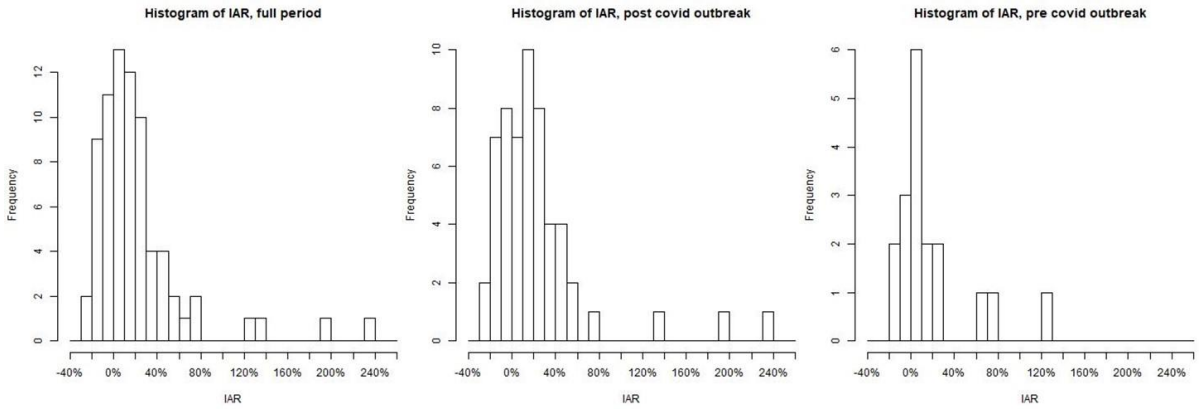


*Figure 4: Distribution of initial abnormal returns.*

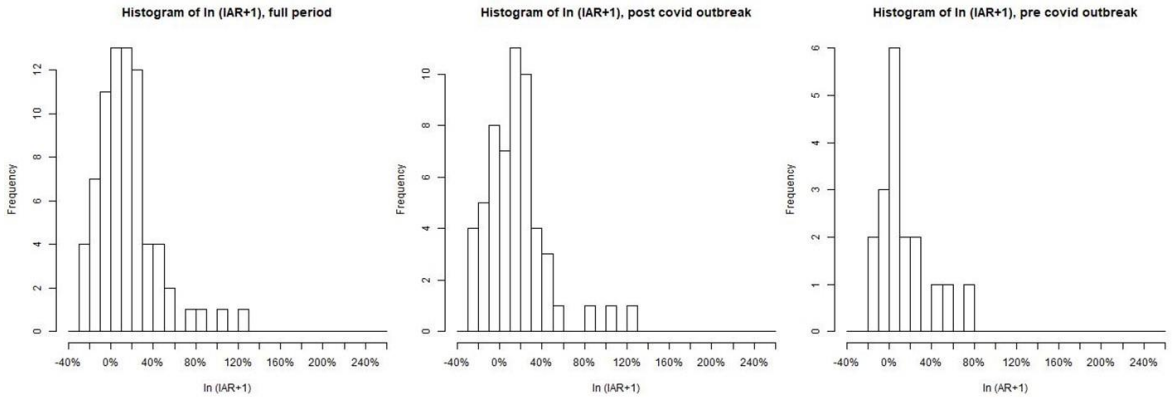


*Figure 5: Distribution of ln(IAR+1).*

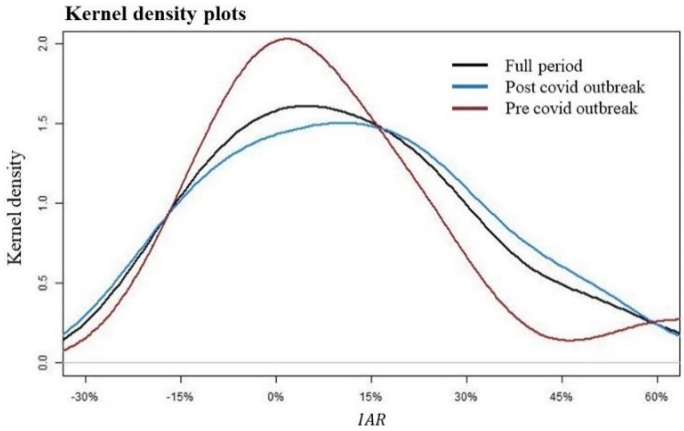


*Figure 6: Kernel density plots of initial abnormal returns.*

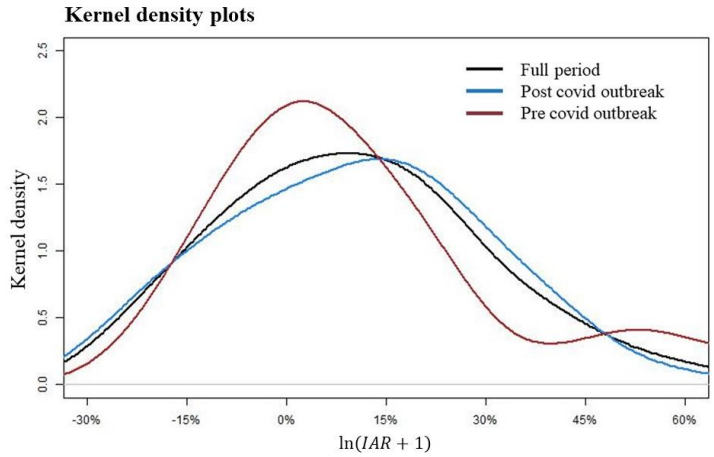


*Figure 7: Kernel density plots for ln(IAR+1).*

## *B: 30-day return*

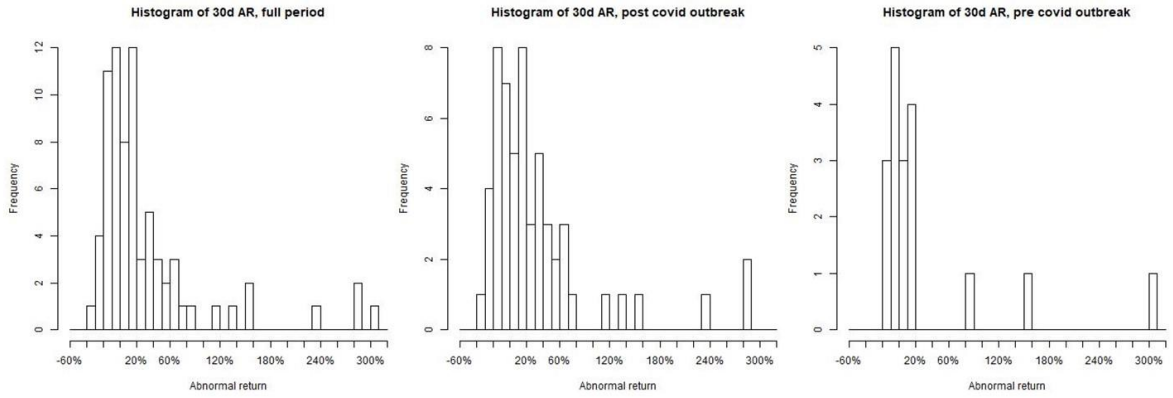


*Figure 8: Distribution of 30-day abnormal returns.*

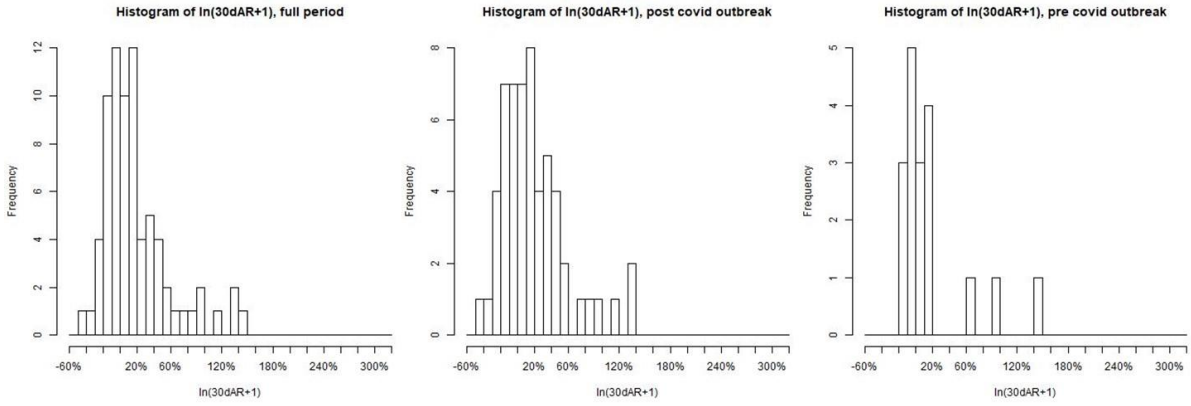


*Figure 9: Distribution of ln(30 dAR+1).*

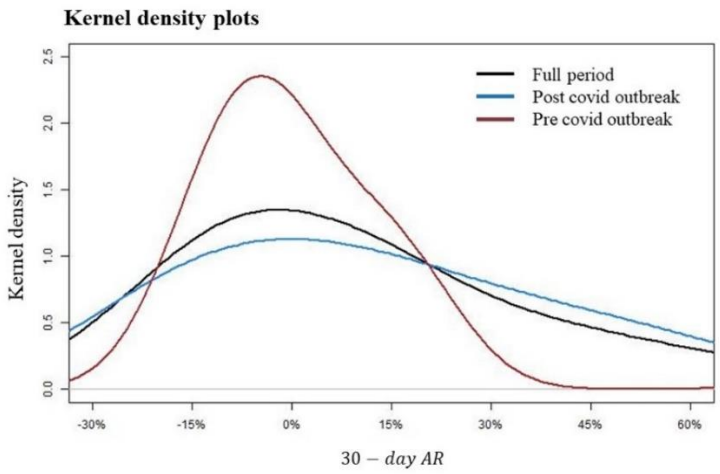


*Figure 10: Kernel density plots of 30-day abnormal returns.*

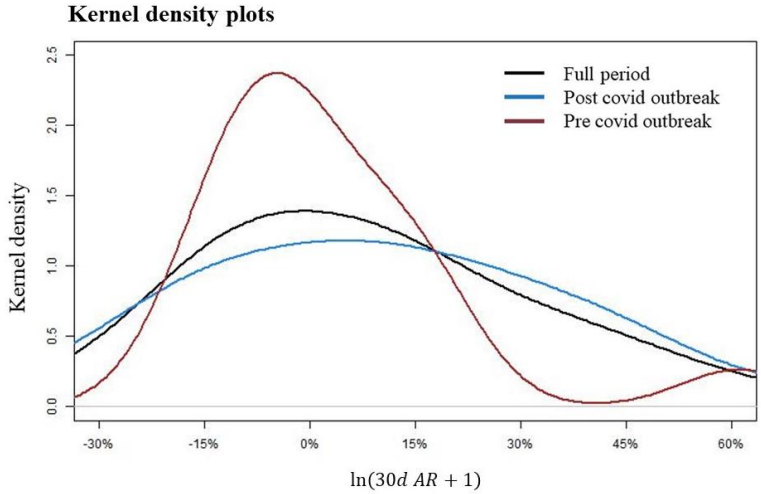


*Figure 11: Kernel density plots of ln(30d AR+1).*

