LUISS

Degree Program in Corporate Finance

Course of M&A and Investment Banking

Underpricing and ESG disclosure: an empirical analysis of European IPOs.

Prof. Leopoldo Maria Attolico

SUPERVISOR

Prof. Leone Pattofatto

CO-SUPERVISOR

Karl Lenkiewicz - 759141

CANDIDATE

Academic Year 2023/2024

Table of contents

Introduction *3*

1.1 The IPO process 14

1.2 The ESG financial ecosystem 21

2 Literature review *31*

2.1 Information asymmetry 32

2.2 Signalling theory 35

2.3 Issue specific factors 37

2.4 Firm characteristics 41

2.5 Exogenous factors 46

2.6 Regulation 50

2.7 The impact of ESG on IPO performance 60

3 Empirical research *69*

3.1 Data and methodology 71

3.2 Summary and descriptive statistics 74

3.3 Empirical results 81

3.4 Robustness tests 89

Discussion of results and conclusion *90*

References *93*

Appendix: list of figures and tables. *99*

Introduction

Sustainability related issues and ESG reporting are currently a widely debated subject. The appetite for greater ESG disclosure is brought about by the ever-increasing relevance of sustainability related issues in the investment decision making process of institutional investors. The demand for reliable, high quality ESG data permeates the market of initial public offerings as the first offering of a company's shares on the stock market sets the transition from a private company to a public company, moment in which informational asymmetries are more pronounced thus disclosure is most needed. Enhanced scrutiny over the ESG performance of an issuer is not only relevant to investors, but also to consumers, employees, regulators and other stakeholders.

Extant literature on IPO underpricing is vast and spans across several decades of research. Many have been the theories which attempt to explain such phenomena, yet the relationship between underpricing and sustainability, more precisely ESG disclosure is still an under discovered topic for the most part, mainly due to its recent rise in popularity.

This research thesis aims to investigate whether higher ESG disclosure leads to a decrease in the underpricing of initial public offerings.
The starting point of this study finds the ground in past research, in particular in the analysis performed by Ferri, Tron, Colantoni and Savio (Sustainability Disclosure and IPO Performance: Exploring the Impact of ESG Reporting, 2023). In the last pages of their publication, the authors suggested to investigate, as a new avenue for future research, the impact of the single E-S-G disclosure components on overall underpricing. In addition, they brought forward the idea of testing the impact of each component of ESG to determine which has the largest impact of underpricing. As a result, the ranking of the E, S and G pillars should reflect the degree to which IPO investors (mainly institutional investors) assign more value to each component in terms of importance, from an informational standpoint.

Unlike most innovations in finance, the role of ESG and its implications on companies started to be taken into consideration in Europe rather than the United States. In the U.S., to this point in time the relevance of sustainability is still largely debated and often considered on a secondary level compared to traditional financial metrics. For this matter, this study focuses on European companies which have gone public in western Europe, where the major stock exchanges of the continent are located.

The data sample considered in this study consists of 984 companies which have successfully carried out an initial public offering on western Europe stock exchanges between January 1st, 2018, and December 31st, 2023. As a proxy for sustainability disclosure, I relied on the Bloomberg ESG disclosure (BESG) score, a proprietary metric employed by Bloomberg to assess the degree of environmental, social and governance reporting disclosure.
By calculating a multiple linear regression, the following hypotheses have been tested.
H_1: Higher disclosure of each E-S-G pillar leads to lower underpricing.
H_2: E-S-G pillars' disclosure reduces underpricing of offerings in which secondary shares account for less than 30% of total shares offered.
H_3: E-S-G pillars' disclosure reduces underpricing of offerings in which secondary shares account for less than 10% of total shares offered.

This research thesis is structured as follows.
The first chapter introduces the reader to the world of initial public offerings, describing the reasons to go public, advantages and disadvantages of the offering as well as the IPO process. While the last paragraph outlines the relevance of sustainability in finance and the main players involved in the ESG ecosystem.
The second chapter summarizes the main arguments related to underpricing through a literature review. Theories are presented in a chronological order from the early works of the 1970s to the most recent contributions to the matter.
The third and last chapter is dedicated to the empirical analysis. This section presents the sample of data, descriptive statistics, statement of the hypotheses, statistical models employed, robustness tests and empirical findings.

1 A brief overview of initial public offerings

Many successful companies have reached the stage in their corporate lifecycle in which they decided to offer shares to the public for the first time, i.e. choose to pursue an initial public offering.
The advantages associated to the first offering are twofold: share liquidity is increased, and external capital is easier and faster to raise. From the investor's point of view, buying stock in a company which is traded on the market presents additional benefits compared to an investment in a private company. Stock exchanges facilitate the transaction process as they bring together a multitude of other investors who wish to buy and sell securities. Transaction costs are dramatically reduced since there is no need to actively search for a counterparty, thus speeding up sale or purchase operations. Moreover, public equities represent safer investments not only due to the regulatory and public scrutiny companies undergo when public, but also because investors can exit the company swiftly and when they wish to do so, taking advantage of the increased liquidity of traded shares.

Shares offered in a public offering are of two kinds. Newly issued shares are referred to as primary offering, in which the proceeds of the sale flow directly into the company and constitute additional financing. Pre-existing shares can be sold within the offerings, thus taking the name of secondary offering. However, the issuer doesn't secure any new capital since the proceeds are cashed in by the selling investors who wish to partially or totally exit the company. As a result, IPOs can either be 100% primary offering, 100% secondary offering (this latter case is often referred to as "direct listing") or a mix of the two, which is the most common configuration.

An issue occurs when the major shareholder (often the founder or an institutional investor) chooses to publicly sell the majority or the entirety of its stake. In this case, the shareholder is effectively selling the control over the company. As a result, the most common outcome of the offering is a shareholding structure which is widely dispersed.

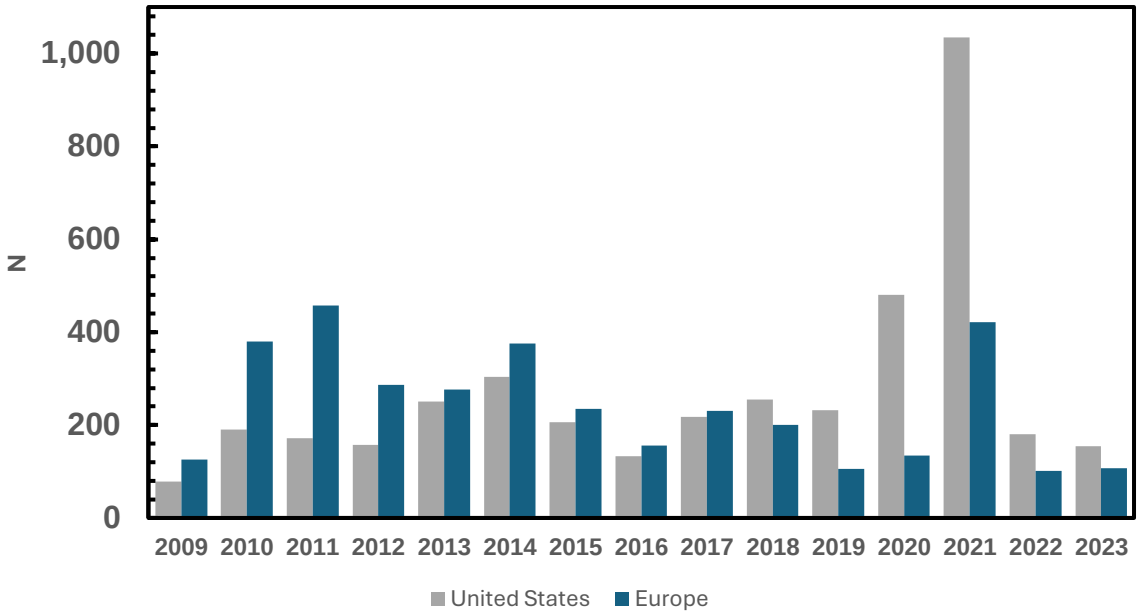
A lack of ownership concentration leads to a decrease in the monitoring efforts over the company's management. Indeed, the cost of monitoring would be borne by just one or few individual investors, yet the benefits are shared among all shareholders.

In such cases, shareholders will not directly exert control in the hope that other investors will do so. Moreover, smaller investors are not incentivised to use their voting rights as their voting power is rather limited thus contributing to a separation between ownership and control, which ultimately results in the management pursuing their own benefits at the expense of the inside investors. All the above lead to what in corporate governance is called a type 1 agency problem, also known as principal-agent problem.

Taking this issue into consideration, regulators and stock exchanges have gradually introduced more stringent requirements for companies to go public such as increased financial disclosure, enhanced accountability, and tighter prerequisites for boards directors.
Complying with such regulation is an increased cost which going public companies must take into account hence representing a disadvantage of IPOs as it adds up to the already substantial costs issuers must incur for carrying out the offering transaction.

Agency problems of this kind are more pronounced in economies which are more dependent on the stock market. In fact, financial markets such as stock exchanges are not the main source of funding everywhere around the world. Anglo-Saxon countries such as the United States and the United Kingdom are more "market centred", as opposed to other European countries like Italy, Germany and France, whose economies are "bank centred".
As a result, companies incorporated in market centred countries are more likely to resort to the stock market as the main source of financing, which explains the reason why the principal-agent problem is more common.
On the contrary, in bank centred countries it is not rare to have very large companies which are still privately held.

Figure 1: IPO comparison by year. Source: Statista



As the above graph shows, the number of IPOs which occurred in the United States has been consistently higher than the offerings carried out in all Europe since 2018. Such figures are impressive, considering that it is a comparison between a single country and a whole continent. Indeed, the IPO market in the United States cannot compare with any other country. Given the amazing size of the US market, the ranking of the biggest investment banks is dominated by American banks. Figures provided by Statista demonstrate the leading banks in terms of global revenue share as of June 2024 are respectively: JP Morgan (9.2%), Goldman Sachs (7.3%), Bank of America (6.4%), Morgan Stanley (6%) and Citi (4.8%). Put together, only these five banks cumulatively capture a third (33.7%) of global market share.

The pre-eminence of investment banks in the IPO market is attributable for the most part to the fact companies cannot approach financial markets on their own. First and foremost, a firm does not have the expertise to go through the IPO process, preparation of filings and other regulatory and legal requirements without the aid of an intermediary.

Alongside these considerations, going public firms must take in account the fact that more than likely their brand and reputation is not well known by investors and the financial community. For this reason, investment banks provide credibility to the private company in order to promote the issue to potential investors for the purpose of selling shares within the issue.

Once a company decides to go public, the management team starts by selecting an underwriter (an investment bank) to assist the company throughout the transaction. The role of the bankers can be briefly summarised in three points. First, they provide financial and legal advisory services. Second, they underwrite the issue. Third, they sell the shares to new investors. The whole operation is called IPO process, which will be described in more detail in the following section.

Overall, the bank provides several services, yet the most important is underwriting. Underwriting is the process by which an investment bank purchases all the shares within the issue with the aim to subsequently resell those same shares to other investors. In most IPOs, and especially in larger issues the banks involved in the underwriting process are usually more than one. Indeed, a group of underwriters is formed, which takes the name of syndicate. The lead underwriter is the bank chosen by the issuer and acts as the primary responsible for the deal. Among the many tasks, they oversee the selection of the other banks forming the syndicate.
The formation of a group of underwriters is necessary to help in the promotion and sale of the issue, but most importantly is an effective tool for sharing the risk across several banks therefore reducing the exposure of the individual banks and reducing the financial commitment to the issue. The main risk associated to such transactions is the unfavourable outcome which might occur when the bank or the syndicate ends up holding shares unwanted by the market.

A striking case of underwriter losses took place in 1987, when the British government chose to privatize the state-owned company British Petroleum through the means of an IPO worth $12 billion. The timing of the deal resulted being very unlikely: just four days after the first trading day one of the worst stock market crashes occurred.

At one stage, the banks forming the syndicate pleaded to halt the transaction due to the steep decline of the issuer's shares. The stock price swiftly dropped by 23% leading to approximately 1 billion dollars in losses for the underwriters.

Exposure to underwriting losses in not the only risk faced by investment bankers. In fact, litigation risk appears to be very common, especially when things turn for the worst. Common grounds for litigation by shareholders derive from accusations of insufficient communication and information disclosure towards investors, or perhaps of mispricing the issue.
As a matter of fact, such risks faced by the bankers are the main reason why investment banks charge hefty fees to compensate for the risk they bear.

Compensation usually relies in a spread (i.e. a discount) that is applied to the issue price, which determines the price at which the bank is willing to buy the issuer's shares. The discount usually stands at around 7%, a very high value given that IPOs are transactions worth several million dollars. This value is supported by the research paper entitled "The seven percent solution" by Chen and Ritter (2000). Gross spreads in the United States appear to be very close to such figure for deals with an offer size between 20 and 80 million dollars. Thus, demonstrating how profitable the industry is and how banks are not interested in competing on fees as "they don't want to turn it in a commodity business".
However, fees change over time and are also influenced by the offer size, as they get smaller as the value of the deal increases. Again, fees can change depending on the underwriting mechanism (firm commitment vs best effort).
Moreover, US banks seem to charge higher fees compared to their European peers.

Pursuing an initial public offering is a very delicate task, managers must ponder the costs and compare them to the benefits. Such comparison can be briefly summarised as follows.

The main advantages of listing on a stock exchange are:

- IPOs are one of the primary transactions used for raising additional financing, of course this is only true for primary offerings (where new shares are sold), or issues with a mix of primary and secondary shares. Moreover, once the company is traded it can rely on future seasoned equity offerings as a supplementary source of financing.
  From the existing shareholders' point of view, the IPO is one of the main exit opportunities to monetise their investment.

- Public companies benefit from having share liquidity. Such advantage is beneficial both for current and future shareholders, since most investors take into consideration exit options prior to committing their wealth to a company's equity. Through the means of a public offering, a firm can tap a large pool of investors thus creating a diversified ownership. Once publicly traded, the company can be included in several stock indexes, thus attracting capital from institutional investors as the likes of passive investors.
  When a firm's stock is traded on the market it provides the advantage of having a continuous market valuation of the shares. As a result, the added liquidity coupled with the market valuation of the share price result in the possibility of using stock as a mean for acquiring other companies, thus resulting in a form of "currency". In fact, it is common practice to use shares or a mix of shares and cash as a form of consideration (term used to refer to the price paid for the takeover) in the context of M&A deals.

- Companies can use their publicly traded stocks as an alternative form of remuneration. Indeed, management compensation is often composed for the most part by shares (or options having the company's stock as underlying). Top management's retribution is designed with the purpose of matching the shareholders' interest (share price increase) with the one of the C-suite, which of course is having a greater compensation. In addition, incentive plans of this kind partially mitigate the agency problems mentioned earlier. Usually, incentive plans for executives are a combination of short term and long-term plans, where in the latter shares or stock options are vested for a specified period. The aim is to avoid earnings manipulation and excessive short termism.
  Vesting shares and stock options provides the additional benefit of retaining executives, considering that the vesting period is contingent upon continuous employment with the company.
  In addition, stock compensation is an effective mean for remunerating executives with a minimal impact on the P&L (income statement). However, the hidden costs of issuing such shares are ultimately born by the company's shareholders through increased ownership dilution.
  The possibility of receiving large bonuses tied to the firm's performance stimulates managers' approach to risk and fosters an entrepreneurial mindset thus promoting innovation and in turn value creation, which is especially favourable in companies operating in mature industries with low growth rates.
  Lastly, firms rely on employee stock ownership plans as a particular form of incentive for employees working in lower levels of the corporate hierarchy. On one hand, the company benefits from increased identification between employees and the firm; on the other hand, employees receive tax breaks for this form of compensation.