## Appendix 3: Residual plots and tests for auto correlation

*A: Residual plots*

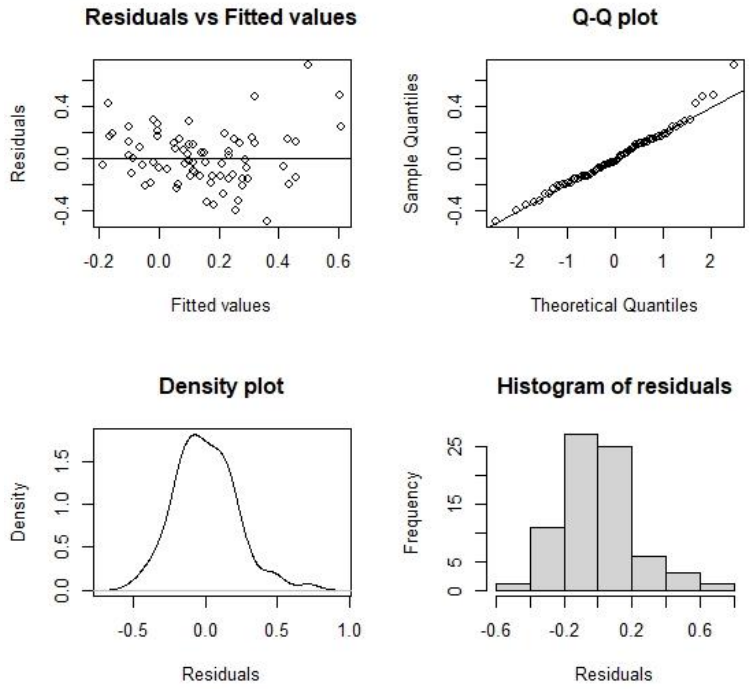


*Figure 12: Residual plots for initial abnormal returns regression 4.*

*The above figure shows four different residual plot for the preferred initial abnormal returns regression (4). The upper left plot is the residual vs fitted values plot, which indicates whether the residuals have constant variance. The upper right plot is the normal probability plot (qnorm), which indicates whether the residuals are normally distributed. The density plot and histogram indicate the distribution of the residuals.*

The residual vs fitted values plot has some outliers to the right but gives reason to believe that homoscedasticity assumption can be accepted. There are some deviations from the trend line in the normality