- When managers guide a public company, their inclination to behave opportunistically decreases in light of the market for corporate control. This phrase refers to the role equity markets provide in facilitating corporate takeovers. Indeed, the stock market disciplines company managers to act in the best interest of the firm and maximise shareholder wealth. If this were not the case, poor performance would lead to stock price declines which in turn would turn the company in a desirable takeover target. Hence according to this phenomenon, the control of a company is allocated to the investors who assign the greater value to the company's shares. In other words, a firm whose share price is depressed (or simply undervalued) turns out to be an opportunity for a potential shareholder who is confident enough of managing the firm more efficiently by replacing the current executives. A better management and corporate strategy should hopefully lead to better firm performance, higher growth and share price increases at last.
- Finally, being a publicly traded company results in increased visibility and enhanced brand awareness. It provides additional financial media coverage and exposure to the firm's C-suite, adding prestige to the company. Moreover, public companies are routinely assessed by the rating agencies, hence reducing the effort and cost of raising debt.

On the contrary, carrying out an initial public offering poses some disadvantages:

- The costs associated to the deal are mainly three. First, the fees paid to the investment banks for their underwriting and advisory services. Second, legal and administrative costs related to the regulatory requirements for the new issue, such as the cost of preparing registration statements and filings fees. Third, underpricing is a cost the company incurs to attract investors, which is represented by the first day return following the IPO. The cost is born by the selling shareholders in the case of a secondary offering, while the shareholders who keep a stake in the company following a primary offering bear the underpricing cost, represented by "money left on the table".

- Dilution constitutes a subtle non-monetary cost. In offerings where part of the shares are of new issue, the existing shareholders incur dilution. Thus, if a shareholder were not to purchase additional shares, he or she would suffer a partial loss of control (e.g. reduced voting power).

- Disclosure of company information brings about direct costs related to compliance of regulatory requirements and periodic reporting as the likes of quarterly financial statements (or every half-year depending on country specific regulation). Whereas additional disclosure may comprehend price sensitive information or any other piece of information which may be captured by competitors against the issuer's interest, thus representing a loss of "privacy". Furthermore, once a company is publicly traded, it will be continuously monitored against its peers in terms of performance. Similarly, quarterly results will be repeatedly compared to analysts' earnings and sales estimates.

- Lastly, the IPO process is very time consuming which may distract the executives from day-to-day operations. In addition, the company's management has to dedicate extensive time into public relations to properly inform the investment community on the company's past performance and growth prospects in order to ensure existing shareholders and analysts are satisfied with the company's development.

1.1 The IPO process

Initial public offerings represent a milestone for businesses; hence a comprehensive action plan, timetable and communication strategy are key components for a successful issue.

The first step the going public company must consider is to properly evaluate whether it is the right time to pursue an IPO. The firm should preferably be in a stage of the corporate lifecycle in which it already has a strong financial track record or, at least, is on a path towards profitability in the near future. The company should have credible growth prospects ahead and its business should have a rooted presence in its industry, with a sustainable market position. Management should be stable and prepared for public scrutiny, while being open to introduce corporate governance best practices.

Once all the implications and repercussions of the offering on the business are evaluated, the firm should appoint all the advisers to help carrying out the deal. Appointed advisers include investment bankers, lawyers, accountants, auditors, financial PR experts.
The firm and the advisers will discuss which objectives to pursue and the IPO plan in a kick-off meeting, which marks the start of the IPO process. The first half of this process is called private, this is when all the planning, preparation of filings and other informative documentation is carried out behind closed doors.

Goals common to all IPOs include IPO price maximisation, high quality shareholder base, stable aftermarket performance with good liquidity and extensive PR and research analysts' coverage. Specific objectives may vary depending on the nature of the controlling shareholder. If the controlling shareholder is selling his entire stake as in the case of a financial sponsor (private equity / venture capital), perhaps he or she should also consider selling the company through an M&A deal or pursue a dual track process, by which the company prepares both for an IPO and a sale or merger with another company, thus maximising the exit options.

The selling shareholder can sometimes be the government as in the case of state-owned enterprises. Usually, for companies operating in critical industries the government prefers to retain a stake in the company large enough to be able to appoint board directors. On the contrary, control is sold to maximise proceeds for companies which do not belong to strategic sectors.

A specific case can be traced back to a series of privatisations which occurred in Italy in the 1990s aimed at reducing the sovereign debt. The government wanted to transform a plethora of state-owned companies into public companies through IPOs. The objective was to introduce Italian retail investors into the shareholding structure of such companies (in some cases there were incentives for retail investors).

Indeed, at the time (and still to this day) Italian households invested their private savings mainly in government bonds. The goal of the government was to create a "new financial circuit" capable of driving and then sustaining the privatisation process itself, according to the principle of fragmented ownership of public companies. The hope was that greater involvement of private individuals could finance the public debt: no longer directly, but by relieving the state of the burden of an industrial system which was no longer sustainable for the government (Innocenti, 2020).

In certain going public companies, the selling shareholder(s) might be the founder(s). In more recent times, founders have preferred to sell most of their stake, often large enough to grant control. Yet, through the creation of a dual class share structure (with multiple voting rights shares) they manage to keep control of the company following the IPO, despite owning only a small percentage of total shares outstanding. Such strategy is still very popular in the technology sector, notable examples include the IPOs of Google in 2004 and Facebook in 2012.

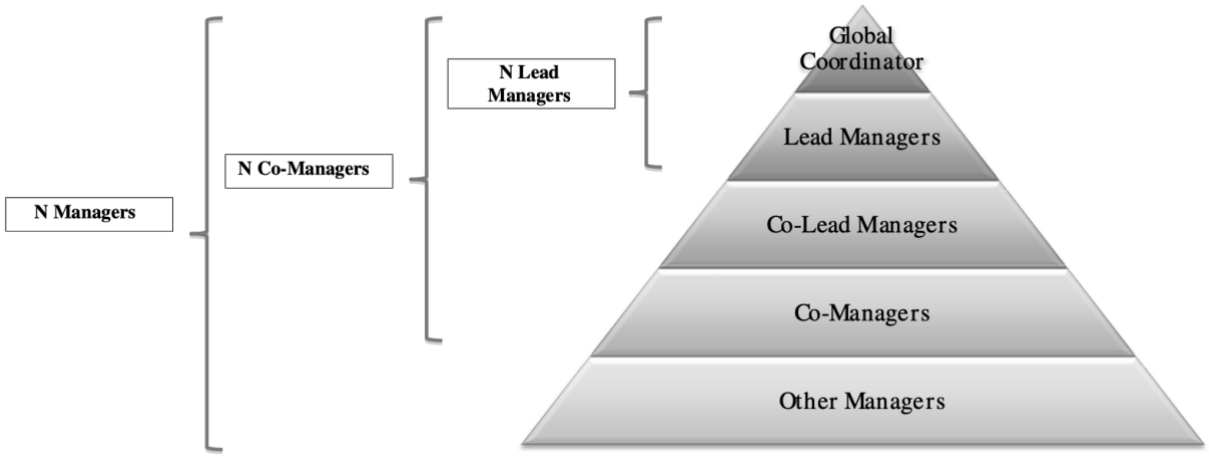
Once all the desired goals are set clear, the issuer and the advisers jot down a timetable and all relevant deadlines. The IPO process must be meticulously planned since speed of execution is key. Most offerings last between six and twelve months, while there have been some exceptions in which it took more than a year. Three are the main reasons why IPO should be executed swiftly:

- Changing stock market conditions. Of course, most companies choose to IPO when equity prices are generally higher. Yet to reap the benefits, the IPO should be concluded before the stock market enters in a downturn.
- Interest rate environment. Interest rates influence the risk appetite of investors. IPO are generally considered risky investments; thus, many investors would choose to opt out in favour of risk-free assets which still yield favourable returns.
- Competitors. From the issuer's point of view, it is better to avoid having other competing companies executing an IPO concurrently with the issuer, as it would distract PR attention, and some IPO investors might opt out in favour of competing IPOs.

Once the timetable is set, the advisers start the due diligence process. Trough the consultation of a data room, they seek for any weaknesses and shortcomings which might be rectified. This task is very delicate as it serves as a mean for protecting the issuer and the advisers from any material misstatements or omissions in the prospectus document. The prospectus is an informative document provided to the public which presents a summary of all the relevant details of the IPO: overview of the company and its risks, accounting and financial data, number of shares offered, price range, use of proceeds, selling shareholders, underwriters, subscription timetable.
Meanwhile, managers start to develop internal structures, systems and functions as well as corporate governance mechanisms to turn the company suited for being publicly traded. Regulatory filings and audited financial statements are prepared for the subsequent publication of the prospectus.

A key task at this stage of the IPO process is the development of the equity story, by highlighting the purpose of the deal, the main strengths of the company and the quality of its management in order to present the investment case as compelling as possible to potential investors.

Figure 2: Syndicate structure.



Source: Underwriting Syndicate Structure and Lead Manager Reputation: An Empirical Study on European Stock Markets, (2013).

The task of forming the syndicate is assigned to the lead manager, which is the investment bank which the issuer has first selected (sometimes more than one lead manager is selected, however it is less common in Europe). The lead manager is responsible for each aspect of the IPO process, both in the private and public phases. Lead managers recommend the issuer to include other investment banks in the deal, as such they are responsible of managing the syndicate. The syndicate is structured on a hierarchical structure, as shown in figure 2. Lead managers and global coordinators (term used in reference to lead managers in the context of international offerings) have the greatest responsibility. Co-lead managers and co-managers are only responsible for the distribution and placement of a portion of securities offered. Co-managers are chosen for their ability to provide additional analysis coverage or because their distribution network complements the one of the lead managers.

Lastly, the other managers are smaller banks with the task of distributing the issue on the domestic market of an assigned geographical area and do not have much input in the IPO process (Bernoussi et al., 2013).

The issuer together with the lead manager set the terms of the deal. First, they decide the mix of primary and secondary shares to sell. Second, they must choose which method to issue securities. For smaller or riskier offerings, underwriters prefer to opt for a best-effort mechanism, in which the syndicate does not guarantee the sale of the full issue, rather it tries its best to sell the highest number of shares at the agreed price. Similarly, in such cases the banks might resort to the all-or-one mechanism, for which the deal is halted in the unfavourable circumstance in which the issue is not entirely sold at the offer price.
Most of the times underwriters agree to carry out a firm-commitment IPO by guaranteeing the sale of the whole issue at the offer price. The underwriting bank purchases all the shares offered at a slightly lower price than the offer price and then resells it at the offer price. If any shares are unsold, the underwriter must sell them at a lower price and bear the loss, thus being a riskier mechanism for the bank and as such is better compensated.

Finally, issuer and underwriter might choose to include an over-allotment option (or green shoe provision). This option allows the underwriter to issue more shares (up to 15% of issue size) and sell them at the offer price. The option normally expires after 30 days and is exercised when demand for the issue is high, and the share price starts rising above the issue price. In such case, the underwriter exercises the option by paying the strike price equivalent to IPO price and subsequently resells those shares at a higher price. Conversely, a reverse green shoe is a provision which works in the opposite way: if the market price declines, the underwriter can buy shares on the market to stabilise the share price and give them back to the issuer. Both options serve as a mean to support the share price and liquidity in post-IPO market trading.

Once the terms of the issue are set, the lead manager oversees the preliminary valuation of the shares. The most common valuation methodologies are the multiples approach and precedent transactions analysis based on past IPOs (acquisitions should be excluded as the consideration paid includes a control premium), both involve relative valuation. The investment bankers must assess which types of multiples (including industry specific multiples) are the most suited and whether to use current or forward-looking multiples. Again, bankers perform the selection of comparable companies for both methodologies. In the case of precedent transaction analysis, also the time period chosen is important since the financing conditions in the market should be similar to the ones at the time of the IPO, so to provide an accurate comparison. As an additional support for valuation, a discounted cash flow (DCF) model is run.

Once the valuation range is set, the due diligence is almost completed and the preliminary prospectus (also called "red herring") is prepared, the public phase of the IPO process starts.
At this point, the issuer releases an "intention to float", a statement announced to the public in which the intention to pursue the IPO is disclosed.

The marketing phase starts with the investor education campaign in which pitches, slide decks and the equity story are presented to potential investors in one-to-one meetings and conference calls. Subsequently, the advisers together with the issuer's senior management set out on a "road show", a series of in person meetings around the country (and around the world) lasting around two weeks. The aim is to present the company and its offering to institutional investors such as mutual funds and pension funds. At the end, the underwriter acting as bookrunner (usually the global coordinator) creates the book of demand. For each investor, the offers containing the proposed price and the number of shares are gathered. The bookbuilding method is particularly useful as it lets the syndicate test the potential demand for the IPO. Despite the offers being non-binding, potential investors rarely go back on their word, as they value the long-term relationship with the underwriters.

Bookbuilding is the most common mechanism used in the price discovery process, yet it is not the only one. Other methods include fixed price offerings, in which the price is predetermined without testing the market's demand (thus is a risky option for the underwriter), and the auction method. Both methods have been rarely used in recent times.

Once the bookbuilding process is over, the syndicate sets the price of the offer. This task is usually carried out by computing a weighted average of the most representative orders submitted by the bidders. If demand is particularly strong, the final offer price might be revised upwards.
After receiving all the formal approvals by regulators and the stock exchange, the syndicate can start allocating shares to investors. Share allotment is discretionary, hence the investment banks choose to whom allocate shares and in which amount. Bankers prefer to assign shares to long term investors and exclude "flippers", investors who just want to turn a quick profit.

In this process, the underwriter selects investors with whom they want to build long lasting relationships in order to maintain a network of buyers for future IPOs. Moreover, it is good practice not to allocate all the desired shares to each investor, so to let them purchase any additional shares once these are publicly traded, ultimately creating a stable aftermarket demand.

Finally, shares start trading on the stock exchange and the general public can buy and sell the shares. In most cases, a lock-up provision prevents the preexisting shareholders and company insiders from selling shares in the 180 days following the first trading day. In fact, once this provision expires many companies experience a sharp stock price decline, as many insiders start cashing out.

1.2 The ESG financial ecosystem

Environmental sustainability, social engagement and robust governance gained growing attention from consumers and investors alike, leading to what we call ‘ESG finance’. ESG metrics have become integrated in the behaviour and choices of corporations, financial intermediaries and organisations.

The business world is gradually shifting from an approach strictly focused on shareholder value maximisation to a more comprehensive emphasis on social responsibility, by taking into consideration the interests of all stakeholders related to the company in their strategical decisions. Decision makers are progressively more aware of the damages brough about by the negative externalities which derive from the maximization of profits. According to the business ethics view, when companies only focus on saving costs, they often impose other hidden costs on society and the environment in the form of externalities (e.g. pollution, deforestation et cetera). Companies should take into consideration the impact of their actions, thus measuring their performance on three dimensions, embracing the triple bottom line perspective: people, planet and profit. Unlike profit, which is easily measured, the environmental and social performance are partly subjective and cannot be calculated in the same manner. Hence, managers are unable to properly balance the trade-off between business profits and social and environmental benefits.

In 2018, Larry Fink, the founder and CEO of Blackrock (the largest investment firm in the world, with more than $6 trillion in AUM) wrote a letter titled “Purpose and profit”. The letter was addressed to all the CEOs of the companies in which his asset management fund is invested. He encouraged business leaders to go beyond the vision of profit-making so to contribute positively to society, thus pursuing a sense of purpose through which finance can be reshaped. Indeed, the push for including ESG considerations in the business decision making process is strongly advocated by large investment funds with a passive investing strategy, like the previously mentioned Blackrock, Vanguard or Norges Bank Investment Fund (the Norwegian Government pension fund).

These institutional investors have been defined “universal owners” since their portfolios are widely diversified, hence are reliant on the performance of the investable universe of equities, rather than on the returns of an individual asset.
Negative externalities deriving from the operations of one company have a ripple effect on the other companies in the portfolio (Dimson et al., 2015). Universal investors care about long term returns: externalities impair long term performance through a rise in input costs and an increase in unplanned capital investments, thus reducing future cash flows and generating greater uncertainty in capital markets.
The most severe effects of externalities will show up over time, to the point in which the long run damages will outweigh short term gains deriving from companies who externalize.

The growing investor interest in ESG factors reflects the view that environmental, social and corporate governance issues can affect the long-term performance of issuers and should therefore be given appropriate consideration in investment decisions.
ESG investing, in general, is an approach that aims to integrate environmental, social, and governance concerns into asset allocation and risk decisions in order to produce sustainable, long-term financial returns.

The finance industry is creating new ESG related products and services such as ESG ratings, indexes and funds in response to growing demand. While some investors use ESG as a tool for risk management, some others use it to improve their position on sustainable finance to align with societal and impact issues.

Despite the progress made, there is still inconsistency in the criteria and metrics employed within ESG ratings and ESG disclosure. ESG ratings can vary greatly from one ESG provider and another. The different methodologies employed to translate raw data into actionable scores have been subject to criticism, given the wide variance of the results. Therefore, investors who integrate such criteria in their investment selection process obtain different outcomes depending on which ESG score provider they use to source the data.

Differences in ESG scoring may be attributable to differences in frameworks, measures, key metrics, key indicators, use of data, qualitative judgement and weightings.

While ESG methodologies are rapidly improving and becoming more transparent, scoring remains in a phase of transition as some rating providers are still defining factors to include in their valuation in light of ongoing disagreements on materiality. Financial materiality is the critical link at the intersection of sustainability and business performance. It refers to the environmental, social and governance (ESG) factors that have the power to influence the primary drivers of value in a business, such as profitability, risk exposure, future growth and cost of capital.

The range of sustainability variables covered by ESG rating agencies is extensive, spanning everything from board diversity, talent retention and employee safety to water quality, waste management and carbon emissions. Financial materiality also covers not just issues within the companies' own operations, but also its preparedness for future regulatory changes as well as for managing the disparate risks spread across their supply chains which include ethical labour practices, community engagement, and resource use.

It is crucial to draw investors' attention towards differences among ESG scores, as additional due diligence should be carried out when using third party ESG ratings to better understand which factors cause such discrepancies. Every ESG rating provider ranks different aspects of the company under assessment. Once each subset of metrics is sampled, an aggregate score is assigned to each E-S-G pillar. However, considering that rating agencies adopt different metrics for each pillar, results may vary.

The following table compares the factors used by Thomson Reuters, MSCI and Bloomberg.

Figure 3: ESG criteria – major index providers

Pillar	Thomson Reuters	MSCI	Bloomberg
Environmental	Resource Use	Climate Change	Carbon Emissions
	Emissions	Natural resources	Climate change effects
	Innovation	Pollution & waste	Pollution
		Environmental opportunities	Waste disposal
			Renewable energy
			Resource depletion
Social	Workforce	Human capital	Supply chain
	Human Rights	Product liability	Discrimination
	Community	Stakeholder opposition	Political contributions
	Product Responsibility	Social opportunities	Diversity
			Human rights
			Community relations
Governance	Management	Corporate governance	Cumulative voting
	Shareholders	Corporate behaviour	Executive compensation
	CSR strategy		Shareholders' rights
			Takeover defence
			Staggered boards
			Independent directors
Key metrics and submetrics	186	34	>120

Source: ESG investing practices, progress and challenges, OECD, 2020.

According to Berg et al. research (2022), correlations between the ESG aggregate scores of the major providers are on average 0.54 and range between 0.38 and 0.71 (the highest being the correlation between Sustainalytics and Moody's ESG). The environmental pillar has the highest correlation with an average of 0.53, while governance is the least correlated pillar, having a mean value of 0.3.

Divergences related to different rating outcomes are mainly attributable to measurement, scope and weighting, which, according to the authors, explain 56%, 38% and 6% of the divergence respectively. Moreover, the authors define a "rater effect" (also called "halo" effect) for which it exists a bias deriving from qualitative judgement, as performance in one category influences perceived performance in other categories. This is particularly evident when assessing social aspects like human rights and labour practices, which require a certain level of judgement. In fact, when such judgement is positive for one particular metric, it is very likely to be positive for another metric.

As the researchers highlighted, disagreements over ESG scoring have several consequences:

1) Evaluation of ESG performance is difficult to measure and comparability is compromised.

2) Divergence in ratings impairs the incentive to perform better from an ESG standpoint. Companies may receive mixed signals from different providers as to which actions are expected and how these are valued by the market, ultimately leading to under investment in ESG improvements.

3) Analysts and investors are less likely to include ESG performance in their evaluation of companies and their publicly traded securities.

4) Links between CEO compensation and single E, S, G pillars performance are more difficult to be defined, as a CEO might only focus on some metrics while ignoring the others thus managing to reach a given target but failing to improve overall ESG performance.

5) Lastly, divergence of ESG scores may hinder empirical research, as using one provider rather than another may alter results and conclusions.

Given the increased size of assets under management in ESG related funds, financial regulators have begun to assess a range of practices in relation to sustainable finance. Key issues which have been addressed include: (i) ensuring relevance and consistency in reporting framework for ESG disclosure, (ii) opaqueness of the subjective elements within ESG scoring, (iii) overcoming the market bias, (iv) aligning ESG investment products with the objective of investors.

On 8 March 2018, the European Union launched the first Sustainable Finance Action Plan to channel more funding to environmentally sustainable economic activities, thus bridging the gap necessary to meet the EU's climate ambitions such as the Paris Agreement commitments and the UN's Sustainable Development Goals.

The main steps of the Action Plan include:

- In 2020, the EU taxonomy was published with the aim to outline the criteria for determining whether an activity can be considered environmentally sustainable. The EU taxonomy is expected to facilitate a pan-European ecolabel for financial products and prevent “greenwashing”.
- In 2021, the Sustainable Finance Disclosure Regulation (SFDR) imposed mandatory ESG disclosure obligations for asset managers and other financial markets participants (FMP). Its goal is to increase transparency regarding 1) sustainability risks, 2) the consideration of adverse sustainability impacts in the investment process and 3) the provision of ESG characteristics in relation to financial products, thus providing investors the information necessary to make sustainable investment choices.

  The regulation defined a list of 64 Principal Adverse Impact (PAI), indicators to be disclosed (only 14 of these are mandatory) regarding the possible negative impact of investments on people and the environment, such as carbon footprint, water consumption etc.

  Lastly, SFDR requires asset managers to classify their funds under one of the following articles. Article 6: investment products with no focus on sustainability but are transparent in how sustainability risks are integrated. Article 8: investment products which do not have an explicit sustainable objective yet follow good ESG practices. Article 9: investment products which pursue a clear, sustainable investment objective.
- In 2023, the Corporate Sustainability Reporting Directive (CSRD) was published as a replacement of the NFRD. The directive requires larger companies (including foreign subsidiaries) and publicly traded companies to disclose audited ESG reports based on a common framework, by assessing double materiality which takes into consideration both the impact of the company’s operations on people and the environment and the risks and opportunities of ESG related developments which may affect the company.

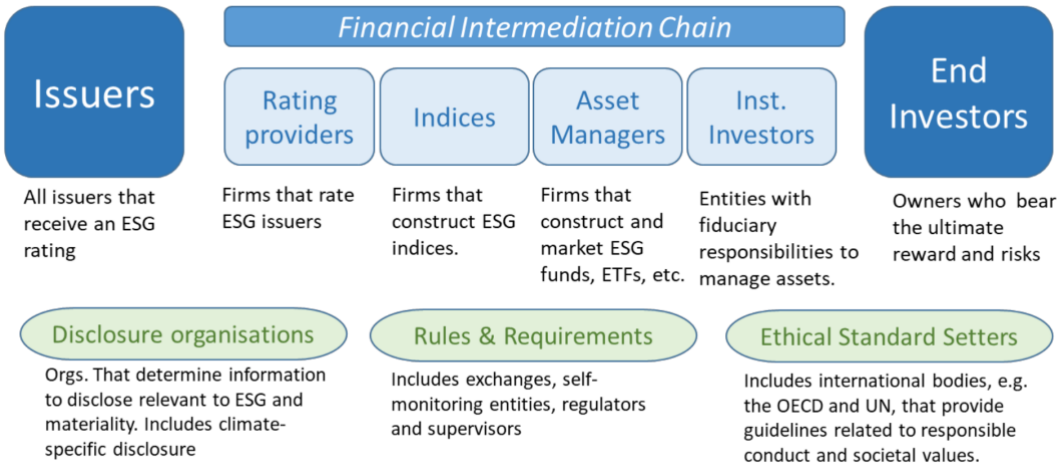
Alongside regulators, there are several non-governmental bodies which promote frameworks to homogenise the classification of ESG issues and sustainability reporting. The Global Reporting Initiative was established as a non-profit entity by the United Nations in 1997. The aim was to create the first global standardised framework for sustainability reporting through a set of guidelines.

Published by the United Nations in 2006, the Principles for Responsible Investment marked the first approach to integrate a sustainable perspective in the investment decisions of asset managers, yet the adoption of the six principles is still on a voluntary basis.

The Sustainability Accounting Standards Board (SASB) was founded in 2011 in the United States with the goal of simplifying and standardising the reporting language of sustainability efforts. The organisation developed a materiality map to assess the financial relevance of a set of 26 ESG issues and how these manifest across 77 industries.

Following the merger between SASB and the IFRS occurred in 2022, the IFRS Sustainability Disclosure Standards set out requirements for disclosures about a company's sustainability-related risks and opportunities that are useful for investors' decision-making. IFRS S1 sets out overall disclosure requirements for sustainability-related financial information. IFRS S2 sets out disclosure requirements specifically for climate-related financial information. The goal of these standards is to provide an international framework for ESG disclosure as a replacement of the several other voluntary standards, thus putting an end to the fragmentation of sustainability reporting thus providing reliable and comparable data upon which market participants can make informed decisions.

Figure 4: ESG financial ecosystem



Source: ESG investing practices, progress and challenges, OECD, 2020.

To this point, the intertwined network of key actors within the ESG financial ecosystem has been presented. Yet, it is crucial to define the main role of corporations within the ESG environment and its implications on initial public offerings.

All issuers that supply debt or equity to the financial markets are part of the ESG ecosystem since ESG assessment is demanded by a growing number of investors who seek to analyse sustainability related data supplied by issuers directly.
According to a forecast by Bloomberg Intelligence, global ESG assets under management are set to surpass $40 trillion by 2030. With this in mind, chief financial officers of IPO-ready companies would want to work closely with the internal ESG department to better understand what their company is doing right in terms of sustainability. At the same time, it is essential to detect any shortcomings, which might be addressed before taking the company public. These are necessary steps to develop a comprehensive ESG report to be published along with the IPO prospectus.

Institutional investors are not new to ESG anymore, and as such, do no longer depend on third party assessments provided by ESG rating providers. Many are the asset managers who developed proprietary frameworks for the appraisal of sustainability related performance. Hence, showing the company's effort in gauging its risks and opportunities from an ESG perspective reflects well on the business and its management.

Having ESG related programs and goals is an effective tool for establishing a sense of identity with consumers and employees. Indeed, many customers are willing to pay a "green premium" for more sustainable products. At the same time, sustainability is a common ground upon which corporate culture can be based, ultimately increasing talent attraction and employee retention.

As it has been described in the previous pages, ESG disclosure will be soon become mandatory for public companies. As such, it is recommended to put in place the appropriate programs, protocols and policies to make the issuer ready for disclosure since the very start of being a publicly traded company.
Opening the company to the public includes onboarding shareholders with specific agendas and standards of corporate governance. Going public with a good ESG foundation is not only a good offense when it comes to attracting stakeholders of all types but is also a great defence. On one hand, it fends off the risk of investor activism, by which shareholders (usually with the support of institutional investors) may challenge the existing board of directors with the threat of replacing them with alternative nominees, with the aim of addressing sustainability issues. On the other hand, forgoing ESG disclosure leads to the exclusion from specific ESG indices, as the likes of article 6, 8 or 9 funds under the SFDR classification, thus deterring passive asset managers.

To enhance the accountability of the company and the credibility of the ESG disclosure, it is good practice to be reviewed by a third party such as an ESG rating agency or an external auditor specialised in sustainability reporting. Investment banks as well play a role in assessing strengths and weaknesses related to ESG in the journey towards the public market. Their tasks may include the definition of ESG KPIs, development of policies and internal controls, as well as the draft of a comfort letter as a guarantee for ESG compliance.

The firm's qualities and strengths can then be an integral part of the equity story when presenting the company to new investors. Ultimately, robust ESG reporting not only fosters investor confidence but also positions the company for long term success in the stock market.

2 Literature review

In the complex world of financial markets, initial public offerings represent a milestone for companies seeking to broaden their investor's base, giving the possibility to grasp future growth opportunities. For most companies, the initial listing on a public market is a one-time event, thus every detail is strategically planned and meticulously analysed. In particular, the undertaking related to the discovery of the price bracket for the newly issued shares is a pivotal moment within the IPO process.
The issue of underpricing is one of the crucial factors in determining the success or failure of a public listing. The magnitude of the underpricing is a matter of great concern for the firm, considering that the higher it is the more will be the amount of "money left on the table" deriving from the sale of primary shares.
Given that the topic is of great interest for companies, researchers and practitioners have devoted a relevant amount of effort in examining further this phenomenon and its causes.

Literature on the issue of underpricing is very extensive and its roots date back to the first research of the 1970s. Over the years many researchers developed several theories which can explain the underpricing phenomenon. In addition, lots of studies have focused on country specific IPOs, given that prior literature has highlighted contrasting outcomes based on the same theory.
The literature review which follows in the next pages is aimed at providing a comprehensive overview of the main theories which are presented in a chronological order:
1) Information asymmetry;
2) Signalling theory;
3) Issue specific factors;
4) Firm characteristics;
5) Exogenous factors;
6) Regulation;
7) ESG and sustainability related issues.

2.1 Information asymmetry

Information asymmetry as a possible explanation for underpricing has its roots in the very first articles on the topic of underpricing, most of which are dated around the ‘80s of the last century.
As in most transactions, the seller has an informational advantage vis-à-vis the buyer over the real value of the underlying assets. The same situation occurs in the context of initial public offerings, where the issuer (seller) is in a better position to understand the fair value of shares sold compared to the IPO investors (buyer).
Rock (1986) ascertained the existence of several classes of investors, each of which has a different degree of information asymmetry. The occurrence of such distinction is the by-product of the cost of obtaining information. Of course, all investors have access to the issuer’s IPO prospectus and other relevant financial documents, but only the investors with greater funds can bear the cost of obtaining relevant information as they can benefit from economies of scale. Thus, the pool of potential investors can be roughly divided in informed investors, most often institutional investors, versus uninformed investors, which mainly comprise retail investors. Rock, on the basis of Ritter’s (1984) research, reiterated the assumption upon which a wider informational gap between informed and uninformed investors, coupled with uncertainty over newly issued share prices, lead to underpricing, which is the consequence of the issuer’s choice of discounting the offer price with the aim to attract also the uninformed investors.

In a similar way, Beatty and Ritter (1986) concluded that in the case of “hot issues”, where demand is particularly high, the allotment of shares to IPO investors is often rationed, meaning that each investor will receive less shares than initially desired. Greater demand for a given issue often leads to positive returns once shares start trading on a public market. As a matter of fact, oversubscribed issues are often followed by positive returns. As a result, an investor who receives all the requested shares, will more than likely obtain below average returns, leading to a situation of “winner’s curse”.

Given the above, an informed investor is one who performs a valuation and security analysis to discriminate between issues with better potential returns. While free riders, or uninformed investors according to Rock, only subscribe underpriced issues, which would compensate for a possible winner's curse. The authors conclude "the degree of underpricing is directly related to the ex-ante uncertainty about the value of an "issue", since greater uncertainty leads to higher chances of winner's curse.