probability plot, but it otherwise looks okay. The density plot and histogram of the residuals do not depict a perfectly normal distribution of the residuals, but the residuals still look to be distributed around zero. We run the Breusch Pagan test (see Table 19) to further detect homoscedasticity and find that the test statistic is significant at the 10% level. The same regression with robust standard errors (Table 20) does not alter the significance of the variables much.

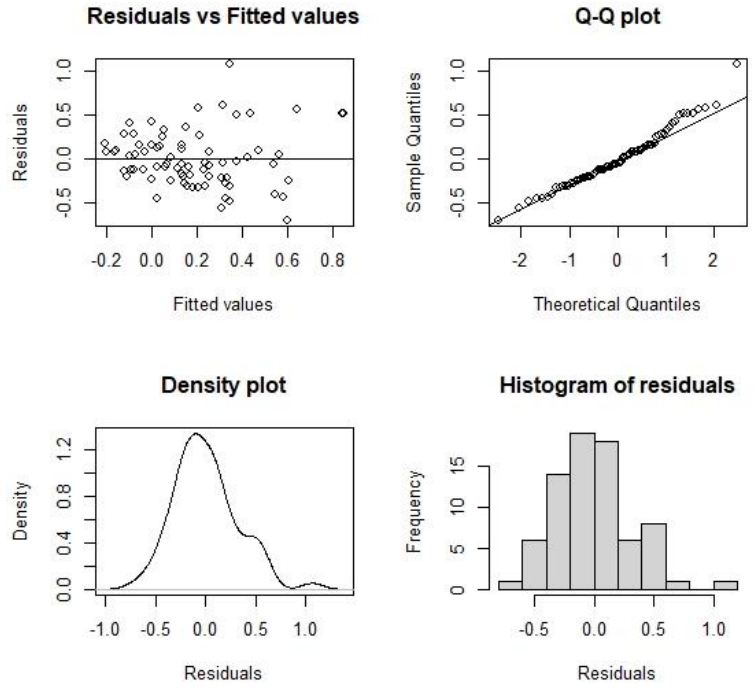


*Figure 13: Residual plots for 30-day abnormal returns regression 4.*

*The above figure shows four different residual plot for the preferred 30-day abnormal returns regression (4). The upper left plot is the residual vs fitted values plot, which indicates whether the residuals have constant variance. The upper right plot is the is the normal probability plot (qqnorm), which indicates whether the residuals are normally distributed. The density plot and histogram indicate the distribution of the residuals.*

The residual vs fitted for the 30-day regression also has some outliers to the right but mostly looks okay. From the normality probability plot, we observe that some observations are not on the line while still being acceptable. The density plot and histogram of residuals indicate a distribution that is less shaped like a normal distribution compared to the initial return regressions. The Breusch Pagan test also reveals a significant test statistic at the 10% level. The same regression with robust standard errors (Table 21) does not alter the significance of the variables much.