Further research on the topic, as in Baron and Holström (1980), theorized an additional level of information asymmetry between the issuer and the underwriter. Indeed, if there were perfect information symmetry between the issuer and the investment bank, then more than likely the former wouldn't pay large fees for the banker's advice. However, banks have a more profound knowledge on the demand for new issues and on the overall conditions of capital markets, such knowledge results from private information obtained through testing demand for the issue based on consultations with potential investors.
Bankers take advantage of the fact the issuer is unable to monitor the distribution efforts. Distribution costs are entirely sustained by the banks forming the syndicate, thus creating an incentive to set a lower issue price to minimize the cost and time related to the distribution of shares, while at the same time limiting the unfavourable circumstance of having unsold shares. From this point view, the underpricing of new issues is the outcome of a principal-agent problem.

Information asymmetry can be mitigated through corporate disclosure, which can either be compulsory or voluntary. Companies which are about go public are obliged to file the IPO prospectus. One section of the prospectus document usually covers the intended use of the proceeds resulting from the offering. Despite such disclosure being compulsory, there is no indication of the level of detail the company must provide in the use of the proceeds. Often, companies prefer to give a vague indication of their intention in using the funds of the offering, so to avoid disclosing confidential information and maintain greater flexibility. In sum, disclosure of the use of proceeds is mandatory, yet the level of specificity is still voluntary.

Leone et al. (2007) focused their research on the nexus between underpricing and the degree of disclosure. The result of the publication confirms the research hypothesis on the basis of which companies which give a more detailed description of the use of the IPO proceeds tend to experience smaller first day returns. Greater specificity entails greater accuracy in the valuation of public going companies, leading to an offer price which is closer to the "true" value of the company.

Indeed, such result is consistent with the view according to which greater disclosure reduces information asymmetry alongside ex-ante uncertainty and, in turn, underpricing.

2.2 Signalling theory

Part of the existing literature interprets the presence of underpricing in public offerings through the signalling theory, according to which good quality firms deliberately underprice their shares to attract investors. In such cases, the issuer promotes positive returns for the IPO subscribers through underpricing with the goal of appealing to investors for future possible seasoned equity offerings (SEO). Signalling theory finds its roots with Welch (1989), who stated only high-quality firms may deliberately underprice, as they are able to give up part of the proceeds. On the contrary, low-quality firms don't have the capacity to pursue such strategy, since the true nature of their quality would gradually unfold once public, while incurring high imitation costs in the process, as for such companies the marginal cost of underpricing is greater.

Yet, signalling theory doesn't properly consider the issue of adverse selection which affects equity markets. In fact, a company might choose to get listed on a stock exchange to raise financing, gain visibility, compensate managers and employees through employee stock ownership plans (ESOP), or simply as a mean for shareholders to cash out. While there might be numerous reasons to undertake an IPO, the reason for carrying out a seasoned equity offering can only be one, which is ultimately securing additional funds. Here is where adverse selection emerges: good quality firms rarely chose to dilute shareholders' ownership (more precisely shareholders who do not exercise their option rights) to raise financing, this because good quality firms can simply rely on their profits (internal financing) to fund operations, as it is the cheapest source of funds, according to the pecking order theory. Conversely, low quality firms resort more often to SEOs as these companies are often unprofitable, with a high cost of debt or even in distress.

Adverse selection proves the presence of a weakness in signalling theory. There is no reason why a company would leave money on the table in an IPO just to ensure the success of future SEOs, which might not even ever occur. After all, good businesses don't need to give up ownership in exchange of financing, as they can rely on internal funds.

"The pricing of initial public offerings: tests of adverse selection and signalling theories" by Michaely and Shaw (1994) is an empirical research conducted on approximately 1000 US IPOs between 1984 and 1988. The authors concluded that "firms that underprice more tend to go to the reissue market less often and for lesser amounts" and they found no support "that firms that underprice more will experience less unfavourable price reactions when they issue seasoned equity". In summary, they assert companies shouldn't deliberately underprice for the sake of future subsequent security issues, in other words "there is no need to underprice to go back to the well". A similar conclusion resulted from the research of authors Spiess and Pettway (1997). Their analysis consisted of 172 industrial companies' IPOs between 1987 and 1991 which were followed by seasoned equity issues within three years. The result showed the inconsistency of the signalling theory, since companies who deliberately underprice do not recover such costs.

2.3 Issue specific factors

Another stream of the existing literature has focused on issue specific factors which have an influence on the degree of underpricing. Issue specific factors relate to the characteristic inherent to each offering, as well as the actors involved in the deal and the execution of each stage in the IPO process. In particular, the issue mechanism through which the offering is carried out is a widely studied topic within the literature on underpricing. Great attention has been devoted to the issue mechanism because it radically affects the price discovery process.

Issue mechanisms can be roughly summarized in three kinds: auction, fixed pricing and book building. Most researchers have focused on the uniform price auction, rather than the discriminatory auction. In a uniform price auction, the issuer/underwriter determines a certain price, subsequently bidders who bid above that price win, but all end up paying the same price that has been set by the issuer. Jagannathan and Sherman (2006) in their study on auction IPOs got to the conclusion that the uniform price issue has lost favour among investment bankers. According to the researchers, such mechanism is better suited for issuance of sovereign debt such as U.S. treasuries. On the contrary, auctions are less favourable to issue shares, given that IPOs are less frequent, price is more difficult to determine and the number and type of participants vary widely.

Moreover, the auction mechanism is affected by the winner's curse, which can be smaller or greater depending on the number of participants in the issue. Indeed, the authors have inferred auctions with a greater number of random participants lead to excess demand which in turn inflates the IPO price. Similarly, an issue with less participants is often undersubscribed, thus leading to underpricing. As a result, not knowing the number of participants can lead to unpleasant surprises for the bidder.

Jagannathan and Sherman found evidence of a free rider problem affecting auctions, on the basis of which uninformed investors might bid a high price, leading to a volatile clearing price, thus not adding any value to the price discovery process. The authors concluded that for auction-based issues potential investors would be better off purchasing shares through the stock exchange once trading begins, thus eliminating all the uncertainties mentioned above.

Fixed priced IPOs partially mitigate the issued related to the number of participants, since the issue price is set by the issuer thus investors do not take part in the price discovery process. The issuer needs to take in account differences of information asymmetry among the investors' base, hence a more cautious issuer would underprice more to appeal to a wider number of investors. As a result, for such issues it exists a trade-off between risk aversion of the issuer and the degree of underpricing.
Fixed priced issues are more popular for smaller sized IPOs, for which book building is too expensive.

The shortcomings of the two previously mentioned issue mechanisms led to increased adoption of the book building mechanism, starting from the 1990s. During the book building process, the investment bank acting as advisor sets a price range for the shares, then potential investors submit their bids, stating the number of shares they want to buy and at which price. The advantage of such mechanism is that it allows investor participation in the price discovery process, without having competition among them as the bids are non-competitive. Book building is particularly useful as it allows the underwriter to test the potential demand for the issuer's shares, while at the same time it helps in reducing the variance related to information asymmetry since bids are flexible.

Biais and Fuageron-Croset in 2006 published a research paper in which they compared the different types of issue mechanisms and its variants across several countries. According to the authors, the type of auction should be chosen in a way that the IPO price reflects the degree of information asymmetry across the investor base. If not, underpricing tends to be larger and little information on shares' value can be taken from the IPO process, as in the case of fixed price issues.

Uniform price auction, instead, may bring about possible collusions among bidders, as they are characterized by strong price reactions to demand, eventually leading to underpricing (Wilson, 1979).

Book building, despite its higher cost in relation to underwriter's fee and the marketing activity, is the most effective issue mechanism in reducing underpricing. Still, the issuer faces a trade off since the reduction in underpricing should outweigh costs associated to book building.

Further studies on book building have taken a more detailed approach by investigating its efficacy in reducing underpricing across different countries. Kaneko & Pettway (2003) empirically proved by taking into consideration Japanese IPOs between 1993 and 2001 book building leads to an average underpricing of 48% compared to an average underpricing of 11% for auction issues. Derrien and Womack (2003) came to the same conclusion based on their study of French IPOs. This proves, and will be later analysed in more detail, country specific differences and regulatory environments can affect underpricing in different ways.

A significant part of the literature has focused on the role of the investment banks in underwriting IPO issues. Several studies have analysed the relationship between underpricing and the reputation of the underwriter. Carter et Al. (1990) stated a syndicate of underwriters with a high reputation on average reduces underpricing. The reason being IPO investors perceive the issue as safer, with lower risk. Moreover, experienced investment bankers are better able to price the security and are better positioned to allocate the shares thanks to their network of clients, which for the most part include large institutional investors. Yet, it must be put forward that these are just technical factors influencing the issue. Besides, a risky company going public is still a risky investment no matter how reputable the investment banker is.

Additionally, there is often a high price to pay for having well reputed bankers as underwriters, which is increased underwriting fees. Hence an issuer facing the choice of the underwriter should take into consideration the trade-off between increased fees to pay versus the increased proceeds linked to narrower underpricing resulting from the higher reputation of the underwriter.

Beatty and Ritter (1986) studied the role of the underwriters through a different perspective. Investment banking is a competitive industry and, as such, even an investment bank with high reputation can lose customers. Underwriters might be tempted to behave opportunistically, given their power in the price determination of new issues. On one hand, they might voluntarily induce underpricing to please investors, thus giving them a very likely initial short-term return. Similarly, if instead underpricing were to be reduced, investors would lose interest in IPOs led by that same underwriter, as returns would be lower, and the chances of winner's curse would increase. On the other hand, bankers who systematically underprice new issues will very likely lose customers, since going-public firms would choose a competing bank for their issue.

In reality, there is little incentive for banks to behave in such manner as they would rapidly lose business opportunities. Beatty and al. empirically proved underwriters who engage in such price manipulation in one subperiod, consequentially lose customers in the following subperiod. As a matter of fact, reputation is essential in investment banking since it is what differentiates banks among each other and enriches their brand, which in turn is the main driver of higher fees and at last, the success of the bank.

2.4 Firm characteristics

Firm characteristics also have an influential impact on the success of an IPO. Factors such as age of the firm, size, competitive advantage, shareholder structure, brand recognition and the quality of its management are crucial in determining the riskiness of the issue. As highlighted in the previous pages, underpricing is often influenced by the ex-ante uncertainty of the issue. It exists a negative relationship between firm age at the date of the issue and the degree of underpricing. Older companies have a longer track record to prove the quality of their business and, as such, the quantity of information and financial data disclosed is greater, resulting in less uncertainty over the issue (Loughran and Ritter, 2004).

Theories on the effect of the offer size on IPO first day returns converge on the following assumptions. Greater sized IPOs lead to increased liquidity on the secondary market. A higher level of liquidity minimizes trading frictions, which entails higher share prices and lower returns, as a result of the relationship between illiquidity and stock returns shown by Amihud (2002). Some researchers (Beatty and Ritter, 1986; Michaely and Shaw 1994) argue larger offerings tend to minimize information asymmetries and underpricing, while others (Ritter, 1984; Aggarwal, 2002) assert quite the opposite, since larger IPOs signal less confidence upon expected cash flows, tend to present lower ownership retention, intensify asymmetric information and underpricing. Moreover, larger companies which plan to go public have the financial means to employ better reputed advisors, which should moderate the degree of underpricing. Not only, a larger offer size entails a greater amount of wealth is at stake and, as such, the issuer is incentivized to decrease wealth losses in relation to underpricing.

Many researchers have taken into consideration the influence of the ownership structure of public going companies on the level of underpricing.
First of all, it must be noted IPOs are not just a tool for obtaining new funds, instead quite often the offering is just a mean for the main shareholder(s) to exit the company.

This occurs when the shares offered are 100% secondary, meaning that no new shares are issued (no primary shares). In such a scenario, the proceeds of the IPO flow directly to the selling shareholder(s) while no additional funds are secured by the firm.
The relationship between underpricing and the nature of shares sold (primary or secondary shares) is an understudied topic in the literature. Bannenberg and Van der Sar (2020) proposed the idea according to which the percentage of secondary shares sold is inversely correlated to expected underpricing. They put forward the example of a company which can raise enough capital through primary shares but with high expected underpricing. In such a scenario, the existing shareholder is less inclined to sell additional secondary shares, as it would increase losses for the seller bearing the negative consequences of underpricing.
Insider selling can influence IPO first day returns since on one side, the sale of shares by insiders sends a negative signal to the market considering the emergence of moral hazard problems as a consequence of the misalignment of interests between new shareholders and the selling shareholder (Ritter, 2004).

Ang and Brau (2003) investigated insider wealth maximizing behaviour in the IPO context and empirically proved insiders tend to conceal such negative signal when selling secondary shares. One way they do so is through underreporting on the IPO prospectus the number of secondary shares offered. Subsequently, they file the additional number of shares offered through a prospectus amendment, which is usually less noticed. When the number of additional shares is considerably high, insiders camouflage the increase by offsetting the total number through an equivalent reduction of primary shares. The authors highlight “amendment filings of secondary shares impact first-day IPO pricing less than shares filed in the original prospectus”, suggesting the market doesn’t value the information in the amendment as much as in the original filing. Through this strategy selling shareholders can benefit from new information regarding the demand of shares in the period between the original prospectus is filed and the offer date. Hence if demand is high and the issuer plans to sell more shares, more secondary shares will be offered, letting insiders reap the benefit of higher pricing.

Habib and Ljunqvist (2001) put forward their view on the underpricing dilemma by presenting a non-mutually exclusive reason (thus accepting other factors influencing underpricing), which is some IPOs might end up with higher underpricing than others due to the owners caring less about having an underpriced issue.

The extent to which pre-existing shareholders care about underpricing relies on the total value of their wealth sold within the issue. According to this view, shareholders who sell a little number of shares are only marginally affected by underpricing. Hence the greater is the stake at sale the greater is the interest of the owner to minimize first day returns. Average underpricing is ultimately influenced by the size of insider selling. Indeed, it can be formalized that owners are mostly interested in underpricing contingent upon the amount they stand to lose from it, where these losses are proportional to percentage mix of primary and secondary shares sold.
The authors argue one way owners keep underpricing under control is through the promotion of the issue, which can be done in several ways: choosing well reputed underwriter and auditor, extending road shows, listing the issue in different countries. Hence, it can be inferred promoting an issue to be a good substitute for deliberate underpricing. In fact, this idea was originally developed by the authors who embraced the signalling theory in prior years.

Issuers are more inclined in promoting their issue when the fraction of secondary shares is higher, as more wealth is at stake. Such strategy is also effective, like in Rock's model (1986), in increasing the percentage of uninformed investors taking part in the issue (thus reducing the necessary underpricing to compensate for the lack of information).

Underpricing not only affects pre-existing shareholders, in fact it also influences the shareholding structure following the issue.
In an IPO the selling shareholder faces two option, according to Zingales (1995): he or she can either sell the entire ownership block to an active investor in a separate transaction or sell to a dispersed base of investors through the offering.

Zheng et al. (2008) empirically proved the assumption of Booth and Chua for which a higher degree of underpricing favours the creation of a dispersed shareholding structure following the IPO. In fact, underpricing favours the creation of the desired ownership structure. This can be made possible as intentionally underpriced issues are often oversubscribed. The oversubscription lets the underwriter, in accordance with the issuer, choose to who and to how many investors allocate shares. In other words, the issuer has the opportunity of rationing share allocation and discriminating among investors with the aim to create an ownership structure with fewer block-holders.
A dispersed ownership might be more desirable since it can foster greater liquidity in the post-IPO period. Enhanced liquidity not only advantages IPO investors, but also insiders who wish to sell once the lock up period expires.
Moreover, greater dispersion implies a twofold benefit for the management: on one hand, a broader shareholder pool can moderately reduce the occurrence of hostile takeovers. On the other hand, a more fractioned ownership structure entails reduced control over top management, leading to a type 1 agency problem. Such strategy has been defined as "reduced monitoring hypothesis" by Brennan and Franks (1997).
One could argue an active investor might still be able to purchase shares to form a block from a multitude of small investor on the market once the company is publicly traded, making the oversubscription strategy vain. Nonetheless, once the intention of the active investors becomes known, the stock price will rise thus erasing any potential abnormal returns.

Other authors have investigated whether companies backed by a venture capital firm experience a different degree of underpricing compared to non-VC backed companies. Results of these publications are mostly divergent, as some found to have a positive influence on underpricing while others the opposite.
From a theoretical standpoint, most researchers converge on the idea the presence of a venture capital firm in the shareholding structure should negatively impact underpricing. The main reason being that having a VC as a shareholder can be interpreted as a sign of good quality, since venture capitalists go through strict screening criteria before investing in a company in the first place. Likewise, VC firm exert control over the management, with such monitoring they enhance firm performance.

Tanda and Manzi (2020) employed a meta-analytic framework to test the influence of VC backing on IPO underpricing. Publications on the topic are plenty, however their results are mostly contrasting, mainly due to differences in time periods and geographical areas, as the authors have stressed. Hence there is no definite answer whether VC firms are able to limit underpricing or not. To draw such conclusion, the researchers have focused their analysis on empirical papers investigating US and European IPOs, which were published between 2000 and 2019. Results indicate a positive correlation between the presence of a VC firm and underpricing for US IPOs, with an average of 4.6%. These figures are in contrast with the theoretical explanations drawn from the related literature. European IPOs instead appear to have negative correlation between underpricing and VC presence, yet such coefficient appears not to be statistically significant.

2.5 Exogenous factors

Up to this point, the topics discussed are mostly related to factors specifically pertaining to the IPO issue or firm specific attributes. Yet, offerings (and, in turn, underpricing) are also conditioned by the external environment. The state of the economy and stock market sentiment are significant drivers of IPO activity. Indeed, the market for new issues is not linear, rather it follows a pattern of "boom and bust" cycles. Of course, peak activity occurs when stock market prices are generally high, and volatility and the cost of money are lower. As a result, in "hot" market periods a multitude of companies go public while in "cold" periods only a fraction chooses to get listed. Hence, market timing is crucial in order to reap the benefits of inflated equity prices, whereas in a depressed market environment newly issued shares rarely get a rich valuation, leading to offerings being postponed or even called off. Still, such conditions might not impact certain offerings, since sectorial trends have a certain degree of influence on IPO prices. In fact, notwithstanding generally unfavourable market conditions, some industries might be in an upward cycle. This is especially true for commodity related companies, which are better valued during periods of high commodity prices.

Moreover, IPOs related to the same industry are often carried out in a close time frame among one and other. Not only because a certain industry might be experiencing an upward trend but also due to what Bienveniste and Ljungqvist (2003) define "indirect learning". The information spillover from the IPO (in particular, from the bookbuilding process) of an industry peer allows the public going firm to avoid the same uncertainties, to better structure the offering and reach a more accurate pricing. In a more extreme scenario, the failure of one can influence the decision of other peers to delay or postpone their offering.

Colaco et al. (2009) focused their research on other reasons why companies avoid IPO clustering and the benefit of indirect learning. The authors defined a variable called "degree of independence" (DOI) to represent the extent of indirect learning available to a company at the time of its IPO. DOI is calculated by taking into consideration the timespan between the filing of the prospectuses of different IPOs in the same industry. The greater the timespan, the greater the DOI (and vice-versa). While the degree of independence is inversely proportional to the level of indirect learning.
By using such metrics, the authors fetched support for their research question by empirically testing a sample of offerings on a ten-year period starting from 1992. Results reinforced their initial hypothesis: companies choose to go public despite lower indirect opportunities because insiders are willing to diversify their investments and because of the firm's capital requirements (i.e. the need to raise funds).

Economic factors are exogenous and always changing, hence companies have little control over them. As a matter of fact, the state of the economy and its characteristics have a profound influence on underpricing: as economic factors change, also underpricing changes.
So, "Why has underpricing changed over time?" This is the title of Loughran and Ritter's (2004) publication, in which they investigate the underlying causes of the non-linear trend of how underpricing levels have evolved over time.
The starting point of their analysis lies in the observed average underpricing of initial public offerings between 1999 and 2000, at the height of the dot-com bubble. The mean underpricing stood at 65% in those two years. Moreover, the authors pointed out average underpricing shifted from an average of 7% in the '80s to 15% in the '90s (excluding the last two years of the internet bubble), a value which is twice as much. At the heart of their research, lie three hypotheses:

1) changing risk composition;
2) realignment of incentives;
3) changing issuer objective function.

The first of the three hypotheses was borrowed by Ritter (1984), who assumed the degree of underpricing is positively correlated with the riskiness of the going public firm. The idea behind such hypothesis relates to the incentive, represented by underpricing, which induces investors to participate in riskier IPOs. Thus, if on average the percentage of risky offerings increases, average underpricing should increase likewise. In this context, riskiness is represented both by technological and valuation uncertainty.
Despite the researchers mentioning such hypothesis, they believe its impact to be minor in explaining changing average underpricing.

The realignment of incentive hypothesis has been proposed by Ljungqvist and Wilhelm (2003). According to their view, managers of going public companies allow for greater money left on the table in their offerings. Reduced CEO ownership, fewer secondary shares offered, and a higher dispersed ownership led issuing firms to be less inclined in bargaining a better price.
Realignment of incentives hypothesis differs from the changing risk composition hypothesis in that "underpricing is not determined solely by the investor demand side of the market".
Again, the authors reject such hypothesis to be the main driver of why underpricing changes over time. Their empirical findings found no relation between the presence of secondary shares and underpricing. Furthermore, they pointed out that, although CEO ownership was lower during the dot-com bubble, the dollar value of their stake instead was on average higher than in other periods, hence incentives not to leave money on the table would have been higher.

The third and last hypothesis was devised by the authors of the publication: holding constant managerial ownership and other characteristics, going public firms tend to increasingly accept the presence of IPO underpricing. Issuers strive to hire a lead underwriter with a highly ranked analyst, so to have greater analyst coverage. Given such priority, issuers would place less effort in trying to avoid investment banks with a reputation for high underpricing. In fact, since there are no fees involved in analyst coverage, issuers would pay for their service indirectly through underpricing.

The need for a higher coverage resulted from the higher valuations than in the decade prior (‘80s). “Analyst lust hyphothesis” is the name the researchers gave to this behaviour.
As a result, the issuing firm can only choose among a few underwriters, having to face with an oligopoly. The result being, like Hoberg (2003) has pointed out, the more market power an investment banker has, the higher the underpricing.

The second reason lies instead in an ever more popular practice during the ‘90s called “spinning”. Underwriters would create brokerage accounts for their clients such as VCs and issuing firms’ executives so to allocate hot IPOs to them. The arrangement between the two parties was structured as a “*quid pro quo*”: the underwriter offered underpriced shares in exchange for increased loyalty and a wider customer base. Despite insiders getting their wealth decreased due to the underpricing of their firm’s issue, they would then recover losses by having allocated other hot IPOs to them, which were, of course, underpriced. Once clients received these shares, they could easily sell on the first trading day, thus obtaining low-risk, sizable returns.
The authors regard such practice as being side payments, since issuers would then be more inclined to seek, rather than avoid, underwriters with a reputation for underpricing. Eventually, regulatory scrutiny started to hinder this practice to the point in which it was ruled illegal. Therefore, such phenomena saw a contraction in the post bubble period, mitigating average underpricing in the years following 2000.
Among the several hypotheses put forward in the article, the changing issuer objective function, comprised of the analyst lust and spinning hypotheses, appears to be better suited in explaining the changing nature of underpricing from the eighties to the early noughties. The empirical findings seem to support this theory, with results indicating its impact to be more relevant than the changing risk composition hypothesis and realignment of incentives hypothesis.

2.6 Regulation

Economic factors not only change over time but also change across countries and geographical areas. Each country has different dynamic properties, one of these is the institutional and legal framework. Law and finance academics have extensively analysed the nexus between the legal environment, business activity and financial markets. For example, La Porta et al. (1997,1998, 2002) showed a well-functioning legal environment facilitates raising financing by corporations both through debt and equity. Moreover, common law countries are characterized by greater investor protection and have more developed financial markets, whereas civil law countries tend to have the lowest level of shareholder protection.

This fundamental cross-country difference is indeed reflected on many firm characteristics such as the ownership structure, corporate governance, capital structure, dividend policy and corporate valuation.

Engelen and Van Essen (2010) investigated whether IPOs occurring in countries with a more developed legal framework experience less underpricing than those in less developed legal systems. They theorised two possible ways in which legal protection influences the degree of underpricing.
First, a weaker legal system increases ex-ante uncertainty on the firm value. The uncertainty mainly affects the post IPO strategies and the managerial decisions which could harm the value of the company, in turn worsening the degree of underpricing. Second, uncertainty may also affect profit distribution, as in jurisdictions with higher investor protection it is less likely that managers or major shareholders may resort to "tunnelling" (or related party transactions) to transfer profits out of the firm, thus damaging minority shareholders. Increased uncertainty leads to increased underpricing: a higher risk of being expropriated entails investors need to be compensated for subscribing the issue and, as a result, IPOs need to be underpriced on average. Uncertainty is also reflected on the increased risk premiums (and cost of capital) borne by companies.

Underpricing is not the only consequence of these factors, value creation is impacted as well. Claessens and Laeven (2003) demonstrated companies operating in countries where the legal environment ensures little protection over intellectual property rights tend to underinvest in intangible assets, thus affecting future growth rates and valuation. As a result, even if there were two identical companies, one incorporated in a developed legal system and one operating in a less developed legal framework, the latter will suffer more underpricing due to country level characteristics, *ceteris paribus*.
Empirical findings of Engelen and Van Hessen's research showed country level characteristics explain about 10% of the variation in the level of underpricing in an IPO. The result is of great concern: issuers in less developed countries will consider IPOs as a less favourable option, since the cost of going public is higher.

Regulation not only impacts underpricing through the legal framework, in fact trading rules have found to be influential as well. In fact, an additional layer of divergence among country level characteristics relies in different stock market trading rules.
On the one side, companies must abide by the business law of the country in which they are incorporated while on the other side, publicly traded or going public firms must adhere to the trading rules of the stock exchange on which their shares are traded or will be traded. Of course, a corporation can decide to get listed on an exchange located in a different country than the one in which it is incorporated.
In such cases, comparability among IPO performance, namely the degree of underpricing, is compromised. The causal effect of the legal environment or the exchange's trading rules on underpricing could be blurred, as it would be more complex to distinguish which of the two has the greatest influence on underpricing.

Two articles deserve to be mentioned regarding the topic of the influence of trading rules on IPO first day returns. One considers the impact of short selling constraints, the other analyses the effect of market manipulation rules.

Miller's "overpricing hypothesis" (1977) puts into relation the effect of short selling constraints on the valuation of publicly traded equities. A ban on short sales excludes market participants with a bearish outlook, thus stock prices do not properly reflect the view of the market in its entirety. Such constraints hinder market freedom, leading to higher valuations overall.
In Boulton et al.'s (2020) publication, the overpricing hypothesis served as a starting point for their research. As a matter of fact, overpricing as described by Miller is not just a hypothesis, since many researchers have proved the hypothesis by providing evidence of overpricing.

Yet, other authors rejected this theory, as they instead embraced Diamond and Verrecchia's rational expectation model (1987), by which equities never reach overvaluation, since market participants take into account the prohibition of short selling in their view and adjust stock valuations accordingly.
However, it must be pointed out the fact that more often than not the words "rational" and stock market do not go well together. It is well known how the market goes through periods of booms and busts, and that stock valuations seldom reflect the true value of the company.

Indeed, numerous studies failed to prove the rationality of the market, despite this being one of the basic assumptions of many theories and models. Stock market bubbles are truly evidence against rationality: whether Diamond and Verrechia's rational expectation model holds even in times of stock market euphoria is a questionable statement.

The authors analysed a total of 17151 IPOs across 36 different countries from 1998 to 2018. As a result of their research, they successfully proved that IPOs issued in countries which ban short sales tend to be more underpriced. Average underpricing of the group of offerings in jurisdictions which permit short selling stands at around 30%, half as much as the other subset of IPOs which occurred in countries where short selling is banned or not practiced. Alongside testing for underpricing, the researchers monitored the frequency of negative first-day returns. As it could be expected, the likelihood of non-positive return is much higher in countries with no shorting restrictions (26.9% vs 8.3%), thus confirming Miller's perspective according to which equity valuations only reflect the views of the more optimistic investors.

Additional evidence of their findings resulted from running the same experiment by addressing differences among countries in terms of information environment. Gathering high quality data in some countries may not be as easy as in more developed economies such as the Unites States or Western Europe. When collecting information poses a hurdle, opinions between optimistic and pessimistic market participants tend to diverge more. The authors took into account this contingency considering for the legal origin of each country (civil law vs common law), since civil law countries tend to have lower quality accounting information compared to common law countries. They found the relationship between short selling bans and first day returns in civil law countries to be stronger than in common law countries.
To further prove their hypothesis, the researchers controlled for International Financial Reporting Standards (IFRS) adoption, which is intended to improve the quality of financial disclosures. Indeed, the nexus between shorting bans and underpricing is materially weaker, and often not statistically significant. As a result, it can be inferred the relation between short selling constraints and first day returns is sensitive to the quality of a country's information environment.

Stock market manipulation is a significant issue for regulators and participants since it erodes investor confidence and market integrity. Previous studies have examined manipulative trading strategies, but the impact of stock exchange rules on market manipulation concerning firms' financing costs and, in turn financing decisions, has not been thoroughly investigated.

This unexplored topic formed the starting ground for Duong et al. (2021) to further examine whether underpricing is somehow affected by regulation on stock market manipulation.

They argue stringent stock exchange market manipulation trading rules can significantly impact IPO pricing. Clear and detailed rules can mitigate information asymmetries and enhance investor confidence, thus the authors hypothesized average lower underpricing should occur on exchanges which adhere to stronger market manipulation provisions. The sample used in their analysis covers international IPOs from 2000 to 2016, alongside they took into consideration the Market Manipulation Index (in which a higher score indicates tighter rules on market manipulation). Results showed a significant negative relationship between the presence of stronger provisions against market manipulation and average first day returns. Furthermore, they tested their findings to account for possible omitted variables which are correlated with both factors.

First, they considered the introduction of the Directive for Markets in Financial Instruments (MiFID) in the 15 EU countries included in the sample. Once again, results were further proved since MiFID adopting countries showed lower levels of underpricing compared to other countries, also underpricing declined in those same countries after adopting the directive.

Second, they performed the same analysis by considering International Financial Reporting Standards (IFRS) across countries. In this scenario, the relationship examined in the analysis still holds but tends to be weaker following IFRS implementation. Thus confirming, once again, the enhancement in the consistency of financial statements due to the IFRS.

Both studies mentioned earlier took into consideration the adoption of IFRS to reinforce their findings. Advocates of IFRS assert public companies should adopt the standard as it would increase the efficiency of capital markets. Mandatory IFRS adoption has the potential to improve cross-border comparability, increase reporting transparency, lower information costs, reduce information asymmetries and, as a result, foster competitiveness and liquidity in capital markets. Of course, the downside of adopting IFRS comes with increased cost associated with the transition from local principles to IFRS.

IFRS was introduced with an uneven approach around the globe: the European Union, Australia, Hong Kong, the Philippines and South Africa were the first to introduce mandatory adoption of IFRS for publicly traded companies, back in 2005. While in countries such as US, Mexico, China and Brazil firms were not allowed to use IFRS. Exemptions from mandatory IFRS are also to be found in the UK, Switzerland and Japan.

Horton et Al. (2013) were among the first to investigate whether mandatory IFRS adoption has any influence on the information environment. Their research goal was to understand how and in which way IFRS can improve the forecasting accuracy of financial analysts. Results showed forecast accuracy and other factor related to information quality significantly increased for companies whose adoption was mandated, while such improvement was not as remarkable for nonadopters or voluntary adopters. Furthermore, improvements were stronger for firms whose accounting treatments differed the most from IFRS, thus confirming IFRS to be the main driver of this change rather than other omitted variables. In addition, they found evidence that forecast accuracy has increased thanks to greater comparability across companies and by enhanced information benefits, both resulting from IFRS adoption.