*B: Durbin-Watson test statistics*

| Regression ln(IAR+1) | | | Regression ln(30d AR+1) | | |
|---|---|---|---|---|---|
| Model | D-W statistic | P-value | Model | D-W statistic | P-value |
| Reg1 | 1.8656 | 0.514 | Reg1 | 1.7677 | 0.254 |
| Reg2 | 1.8729 | 0.47 | Reg2 | 2.1543 | 0.574 |
| Reg3 | 1.863 | 0.418 | Reg3 | 2.2291 | 0.388 |
| Reg4 | 1.982 | 0.766 | Reg4 | 2.2793 | 0.332 |
| Reg5 | 2.0313 | 0.874 | Reg5 | 2.2693 | 0.374 |

*Table 17: Durbin-Watson test statistics for regressions on initial abnormal returns and 30-day abnormal returns. None of the test statistics are statistically significant, and it can be concluded that none of the regressions display autocorrelation in the residuals.*

## Appendix 4: Variance Inflation Factor

| Variance Inflation Factor (VIF) | |
|---|---|
| Variables | Factor |
| Ln placement size | 2.73 |
| Ln value | 2.77 |
| Ln age | 1.32 |
| Volatility | 1.26 |
| Post covid dummy | 1.81 |
| Green dummy | 1.29 |
| Tech dummy | 1.29 |
| Cornerstone dummy | 1.75 |
| NOTC dummy | 1.32 |
| GSO dummy | 1.33 |

*Table 18: Variance inflation indicator for all independent variables. Values above 5 indicate high correlation.*

.

## Appendix 5: Homoscedasticity

*A: Breusch Pagan test statistics*

| Regression ln(IAR+1) | | | Regression ln(30d AR+1) | | |
|---|---|---|---|---|---|
| Model | BP | P-value | Model | BP | P-value |
| Reg1 | 0.18691 | 0.6655 | Reg1 | 0.015401 | 0.9012 |
| Reg2 | 13.116* | 0.01072 | Reg2 | 8.7717* | 0.06707 |
| Reg3 | 16.116** | 0.01314 | Reg3 | 15.612** | 0.016 |
| Reg4 | 13.166* | 0.06816 | Reg4 | 13.45* | 0.06188 |
| Reg5 | 16.534* | 0.05653 | Reg5 | 13.115 | 0.1575 |

*Table 19: Breusch Pagan test statistics for regression on initial abnormal returns and 30-day abnormal returns. * indicates significance at the 10% level, ** at the 5% level and *** at the 1% level.*

*B: Regressions with robust standard errors*

**Regression results (OLS) with robust standard errors**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | ln (IAR+1) | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| **Post covid outbreak (dummy)** | 0.02 | 0.084 | 0.082 | 0.079 | 0.063 |
| | (0.071) | (0.080) | (0.079) | (0.078) | (0.078) |
| **Green (dummy)** | | 0.235** | 0.226** | 0.233*** | 0.249*** |
| | | (0.093) | (0.086) | (0.084) | (0.085) |
| **Tech (dummy)** | | -0.150*** | -0.134** | -0.161*** | -0.159*** |
| | | (0.051) | (0.054) | (0.055) | (0.058) |
| **Cornerstone (dummy)** | | -0.160** | -0.06 | -0.033 | -0.034 |
| | | (0.069) | (0.069) | (0.070) | (0.072) |
| **ln Value** | | | -0.075*** | -0.076*** | -0.082*** |
| | | | (0.023) | (0.022) | (0.027) |
| **ln Firm age** | | | -0.041** | -0.030* | -0.032* |
| | | | (0.018) | (0.018) | (0.019) |
| **Volatility** | | | | 23.331* | 24.646* |
| | | | | (12.666) | (12.490) |
| **OTC (dummy)** | | | | | -0.007 |
| | | | | | (0.098) |
| **GSO (dummy)** | | | | | 0.079 |
| | | | | | (0.070) |
| **Constant** | 0.134** | 0.142** | 1.703*** | 1.482*** | 1.589*** |
| | (0.059) | (0.060) | (0.476) | (0.480) | (0.561) |
| Observations | 74 | 74 | 74 | 74 | 74 |
| $R^2$ | 0.001 | 0.27 | 0.387 | 0.416 | 0.424 |
| *Note:* | | | | | **p<0.1; **p<0.05; ***p<0.01* |