Starting from 2005, regulatory reforms were introduced in the European Union aimed at increasing transparency and disclosure for IPO companies. On one hand, the Prospectus Directive (PD) mandated additional IPO prospectus disclosure. Not only, the "passporting" regime allowed IPO firms whose prospectus received regulatory approval in one EU country to issue securities in other member states. On the other hand, increased accounting enforcement was put in place together with the introduction of IFRS through the means of a regulation (IFRSR). Nevertheless, MIFID allowed the formation of two types of exchanges: EU regulated markets and exchange regulated markets. Where in the latter, companies are not mandated to adhere to the PD and IFRSR.

Byard et al. (2020) studied whether these reforms benefit firms by a reduction in average underpricing. Previous articles examined the effect of IFRS on first day returns in EU financial markets, although, according to Byard, these studies did not isolate for the concurrent introduction of the PD. Hence, the authors focused on IPO occurred between 2004 and 2008 on EU regulated markets to investigate the joint effect, on IPO underpricing, of the adoption of IFRSR and PD. Results showed a significant decrease in countries where the PD was adopted, and accounting enforcement was increased. Whereas no decrease was found in countries adopting the PD but not enhancing accounting enforcement. No evidence showed a reduction in underpricing due to mandatory IFRS. This last finding is in sharp contrast with Hong et al (2014), which asserted the opposite, that is mandatory IFRS reduces underpricing. According to the authors, the previous study was characterised by a sampling error, as they also considered IPOs occurred on exchange regulated markets, in which most companies choose not adopts IFRS.

Despite several research caveats such as the sample being small (both in terms of timespan and number of IPOs) and the occurrence of possible selection biases (lower quality firms tend to be listed on exchange regulated markets to avoid the adoption of IFRS and PD) , this study shows the challenges of conducting analysis on the impact of the introduction of new regulation, as it is quite difficult to completely clear out the effects of other regulatory changes.

Moreover, regulation affects countries and their financial markets differently. Hence, the outcomes of regulation might not be homogeneous, as a result it would be very bold to argue mandatory IFRS to have beneficial effects all around the world. Indeed, what this article shows is that improved accounting standards (IFRS) are not beneficial “per se” to the enhancement of financial reporting quality (and in turn underpricing). IFRS is only beneficial if coupled with accounting enforcement measures. However, since enforcement measures are shaped by country level institutions, there are cross-country differences related to the effectiveness of IFRS and its enforcement, thus its impact on underpricing is very likely to be different depending on the country.

A stream of the underpricing literature instead took into consideration for research purposes the lawsuit risks which lie with initial public offerings. Such matter is of great importance for all parties involved into corporate transactions such as mergers, seasoned offerings, spin offs and, of course, IPOs. Involvement in a lawsuit can have serious repercussions both for the issuer and the underwriter as it can lead to financial losses due to legal fees, settlements and regulatory fines.

For the client/issuer, ongoing lawsuits are a source of distraction from running everyday business operations. Management could fall out of favour with shareholders and institutional investors thus exposing them to proxy fights or put simply, to the risk of being replaced.
For the investment banks/underwriters, lawsuits can bring about considerable damage to the bank's reputation and image, which often outweighs any financial penalty or fine of any kind. Reputation is of utmost importance in investment banking, as it is often rewarded with sizable fees paid by their clients. Not only, a damage to the bank's credibility and reputation ultimately results in a loss of market share in favour of competing investment banks. As a result, great effort has been put in investigating ways to reduce legal disputes, one of these being, once again, underpricing.

As Hughes and Thakor (1992) point out, issuers which reach the market to raise equity lack the notoriety and credibility of certifying the value of their future expected cash flows, which is especially true for young companies. This is one of the reasons why companies prefer to rely on reputable underwriters. In this circumstance, the word reputation entails a bank which cares more about the long run rather than being myopic. To put this statement into context, underwriters face a trade off when advising on an issue. On one hand, they might be more inclined to overprice the issue, given that their compensation is positively linked to the overall proceeds of the offering. On the other hand, overpricing increases the likelihood of price declines subsequent to the IPO, which is often the first step for the start of a legal proceeding.

Tinic (1988) suggested this strategy of deliberate underpricing to be a kind of "insurance policy" against the risk of future litigation. While Hensler (1995) viewed this strategy in a less optimistic way, by considering it simply a cost (defined as "litigation cost") which decreases the wealth of a risk-averse entrepreneur.

These earlier studies on the topic advocated the lawsuit avoidance hypothesis as a valid reason for underpricing new issues. Even if, on paper, the hypothesis seemed reasonable and economically relevant, many empirical studies tested the idea in the following years, often providing mixed and contrasting results. In addition, the underlying assumption in such papers is that losses deriving from share price declines are sufficient to take legal action.
Instead, Section 11 of the Securities Act of 1933 (the law granting the shareholders' right to file such lawsuits) states two conditions must be met before an issuer, underwriter, officer or director of the issuer can be sued:
1) In the first place, investors must have experienced financial losses as a result of their investment.
2) In the second place, investors must provide proof of a significant omission in the company's disclosure which was present at the time when the investment was made.

Given the above, plaintiffs are required to provide evidence of both investment losses and poor disclosure. Hence to mitigate litigation risk, only one of the two conditions needs to be hedged. Hedging can be carried out through underpricing (to minimise damages) or through enhanced disclosure (to lessen the likelihood of a material omission).

Hanley and Hoberg (2012) hypothesised the two strategies as being substitute hedges for litigation risk. Yet, underpricing should be significant only when a company faces material omissions in their prospectus. Therefore, the underpricing strategy is more likely to be used by issuers with a high probability of information omission.
It must be noted though, underpricing is only effective in preventing lawsuits from IPO investors while it does not deter legal actions brought by aftermarket purchasers, which are the primary plaintiffs in most lawsuits since they buy at higher prices compared to IPO shareholders.

In contrast, greater disclosure can fend off any type of claim as it applies evenly to both IPO investors and aftermarket shareholders. Nonetheless, in some cases disclosure can be costlier than underpricing when new information is strategic or has high proprietary value to the issuer (which is especially true if new information is good). If, instead, a new piece of information arises during the IPO process and has negative implications for the company, there is little benefit in withholding it since bad information is usually of low proprietary value and is hard to conceal for a long time.

To conclude, it must be highlighted these hedging strategies are effective in preventing lawsuits under Section 11. The primary benefit is enjoyed by the underwriter, since there is a significant reduction of the probability that the underwriter will be named in the suit. Litigation costs for underwriters can be relevant since even frivolous lawsuits can impact the bank's reputation, leading to a decline of market share.

Extant literature on the lawsuit avoidance hypothesis is for the most part focused on the U.S. environment. However, testing the same assumptions in a single country or in a limited sample period can skew the results. Changes in regulation, like the ones occurred in the United States during the '90s, can significantly impair the comparability of findings related to different periods. Moreover, drawing conclusions from studies performed in one country to test the validity of a hypothesis leads to imprecise outcomes, given that regulation is much different in other parts of the globe. In fact, previous studies confirmed litigation risk to be higher in countries with high shareholder protection. While in some countries investors resort to class actions, in other countries this type of lawsuit is completely absent.

"An international look at the lawsuit avoidance hypothesis of IPO underpricing" by Lin et al. (2013) shows the results of an empirical research performed using more than 13000 IPOs across 40 countries in which the lawsuit avoidance hypothesis was tested. Results show a positive relationship between a country's level of litigation risk and average underpricing, suggesting that the legal liability could justify differences in underpricing across countries.
Findings confirm the insurance effect of underpricing as a hedge against litigation risk in an international context

2.7 The impact of ESG on IPO performance

Environmental, social and governance issues have only become a relevant concern in the last few years. Investors and the financial community now view sustainability as an alternative form of risk management, while at the same time showing care towards the environment so to preserve it for future generations. Sustainability related matters are currently deeply engraved in the investment decision process. Hence, accountants and investor relations experts have started to introduce ESG metrics into corporate disclosures and reporting. New communication strategies are being developed to satisfy the information needs of potential investors. Not only, companies are now embracing campaign of mass advertising just to show their environmental commitment towards stakeholders with the goal of enriching their brand identity. Yet, it must be noted communication is not just merely employed for marketing purposes. Indeed, communication is key in the IPO context too.

Literature related to the ESG topic is, of course, mostly recent. Researchers have put their focus on sustainability just in the last years, only once ESG became a trend. Since this literature review is developed on the basis of a chronological order, the main theories and articles related to underpricing and ESG will be presented in this last section.

Publications regarding the relationship between sustainability can be roughly divided into two categories. Some articles take into consideration the effect of ESG disclosure on underpricing, while others focus on corporate ESG performance and its implications on underpricing.

Articles belonging to the ESG disclosure group will be presented first and, in more detail, as they are closely related to the research topic and objective of this dissertation. While the literature related to ESG performance will be briefly summarized in the last pages of this section.

“Sustainability disclosure and IPO performance: exploring the impact of ESG reporting” is a research article published in 2023 by Ferri S., Tron A., Colantoni F. and Savio R.
This publication is one of the few studies on the effect of the disclosure of an ESG report on IPO performance and it constitutes the starting point of this research thesis, hence it is presented first in this section.

ESG ratings are now rooted in investment decision making thus are able to affect the value of the firm. Given their relevance, market participants are increasingly interested in how companies address environmental, social and governance issues. With this in mind, most companies are now able to report their environmental risks, sustainability goals and performance through reporting frameworks. Any relevant piece of information which is withheld and not disclosed to the public increases the level of information asymmetry. This is especially true for private companies which are willing to get listed on a stock exchange.
Indeed, the main principle at the heart of the relationship between ESG disclosure and underpricing is that increased disclosure diminishes ex-ante uncertainty and information asymmetry, which in turn should moderate underpricing. As a result, the ESG disclosure related literature belongs to the wider stream of publications related to information asymmetry and underpricing, presented in the first pages of this review.

The main research question on which Ferri et al.’s publication is based, relies on the aim of analysing the consequence of the publication of non-financial information on the performance of IPOs from an underpricing perspective. Given that there is a negative correlation between ESG disclosure and underpricing, a company which decides not to disclose an ESG report would give rise to higher information asymmetry, in turn increasing underpricing.

The sample used for gathering data comprises European IPOs which occurred between January, 2017 and April, 2021. Afterwards, 100 companies among these IPOs were selected, 50 of which disclosed an ESG report prior to the offering while the other 50 had not. The selection was performed on the basis of a pairwise sampling procedure, so to choose companies which are comparable in terms of size, sales and sectors. Results of the multiple linear regression show a statistically significant (10% level) negative impact of the "ESG reporting" variable on underpricing.

To summarise, firms which disclose their ESG performance are rewarded by the market. Based on their findings, the publication of a sustainability report can reduce underpricing by about 8%.
However, as also the researchers have pointed out, this study focuses on a small, limited sample. Moreover, the pairwise sampling was performed arbitrarily even though size, industry and sales comparability criteria were employed. Lastly, among the variables used, ESG was treated as a whole rather than analysing separately the impact of the single environmental, social and governance factors, which instead was suggested as a future avenue for research.

A previous study similar to the aforementioned one was conducted by Bollazzi et al. (2017) with a focus on the Italian stock exchange. The authors present an empirical analysis to determine the impact of corporate social responsibility (CSR) on first day returns in the years between 2009 and 2015, a period in which CSR was most commonly used in place of the more recent term ESG. Despite being times in which CSR/ESG was not a rather debated issue yet, 77.4% percent of the companies within FTSE MIB (Italy's main stock index) had already a CSR manager, as opposed to the average of 42.8% of other markets. Likewise, 67.7% of FTSE MIB listed companies presented an organizational unit to promote CSR, compared to a mean value of 42.8% of other listed firms.

The sample includes a total of 84 companies listed on all segments of Borsa Italiana. Among these, 13 listed on the MTA (Mercato Telematico Azionario), the segment which comprehends companies with higher market capitalization. Only four of the firms on the MTA have disclosed a sustainability report, which is the evidence of a time in which ESG wasn't a priority yet.
In sum, most of the companies included in the sample are small and medium enterprises (SMEs).
The control variables in the model are all dummy variables and comprehend: disclosure of sustainability performance and other ESG related metrics such as green business model, efficient usage of materials, reduced emission, social support towards the community and responsible corporate governance.

Results of the univariate t-tests based on each of the other ESG metrics (other than ESG reporting disclosure) show no significant differences in the underpricing averages of the two populations (ESG vs Non-ESG) thus rejecting the hypothesis according to which the underpricing of the environmental responsible companies is lower. The same statistical model applied to the sample with sustainability disclosure as the main control variables indicates a statistically significant difference in the mean values of the two subsets, yet the average underpricing of ESG reporting companies appears to be significantly higher than their non-reporting counterparts (14.56% vs 4.9%), which appears rather counterintuitive.

Indeed, it must be pointed out such empirical analysis could be flawed given the relatively limited size of the sample. Regarding the latter model employing disclosure metrics, only seven companies make the list of ESG reporting firms (compared to 77 non reporting companies). Three out of the seven companies which reported on sustainability are SMEs. While this percentage might be a good representation of the Italian economy, which is largely based on small and medium enterprises, the same cannot be considered a fit cluster for investigating the effect of ESG disclosure on underpricing.

First day returns of smaller companies tend to be higher on average, considering that not only are they riskier but also information asymmetry is more pronounced. In sum, such findings could be impaired by the size composition of the sample hence no relevant conclusions can be made upon the relationship between ESG disclosure and underpricing.

Voluntary ESG disclosure can be beneficial for initial public offerings in other ways. It can improve the quality of company information, mitigate information asymmetry in determining firm value and, at the same time, signals compliance with ethical and societal norms in terms of sustainable business conduct. All the above enrich the image and the legitimacy of the firm while reducing idiosyncratic risk in the after-market trading following the offering. Idiosyncratic risk refers to the firm specific risk which adds to the general market risk (otherwise called systemic risk). The additional risk is represented by increased volatility or downside tail risk, which, said differently, is the amount of loss sustained as a result of a decline in the stock price.

Voluntary disclosure on sustainability related matters is particularly relevant when a firm decides to pursue an IPO rather than in other moments within the life cycle of a company. Private firms suffer from higher levels of information asymmetry between insiders and outside investors, thus the will to disclose non mandatory pieces of information produces a strong signalling effect.
ESG disclosure meets the demand of stakeholders to bring corporate accountability on ESG material aspects on the same level as corporate power. At the same time, it provides a “hedge” in terms of reputational loss and towards brand value, hence representing a powerful instrument for the prevention of harmful damages to the company and the subsequent litigation.
These considerations have served as a backbone for the research by Reber and Gold (2021). Their hypothesis for the study involved looking for an answer to the question: “How do voluntary ESG disclosures and scores at the time of the flotation influence the idiosyncratic risk of IPOs in aftermarket trading?”.

After all, an ESG disclosing company is less likely to experience incidents or scandals such as industrial accidents, fraud or corruption cases which can significantly impair the company image. This effect is greater for highly rated ESG companies and can be attributed for the most part to the fact that such companies tend to be characterised by an above average risk management with internal control mechanisms in place.
Keeping idiosyncratic risk, and in particular downside risk under control is crucial in preventing decreases in market capitalization, which can lead to accelerated financial distress, and avoiding litigation cases by investors within IPOs. Moreover, from the investor's point of view idiosyncratic risk is closely monitored. Unlike systematic risk, firm specific risk is not priced in the market since it represents the diversifiable business risk. In fact, an investor holding a portfolio with several stocks can cancel out the firm specific risk of each holding. For this reason, idiosyncratic risk is a risk which is not rewarded by the market.

Following the analysis of 1312 US IPOs between 2002 and 2018, results confirmed a negative a relationship between idiosyncratic volatility and downside tail risk in the first year of trading (measured by VaR, Value at Risk). ESG disclosure seems to affect idiosyncratic volatility but not total volatility.
To sum up, there is evidence that voluntary ESG disclosure serves the information needs of investors and stakeholders, enriching the stock price informativeness. Companies have more to lose than to gain in terms of business ethics and sustainability, hence improving transparency and accountability serves as a strategy for maintaining legitimacy in the business world.

Despite the recent rise in ESG disclosure, most institutional investors agree on the fact that the qualitative and quantitative information provided by companies is not precise enough. In addition, standardized and mandatory reporting is necessary and still insufficient.

Indeed, voluntary disclosure as described earlier is still used and interpreted with a signalling purpose towards outside investors and stakeholders. The lack of standardization, in conjunction with missing sanctions or fines for misreporting, leads to poor comparability in terms of ESG disclosure and performance both across companies and across markets. Not only, there is the added risk by which disclosing firms may consider releasing unsupported claims regarding their ESG performance and goals resulting in "greenwashing".
In addition, differences in ESG rating standards such as the issues considered, materiality assessments, score weights and measurements lead to discrepancies in relation to comparability. While from an academic point of view, findings and conclusions of a study might be sensitive to the ESG rating employed

Boulton's publication (2023) researched the effects of ESG disclosure mandates across the world. A direct effect of mandatory disclosure is the improvement in the amount and quality information in comparison to reports disclosed on a voluntary basis. Moreover, in countries where disclosure mandates are introduced firm-level share liquidity increases.

Mandating ESG disclosure can serve as a mean for companies to behave in a more sustainable manner so to avoid any potential risk of litigation. For instance, companies which are classified by the market as "sin stocks" (e.g. companies active in the alcohol, tobacco, gambling or weapons industries) use ESG disclosure to mitigate the direct and indirect effects of litigation.

Sustainability related disclosure mandates are not homogenous around the world. Two are the main differences:
- who issues the mandate (government or the national stock exchange).
- whether companies have the possibility to provide explanations and opt out of complying with the mandate.

The negative relationship between ESG mandates and underpricing is consistent, regardless of the authority imposing the mandate. However, the relationship appears to be stronger for mandates imposed by non-governmental authorities. Conversely, the inverse correlation pertaining to the second point is only present when full disclosure is required and no exceptions to opt out are present.
Moreover, the authors have found the negative relationship between ESG mandates and underpricing to be weaker in countries with more stringent accounting standards enforcements, higher audit quality, stronger governance institutions.
After analysing a set of 15000 IPOs between 1998 and 2018 in 36 countries in which ESG disclosure mandates were introduced, the researchers concluded that underpricing is indeed lower (precisely 15.9 percentage points lower on average) when such mandates are present.

Information frictions are detrimental for initial public offerings as they often lead to information asymmetry. Greater disclosure is an effective mean for mitigating such issue, hence disclosing more ESG information would also benefit investors which embrace socially responsible investments (SRI) and investors who care about the impact of companies on the environment and stakeholders. Such investors go through ESG screening criteria when performing “stock picking” for an equity portfolio or simply in the process of choosing IPOs to invest in.

Fenili and Raimondo (2021) conducted a textual analysis of S-1 filings (the code to which prospectuses are classified in the United States) on a sample of 783 U.S. IPOs between 2012 and 2019. By computing a text-based measure for ESG disclosure, they aim to find whether it exists a negative relationship between ESG disclosure in the S1 filing and IPO underpricing, both for the individual pillars and the aggregate.

The methodology employed resembles the one used in prior literature, which consisted in the search for a list of words in the S1 filings associated with certain sentiment attributes, some positive some negative. The same process is then repeated to obtain words related to the single E-S-G pillars.

At the end of this process, the authors gathered a total of 515 terms, eventually forming an “ESG dictionary”. Following the textual analysis, they found on average S-1 filings present an average of 305 words related to the E pillar, 1232 words related to the S and 3367 related to governance. An additional variable “Number of ESG words” captures the cumulative total of the words related to each pillar in a single S-1 form.

Findings based on an OLS linear regression confirm the statistical significance of the negative correlation between the number of words related to E-S-G and underpricing. The sign and the significance of the control variables are in line with the previous related literature. The variables in order of magnitude are ESG (cumulative), governance, social and environmental, with environmental having the lowest effect in terms of negative relationship with underpricing.

Governance topics are the most important to investors in a young company, as often happens in the case of IPOs: shareholders rights, executive compensation, financial reporting audits, internal controls, and board composition.

3 Empirical research

As it has been explained in the literature review, the magnitude of underpricing within an IPO is closely tied to the level of information asymmetry between new IPO investors and company insiders. The aim of this research is to further analyse this aspect from an ESG perspective, considering that asymmetry of information may include also a company's qualities pertaining to the environmental, social and governance sphere. In the context of IPO underpricing, major relevance is given to the amount of disclosure of ESG and its components rather than the company's proficiency and integrity from a sustainability perspective.

The starting point of this study finds the ground in past research, in particular the research performed by Ferri, Tron, Colantoni and Savio (Sustainability Disclosure and IPO Performance: Exploring the Impact of ESG Reporting, 2023). In the last pages of their publication, the authors suggested as a new avenue for future research the impact of the single E-S-G disclosure components on overall underpricing. In addition, they brought forward the idea of testing the impact of each component of ESG to determine which has the largest impact of underpricing. As a result, the ranking of the E, S and G should reflect the degree to which IPO investors (mainly institutional investors) assign more value to each component in terms of importance, from an informational standpoint. ESG disclosure does not merely provide value just for potential investors but informs all stakeholders involved on the impact of a company. Increased ESG transparency towards stakeholders constitutes an additional value for the investors, since it avoids future potential litigations, as shown by the study "Mandatory ESG Disclosure, Information Asymmetry, and Litigation Risk: Evidence from Initial Public Offerings" (Boulton, 2023)". Moreover, greater disclosure implies enhanced trustworthiness and a more favourable reputation, such characteristics are crucial for the long-term success of a company.

Unlike most innovations in finance, the role of ESG and its implications on companies started to be taken into consideration in Europe rather than the United States. In the U.S., to this point in time the relevance of sustainability is still largely debated and often considered on a secondary level compared to traditional financial metrics. For this matter, this study focuses on European companies which went public in western Europe, where the major stock exchanges of the continent are located.

The rise of ESG can be considered a relatively new phenomenon in the world of investments. Despite having its roots in the late 90's of the last century, the importance of sustainability disclosure and reporting has rapidly increased, as most frameworks have been developed in recent years.

Given that ESG reporting is still considered a novelty, the period taken into account for the purpose of this research ranges from 2018 to 2023. For example, in one of the previous studies on this matter "IPO and CSR: An Analysis on Last Performance in Italian Stock Exchange" (Bollazzi, Zanatta; 2017) only 4 out 94 companies listed on Borsa Italiana between 2009 and 2015 had ESG disclosure. The sample being so small is more than likely due to the time frame of the analysis, at a time in which ESG still wasn't a widely debated subject.

3.1 Data and methodology

The data sample considered in this study consists of 984 companies which have successfully carried out an initial public offering on western Europe stock exchanges between January 1st, 2018, and December 31st, 2023. The sample includes only successful IPOs thus excluding any suspended, withdrawn, or postponed offerings.

Moreover, some common exclusions have been performed similarly to previous literature focused on underpricing research. Namely, the author excluded companies incorporated in countries located outside Europe, so to harmonize within the sample the governance practices and regulatory compliance standards to which companies must adhere. As in Slovin et al. (1994), financial firms have been excluded. Banks and insurance companies must comply with capital requirements, which entails regulation affects the choices of security issues of such companies, hence altering the results. Additional exclusions comprise Real Estate Investment Trusts (REITs), American Depositary Receipts (ADRs), Special Purpose Acquisition Companies (SPACs), closed-end funds, mutual funds, limited partnerships, trusts, unit offerings. Finally, those companies for which the underpricing data is missing have been dropped.

Most of the data has been retrieved from the Bloomberg Terminal and LSEG Workspace (ex-Refinitiv). The missing data points have been filled manually by taking the data from individual companies' websites or financial filings.

For each company included in the sample, I gathered the following data:

- IPO date.
- Country and year of incorporation.
- Industry.
- Currency of the offering.
- IPO offer price (domestic currency) and size of the offering (in Euros).
- Number of shares offered and, where available, overallotment (greenshoe) issued shares.
- IPO underpricing.
- Percentage of primary and secondary shares offered.
- Percentage of institutional ownership at offering date.
- Private equity or venture capital backed IPO (dummy variable).
- Bloomberg ESG (overall) disclosure score and disclosure score of each ESG component.

As a proxy for sustainability disclosure, I relied on the Bloomberg ESG disclosure (BESG) score, a proprietary metric employed by Bloomberg to assess the degree of environmental, social and governance reporting disclosure. The score ranges from 0 to 100 for each component, 100 being the maximum disclosure score. The BESG metric is updated on a yearly basis, thus only the data related the year in which each company gets publicly listed has been gathered for the purpose of this research.
For the calculation of the BESG score, Bloomberg relies on a bottom-up approach, by gathering data from self-reported and publicly available sources such as sustainability and governance reports, annual filings, company websites and proxy statements. The BESG score is remarkably useful for this research, not only for its ease of use but also because it provides a quantitative measure of the degree of disclosure for each ESG pillar (and ESG as a whole).

As opposed to ESG scores used by other data providers, BESG measures the company's transparency towards stakeholders rather than the company's performance on ESG issues, which hasn't been taken into account for the purpose of this research.

In order to determine the relationship between ESG disclosure and information asymmetry, the author considered the degree of underpricing of each IPO included in the sample. The underpricing consists of the first day stock return following the listing and is calculated using the following formula:

$$3.1\ Underpricing = \frac{First\ day\ closing\ price - Offer\ price}{Offer\ price}$$

3.2 Summary and descriptive statistics

Table 5: IPOs sorted by country of incorporation

Country	N	Mean Underpricing	Median Underpricing
Sweden	222	2,64%	0,00%
Great Britain	176	16,59%	7,14%
Italy	166	14,76%	6,67%
Norway	93	20,01%	1,16%
France	82	3,34%	0,38%
Denmark	55	23,18%	5,63%
Finland	48	7,83%	2,36%
Germany	41	5,69%	2,07%
Other	38	6,36%	0,65%
Switzerland	19	22,40%	8,99%
Netherlands	18	9,33%	0,87%
Spain	16	6,41%	2,04%
Belgium	10	2,75%	2,76%

Table 5 reports the distribution by country of incorporation for all the IPOs included in the sample. The sample contains a total of 984 IPOs covering 29 countries across all Europe. 17 countries had less than 10 offerings during the period considered thus have been grouped under the name “Other”.

In every country, IPOs are underpriced as shown by the average and median underpricing. Overall, Sweden is the country with the most initial public offerings and ranks first in terms of lower underpricing, with a mean underpricing of 2.64% and median underpricing of 0%. Conversely, Switzerland presents the highest median underpricing at almost 9% with a mean of 22.4%.
Surprisingly, more than half of the offerings within the sample have been issued in currencies other than the Euro, since a relevant portion of the sampled companies are incorporated in Scandinavian countries such as Sweden, Norway and Denmark.

Table 6: IPOs sorted by sector

Sector	N	Mean Underpricing	Median Underpricing
Technology	228	11,80%	4,12%
Industrials	179	10,37%	1,89%
Consumer Discretionary	134	7,66%	2,00%
Health Care	132	7,40%	0,54%
Energy	72	13,31%	4,01%
Communications	67	9,35%	8,48%
Materials	63	9,71%	4,58%
Consumer Staples	53	15,40%	3,56%
Real Estate	40	6,43%	0,60%
Utilities	16	66,53%	5,98%

Table 6 shows the results of the sample grouped on the basis of the sector in which newly listed companies operate. The distinction of the different industries is based on the Global Industry Classification Standard (GICS) consisting of 11 sectors (only 10 sectors are shown on the table as financial companies have been excluded). Technology represents the most active sector, accounting for almost a quarter of all transactions. Such predominance is more than likely attributable to the stock price boom of tech companies in 2020 and 2021. The communications sector is characterized by the highest median underpricing as opposed to the healthcare sector with a median value close to zero.

Figure 7: Number of IPOs by year

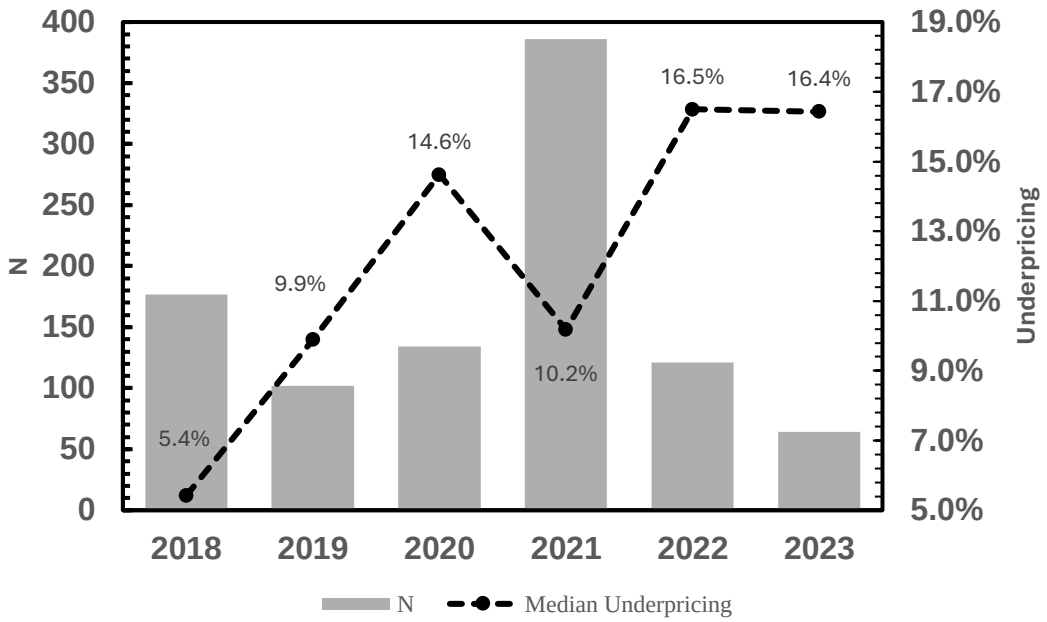


Figure 7 summarizes the distribution of the IPO samples on a time basis. The year with highest number of offerings is 2021, with a total of 386 deals. An environment of low interest rates and lofty stock valuations favoured the listing of firms. Tech related companies, many of which unprofitable, decided to get listed so to take advantage of the increased adoption of digitization brought about by the pandemic. On the contrary, 2023 saw the lowest IPO activity, as a consequence of high interest rates and greater macro uncertainties. Interestingly, 32 out of the 64 offerings in the year involved Italian companies, likely due to a better performance of the Italian stock market compared to its European peers thus partially offsetting the high cost of money.

By shifting the focus on underpricing levels, it clearly emerges an upward trend: the median underpricing has grown year over year during the observed period (with the exception of 2021), with a threefold increase from 2018 to 2023. The trend could be caused by a higher degree of uncertainty in the aftermath of the pandemic followed by a lower demand for risky investments as the likes of IPOs, in relation to high interest rates. Such view would be consistent with Loughran & Ritter (2004), according to which underpricing is influenced by risk, in particular valuation uncertainties.

Table 8: Distribution of ESG reporting companies by sector and year

Sector	**N**	**%**
Technology	52	23,4%
Consumer Discretionary	50	22,5%
Industrials	48	21,6%
Health Care	15	6,8%
Materials	13	5,9%
Communications	12	5,4%
Consumer Staples	11	5,0%
Energy	10	4,5%
Real Estate	7	3,2%
Utilities	4	1,8%
IPO year	**N**	**%**
2018	34	15,3%
2019	26	11,7%
2020	30	13,5%
2021	113	50,9%
2022	13	5,9%
2023	6	2,7%
Total	**222**	

As mentioned in the previous section, the author collected for each company the data related to ESG disclosure by utilizing the proprietary Bloomberg ESG disclosure score. The screening led to a total of 222 companies for which there are available data, representing 22.5% of the sample. The division of the sample in two subsets, ESG vs non-ESG reporting companies, makes possible some comparisons. Within the ESG subset, the consumer discretionary and industrials sectors represent a greater percentage with respect to the percentage held in the whole sample of both ESG and non-ESG reporting companies, which entails there is a higher degree of attention towards sustainability in these two industries.