*Table 20: Regressions on initial abnormal returns with robust standard errors.*

*The accompanying table presents the results of linear regressions assessing the effect of different variables on initial abnormal returns in initial private placements on Euronext Growth. The dependent variable ln (IAR+1) is the logged underpricing factor. The four independent variables are all dummy variables: a post covid outbreak dummy, a green company dummy, a tech firm dummy and a cornerstone investors dummy. The control variables include logarithmic transformations of company value at time of listing and firm age, a market volatility measure, as well as dummy variables for OTC listing and GSO. Robust standard errors are reported in parentheses below each coefficient.*

**Regression results (OLS) with robust standard errors**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | ln (30d AR+1) | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| **Post covid outbreak (dummy)** | 0.034 | 0.035 | 0.026 | 0.022 | -0.008 |
| | (0.110) | (0.119) | (0.118) | (0.118) | (0.127) |
| **Green (dummy)** | | 0.430*** | 0.416*** | 0.429*** | 0.431*** |
| | | (0.123) | (0.117) | (0.111) | (0.113) |
| **Tech (dummy)** | | -0.042 | -0.021 | -0.07 | -0.078 |
| | | (0.076) | (0.079) | (0.083) | (0.086) |
| **Cornerstone (dummy)** | | -0.200** | -0.092 | -0.04 | -0.044 |
| | | (0.094) | (0.095) | (0.093) | (0.094) |
| **ln Value** | | | -0.080** | -0.081** | -0.069* |
| | | | (0.033) | (0.031) | (0.038) |
| **ln Firm age** | | | -0.050* | -0.03 | -0.029 |
| | | | (0.027) | (0.030) | (0.031) |
| **Volatility** | | | | 43.356** | 42.946** |
| | | | | (19.581) | (19.357) |
| **OTC (dummy)** | | | | | -0.106 |
| | | | | | (0.106) |
| **GSO (dummy)** | | | | | 0.022 |
| | | | | | (0.084) |
| **Constant** | 0.159 | 0.161 | 1.825** | 1.415* | 1.212 |
| | (0.096) | (0.098) | (0.729) | (0.757) | (0.862) |
| Observations | 74 | 74 | 74 | 74 | 74 |
| $R^2$ | 0.001 | 0.245 | 0.32 | 0.369 | 0.376 |
| *Note:* | | | | | **p<0.1; **p<0.05; ***p<0.01* |

*Table 21: Regressions on 30-day abnormal returns with robust standard errors.*

*The accompanying table presents the results of linear regressions assessing the effect of different variables on 30-day abnormal returns in initial private placements on Euronext Growth. The dependent variable ln (30d AR+1) is the logged underpricing factor. The four independent variables are all dummy variables: a post covid outbreak dummy, a green company dummy, a tech firm dummy and a cornerstone investors dummy. The control variables include logarithmic transformations of company value at time of listing and firm age, a market volatility measure, as well as dummy variables for OTC listing and GSO. Robust standard errors are reported in parentheses below each coefficient.*

# Appendix 6: Medium-term performance

## *A: Descriptive statistics on 90-day returns*

**Descriptive statistics on 90-day returns**

| | Full period (65 obs.) | | | Post covid outbreak (47 obs.) | | | Pre covid outbreak (18 obs.) | | |
|---|---|---|---|---|---|---|---|---|---|
| | *90d R* | *90d AR* | *ln(90d AR+1)* | *90d R* | *90d AR* | *ln(90d AR+1)* | *90d R* | *90d AR* | *ln(90d AR+1)* |
| Mean | 75.88% | 66.14% | 0.26 | 89.95% | 78.96% | 0.291 | 39.14% | 32.67% | 0.184 |
| Std dev | 131.35% | 130.79% | 0.78 | 146.15% | 146.00% | 0.877 | 71.93% | 71.30% | 0.425 |
| | | | | | | | | | |
| Min | -84.06% | -97.85% | -3.84 | -84.06% | -97.85% | -3.841 | -22.68% | -27.59% | -0.323 |
| 25th percentile | -0.24% | -6.98% | -0.072 | 4.76% | -6.62% | -0.068 | -2.20% | -7.73% | -0.080 |
| Median | 22.29% | 13.26% | 0.125 | 25.61% | 22.24% | 0.201 | 10.12% | 2.47% | 0.024 |
| 75th percentile | 83.98% | 77.80% | 0.590 | 142.00% | 128.97% | 0.828 | 76.53% | 75.43% | 0.562 |
| Max | 631.34% | 616.75% | 1.970 | 631.34% | 616.75% | 1.970 | 259.23% | 249.14% | 1.250 |
| | | | | | | | | | |
| Kurtosis | 5.480 | 5.463 | 11.493 | 3.945 | 3.912 | 10.006 | 4.576 | 4.315 | 0.980 |
| Skewness | 2.213 | 2.215 | -1.828 | 1.951 | 1.954 | -1.920 | 2.105 | 2.050 | 1.263 |

*Table 22: Descriptive statistics on 90-day returns. It includes marked-adjusted 90-day return and the log-transformed variable of the market-adjusted 90-day return used in the regressions.*

## *B: Descriptive statistics on 180-day returns*

**Descriptive statistics on 180-day returns**

| | Full period (49 obs.) | | | Post covid outbreak (31 obs.) | | | Pre covid outbreak (18 obs.) | | |
|---|---|---|---|---|---|---|---|---|---|
| | *180d R* | *180d AR* | *ln(180d AR+1)* | *180d R* | *180d AR* | *ln(180d AR+1)* | *180d R* | *180d AR* | *ln(180d AR+1)* |
| Mean | 68.80% | 53.10% | 0.194 | 88.18% | 67.77% | 0.220 | 35.40% | 27.83% | 0.150 |
| Std dev | 155.67% | 155.88% | 0.595 | 188.30% | 189.67% | 0.679 | 63.11% | 63.67% | 0.427 |
| | | | | | | | | | |
| Min | -36.10% | -59.86% | -0.913 | -36.10% | -59.86% | -0.913 | -28.17% | -29.41% | -0.348 |
| 25th percentile | 1.00% | -14.02% | -0.151 | 4.52% | -17.64% | -0.194 | -0.75% | -13.38% | -0.144 |
| Median | 19.37% | 5.83% | 0.057 | 31.00% | 13.98% | 0.131 | 3.32% | -7.65% | -0.080 |
| 75th percentile | 70.00% | 48.20% | 0.393 | 70.00% | 48.20% | 0.393 | 84.99% | 94.32% | 0.664 |
| Max | 928.94% | 915.29% | 2.318 | 928.94% | 915.29% | 2.318 | 199.36% | 184.52% | 1.046 |
| | | | | | | | | | |
| Kurtosis | 19.944 | 20.016 | 2.875 | 13.588 | 13.651 | 2.395 | 1.443 | 0.678 | -0.493 |
| Skewness | 4.087 | 4.086 | 1.421 | 3.466 | 3.473 | 1.360 | 1.509 | 1.352 | 0.997 |

*Table 23: Descriptive statistics on 180-day returns. It includes marked-adjusted 180-day return and the log-transformed variable of the market-adjusted 180-day return used in the regressions.*

## *C: Regressions on 90-day performance*

**Regression results (OLS)**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | ln (90d AR+1) | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| **Post covid outbreak (dummy)** | 0.144 | 0.071 | 0.095 | 0.076 | 0.102 |
| | (0.152) | (0.164) | (0.162) | (0.162) | (0.169) |
| **Green (dummy)** | | 0.709*** | 0.699*** | 0.719*** | 0.716*** |
| | | (0.160) | (0.155) | (0.155) | (0.159) |
| **Tech (dummy)** | | 0.119 | 0.103 | 0.079 | 0.096 |
| | | (0.144) | (0.142) | (0.143) | (0.147) |
| **Cornerstone (dummy)** | | -0.347** | -0.153 | -0.120 | -0.120 |
| | | (0.139) | (0.153) | (0.154) | (0.157) |
| **ln Value** | | | -0.137** | -0.137** | -0.134** |
| | | | (0.054) | (0.053) | (0.062) |
| **ln Firm age** | | | -0.038 | -0.023 | -0.021 |
| | | | (0.035) | (0.036) | (0.037) |
| **Volatility** | | | | 35.674 | 36.003 |
| | | | | (27.380) | (27.754) |
| **OTC (dummy)** | | | | | 0.075 |
| | | | | | (0.193) |
| **GSO (dummy)** | | | | | -0.142 |
| | | | | | (0.216) |
| **Intercept** | 0.184 | 0.177 | 2.958*** | 2.593** | 2.515* |
| | (0.129) | (0.112) | (1.079) | (1.109) | (1.262) |
| Observations | 65 | 65 | 65 | 65 | 65 |
| $R^2$ | 0.014 | 0.299 | 0.374 | 0.392 | 0.399 |
| Adjusted $R^2$ | -0.002 | 0.252 | 0.309 | 0.317 | 0.300 |
| F Statistic | 0.901 (df = 1; 63) | 6.392*** (df = 4; 60) | 5.773*** (df = 6; 58) | 5.250*** (df = 7; 57) | 4.053*** (df = 9; 55) |
| *Note:* | | | | | **p<0.1; **p<0.05; ***p<0.01* |

*Table 24: Regressions on 90-day returns.*

*The accompanying table presents the results of linear regressions assessing the effect of different variables on 90-day abnormal returns in initial private placements on Euronext Growth. The dependent variable ln (90d AR+1) is the logged underpricing factor. The factor is calculated in a similar way as the initial and 30-day underpricing factor. The four independent variables are all dummy variables: a post covid outbreak dummy, a green company dummy, a tech firm dummy and a cornerstone investors dummy. The control variables include logarithmic transformations of company value at time of listing and firm age, a market volatility measure, as well as dummy variables for OTC listing and GSO. Standard errors are reported in parentheses below each coefficient.*

*D: Regressions on 180-day performance*

**Regression results (OLS)**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | ln (180d AR+1) | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| **Post covid outbreak (dummy)** | 0.070 | -0.035 | -0.071 | -0.099 | -0.061 |
| | (0.178) | (0.183) | (0.184) | (0.183) | (0.197) |
| **Green (dummy)** | | 0.954*** | 0.896*** | 0.884*** | 0.886*** |
| | | (0.193) | (0.188) | (0.185) | (0.193) |
| **Tech (dummy)** | | -0.156 | -0.117 | -0.162 | -0.136 |
| | | (0.178) | (0.176) | (0.176) | (0.185) |
| **Cornerstone (dummy)** | | -0.220 | -0.125 | -0.035 | -0.053 |
| | | (0.181) | (0.186) | (0.192) | (0.200) |
| **ln Value** | | | -0.071 | -0.059 | -0.066 |
| | | | (0.061) | (0.061) | (0.071) |
| **ln Firm age** | | | -0.082** | -0.048 | -0.049 |
| | | | (0.037) | (0.043) | (0.044) |
| **Volatility** | | | | 59.936 | 53.831 |
| | | | | (39.706) | (41.973) |
| **OTC (dummy)** | | | | | 0.093 |
| | | | | | (0.223) |
| **GSO (dummy)** | | | | | -0.185 |
| | | | | | (0.372) |
| **Intercept** | 0.150 | 0.159 | 1.701 | 0.847 | 1.027 |
| | (0.142) | (0.113) | (1.231) | (1.338) | (1.508) |
| Observations | 49 | 49 | 49 | 49 | 49 |
| $R^2$ | 0.003 | 0.413 | 0.480 | 0.507 | 0.512 |
| Adjusted $R^2$ | -0.018 | 0.359 | 0.406 | 0.423 | 0.399 |
| F Statistic | 0.153 (df = 1; 47) | 7.730*** (df = 4; 44) | 6.460*** (df = 6; 42) | 6.031*** (df = 7; 41) | 4.544*** (df = 9; 39) |
| *Note:* | | | | | **p<0.1; **p<0.05; ***p<0.01* |

*Table 25: Regressions on 180-day returns.*

*The accompanying table presents the results of linear regressions assessing the effect of different variables on 180-day abnormal returns in initial private placements on Euronext Growth. The dependent variable ln (180d AR+1) is the logged underpricing factor. The factor is calculated in a similar way as the initial and 30-day underpricing factor. The four independent variables are all dummy variables: a post covid outbreak dummy, a green company dummy, a tech firm dummy and a cornerstone investors dummy. The control variables include logarithmic transformations of company value at time of listing and firm age, a market volatility measure, as well as dummy variables for OTC listing and GSO. Standard errors are reported in parentheses below each coefficient.*