On a country-based analysis of the sample, Sweden, Great Britain and Italy are the countries with highest number of ESG reporting companies. The outcome is in line with the results shown in table 5, in which the three countries rank in the top three by number of deals.

Contrary to my expectations, the number of ESG transparent companies has shrunk considerably in the last two years of the sample. Following a peak in 2021, less than 20 newly listed companies reported in 2022 and 2023. Such result is in contrast with the increasing attention ESG has experienced in recent years.

Shifting back the attention to the main research objective, a comparison of underpricing between the two subsets leads to an intriguing result. On one hand, the median underpricing of the ESG and non-ESG subsets do not differ significantly, being 3.02% and 3.13% respectively. On the other hand, there is a wide difference in mean underpricing: ESG reporting companies experience on average an underpricing of 8.34% compared to 11.96% of their non-reporting counterparts. In other words, there is a spread of approximately 350 basis points between the two groups, leading to the conclusion that more transparent companies in terms of environmental, social and governance issues are rewarded with a significantly lower amount of money “left on the table”.

Table 9: z-Test: Two Samples for Means

	NON-ESG	*ESG*
Mean	0,119561214	0,08338968
Known variance	0,298	0,031
Observations	723	221
Hypothesized mean difference	0	
z	1,538945478	
P(Z<=z) one-tail	0,061908804	
z critical one-tail	1,281551566	

To better understand the statistical significance of such discrepancy, a z-test is performed by taking into consideration the two subsets. In this case, the null hypothesis states there is no significant difference between the two mean values (underpricing). The significance level of the test was set to 0.1. Results based on a one-tail test, allow the null hypothesis to be rejected as the z-value is higher than the critical z-value and the p-value P(Z) is smaller than 0.1. Indeed, such test confirms the validity of the assumption upon which underpricing is smaller for ESG transparent companies.

The result of the mean value should be trustworthy considering there are no extreme data points in the dataset (in prior research any value out of the -200%];[+2000% range would have been regarded as an outlier and thus discarded). This first finding is consistent with the research hypothesis and would initially prove true the conjecture according to which ESG disclosure leads to a reduction in underpricing. However, such conclusion could also be influenced by the size of the offerings belonging to the two subsets. As a matter of fact, the deal value calculated in euros (IPOs in currencies other than the euro have been converted) is quite different: ESG transparent companies have an average offer size of 436 million euros (with a median of €139 million) compared to the non-ESG subset with an average of 50 million euros (median being €10 million. Additionally, the partition in two samples allows for an easy comparison of companies based on firm age at IPO. The company's age at the time of the offering is calculated as the year in which the listing occurs minus the year in which the issuer is incorporated, as the following formula:

$$3.2\ Firm\ age\ at\ IPO = Year\ of\ IPO - Year\ of\ incorporation$$

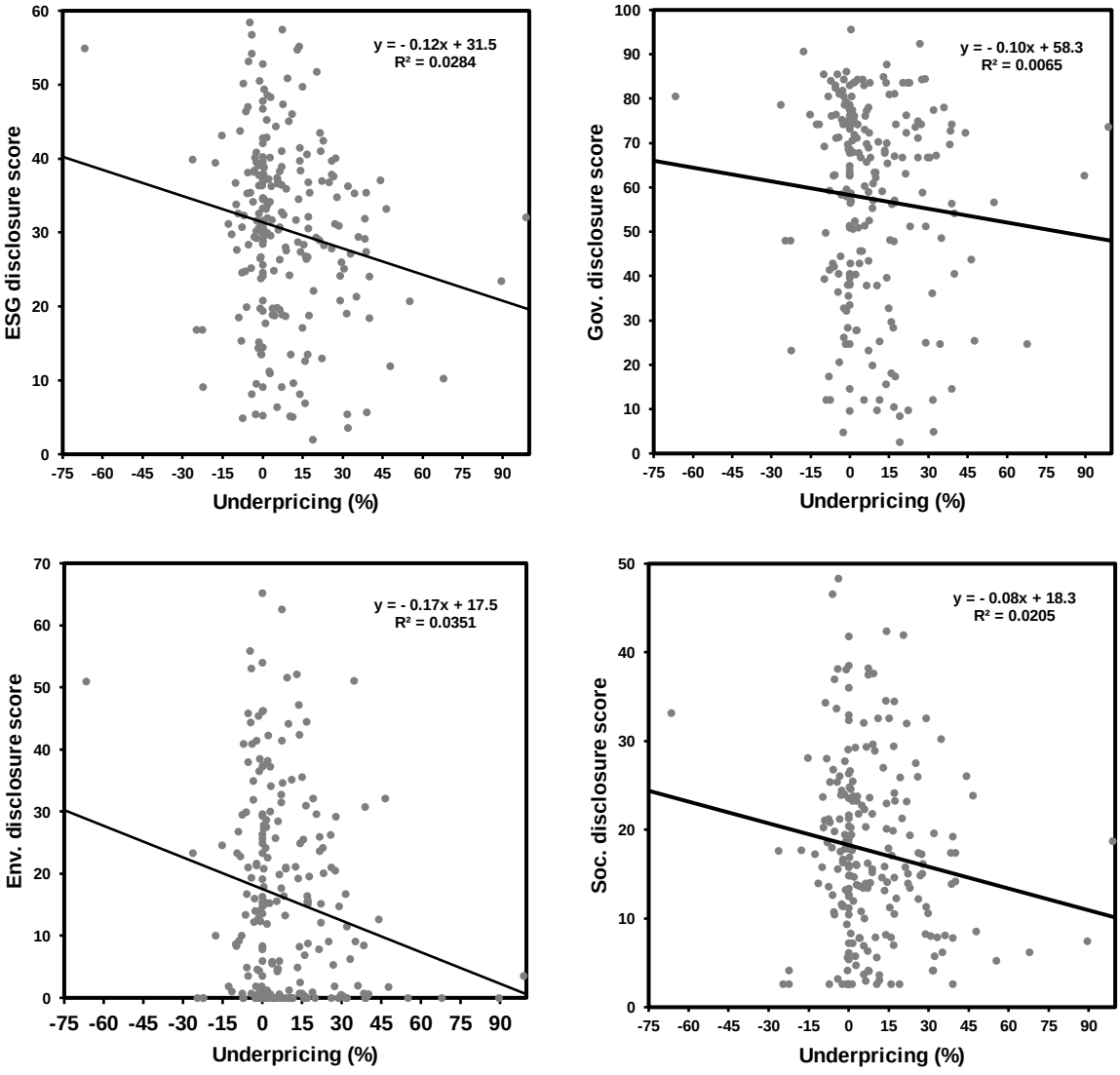
After calculating the firm age at IPO for each company, the mean and median of both samples have been computed. Results show a mean age for the ESG subset of approximately 12.5 years[1] as opposed to 10.5 for the other group. Similarly, the median age resulted as being 6 and 7 respectively. As a result, there is no statistically significant difference of firm age at the time of the listing between the two groups of companies, thus lower underpricing which characterizes ESG reporting companies, in this case cannot be explained by firm age. Previous research conducted on this matter found an "inverse relationship" between the age of the issuer and the amount of underpricing resulting from the listing, as already mentioned in the literature review.

[1] For the purpose of this calculation one outlier has been removed (the Italian Sea Group, founded in 1575), as it significantly skews the average which would otherwise be 14.5 years.

3.3 Empirical results

Figure 10 represents the scatter plots between underpricing, set as the dependent variable, and each BESG score (ESG aggregate disclosure, environmental disclosure, social disclosure and governance disclosure). For each scatter plot, a line of best fit together with its function have been displayed.

Figure 10: Scatter plots of ESG factors vs Underpricing



All the sustainability disclosure scores appear to be negatively correlated with underpricing, since the coefficients of the lines of best fit have all negative values. This entails a higher degree of disclosure reduces the amount of underpricing at the time of the listing. Moreover, by comparing the coefficient values of each trend line, the Beta of the trend line in reference to the environmental disclosure score appears to be the largest, hence suggesting environmental disclosure to have the greatest effect on underpricing. Again, by making a comparison among the R^2 for each scatter plot, the R^2 of the environmental disclosure appears to be the highest, hence leading to the same conclusion.

Subsequently, a correlation matrix was calculated to check whether the results are consistent.

Table 11: Correlation matrix

	Underpricing	**Environmental**	**Social**	**Governance**
Underpricing	1			
Environmental	-0,1861	1		
Social	-0,1436	0,7132	1	
Governance	-0,0812	0,1941	0,3064	1

Indeed, the correlation matrix shows a negative relationship between underpricing and each of the E-S-G disclosure scores. Environmental disclosure is still the variable with the largest correlation coefficient by order of magnitude. Surprisingly, social disclosure appears to have a greater impact on underpricing compared to governance.

The following step in this analysis involves the use of an ordinary least squares regression to test the first hypothesis. Which, as a reminder, states the following:

***H*1: Higher disclosure of each E-S-G pillar leads to lower underpricing**

The multifactor regression model is thus based on the three disclosure factors:

$$3.3\ Underpricing = \beta_0 + \beta_1\, Environmental + \beta_2\, Social + \beta_3\, Governance$$

As shown in the formula, Underpricing represents the dependent variable, while environmental, social and governance disclosure scores are used as factor for the independent variables.

Table 12: Multiple linear regression model with ESG factors

Dependent variable	**Underpricing**
Independent variable	
Environmental	**-0,191***
	(0,105)
Social	**-0,105**
	(0,171)
Governance	**-0,036**
	(0,054)
Constant	**13,625**
	(3,42)
Observations	221
R-squared	0,037
F (3, 217)	2,76
P-value (F)	0,043

Standard error in parenthesis.

* Indicates statistically significant level of 10%.

Results shown in Table 12 confirm, once again, the greatest impact of environmental transparency, as demonstrated by its coefficient being the highest. Such relationship is statistically significant at a level of 10% and marginally significant at a level of 5%, given the P-value associated to the environmental factor being equal to 0.07. Considering the coefficient of 0.191 associated to the environmental pillar, it may be concluded that, given an increase of 1% of the environmental disclosure score, underpricing is reduced by approximately 0.2%, holding the other variables constant. In clearer terms, if a company ready for listing were to increase their disclosure on its environmental impact by 5%, it should reduce its underpricing by 1%, according to the MLR results. Considering the average offer size of the ESG transparent companies is estimated to be around 430 million €, such 1% reduction would entail a saving of at least 4 million €, which would otherwise be "money left on the table".

Regarding the other two factors, despite the negative coefficient indicating a negative relationship with the dependent variable, it can't be inferred the presence of a statistically significant relationship due to the p-values being higher than the significant level threshold.
Overall, the standard errors of each factors appear to be quite low thus signalling a precise estimate of the regression. The R squared of 0,037 entails only 3.7% of the variance of the dependent variable is explained by the regression's factors. The low figure is to be expected considering the multitude of variables which ultimately influence the degree of underpricing, which were previously analysed in the literature review.
The validity of the model can be further analysed by assessing the result of the F statistic. The F-value F(3,217) is equal to 2.76, where 3 are the degrees of freedom (df) of the regression (equal to the number of factors) and 217 are the df of the residuals (calculated as N observations – N factors – 1). The associated critical F-value given the degrees of freedom of the regression and the residuals is 2.64. Considering that F(3,217) is greater than the critical f-value and the p-value related to the F-statistic is smaller than 0.05, the null hypothesis stating all the regression coefficient are equal to 0 can be rejected, thus it can be inferred at least one of the factors in the MLR model has a significant effect on underpricing.

Given the above, it can be concluded that only the results associated to the environmental disclosure score appear to have statistical significance. Social and governance scores have a negative coefficient, indicating an inverse correlation with underpricing, yet MLR results do not confirm the significance of such correlation.
As a result, the first hypothesis can only be partially accepted since only one of the three sustainability pillars seems to be statistically influential on the underpricing of initial public offerings.

To get a better understanding and further validate the previous findings related to the first research hypothesis H1, I introduce in this analysis two additional hypotheses. Both of which take into account the percentage amount of primary and secondary shares issued within the offering, so to exclude IPOs with the purpose of cashing out instead of raising new financing.
The first one being:

***H_2:* E-S-G pillars' disclosure reduces underpricing of offerings in which secondary shares account for less than 30% of total shares offered.**

The second one being:

***H_3:* E-S-G pillars' disclosure reduces underpricing of offerings in which secondary shares account for less than 10% of total shares offered.**

Hypotheses are tested on the same sample of IPOs yet taking into account the proportion of primary and secondary shares offered. The two thresholds set in H_2 and H_3 related to the percentage of secondary shares are respectively 30% and 10% calculated on the total amount of shares offered within the issue (such thresholds have been chosen arbitrarily). In both cases, the resulting subsets comprehend IPOs in which the main purpose is to raise funds rather than existing shareholders selling their own shares.
To summarise, 984 were the companies who listed on Western Europe's stock exchanges between 2018 and 2023 (screening for the exclusions listed at the beginning of these section).

Only 221 of the firms have published and ESG disclosure report prior to listing, hence this subset was used for testing hypothesis number one. Then, to validate H_2 and H_3 another screening was made to obtain IPOs with less than 30% and 10% of secondary shares, this led to a subset of 87 and 67 companies respectively.
The statistical model employed is once again the ordinary least squares regression, in which underpricing is set as the dependent variable while the regression factors are the three ESG disclosure pillars, the same as in the multiple linear regression showed in formula 3.3 used for testing H_1.

Results for the two MLR tests for H_2 and H_3 are summarized in the Table 13 and Table 14 below.

Table 13: MLR for IPOs with less than 30% secondary shares

Dependent variable	**Underpricing**
Independent variable	
Environmental	**0,143**
	(0,180)
Social	**-0,340**
	(0,292)
Governance	**-0,072**
	(0,079)
Constant	**13,983**
	(4,42)
Observations	87
R-squared	0,036
F (3, 83)	1,02
P-value (F)	0,386

Standard error in parenthesis.

Table 14: MLR for IPOs with less than 10% secondary shares

Dependent variable	**Underpricing**
Independent variable	
Environmental	**0,200**
	(0,252)
Social	**-0,331**
	(0,418)
Governance	**-0,11**
	(0,104)
Constant	**15,52**
	(5,4)
Observations	67
R-squared	0,042
F (3, 63)	0,911
P-value (F)	0,44

Standard error in parenthesis.

Results of the two regressions are similar but in contrast with the findings deriving from the MLR used to test the first hypothesis. The main differences are:

- First, none of the coefficients has a p-value lower than 0.1, hence the independent variables are not statistically significant, which means the relationship between the E-S-G disclosure factors and underpricing is not significant in this case.
- Second, surprisingly the coefficient associated to the environmental disclosure factor is now positive (as opposed to the MLR in table 12), which theoretically entails a higher disclosure of environmental issues leads to higher underpricing.
- Third, the p-values associated to the overall regression are both large (>0.1) thus not statistically significant. As and additional proof, I compared the F- values of the MLR for H_2 F(3,83) and the MLR for H_3 F(3,63) to the critical F-values (with 83 and 63 degrees of freedom), which are 2.72 and 2.75 respectively. Both F-values are substantially lower than their respective critical F values, thus the overall F-test confirms the non-significance of the MLR findings.

Given the above, the findings which seemed to hold for hypothesis 1 do not have the same statistical significance for hypothesis 2 and 3. As listed before, the p values of both the overall regression and of the single control variables are too large, as a consequence hypotheses 2 and 3 are to be rejected. In other words, there is no significant relationship between ESG disclosure scores and first day returns for IPOs with a percentage of secondary shares offered lower than 30% and 10%.

3.4 Robustness tests

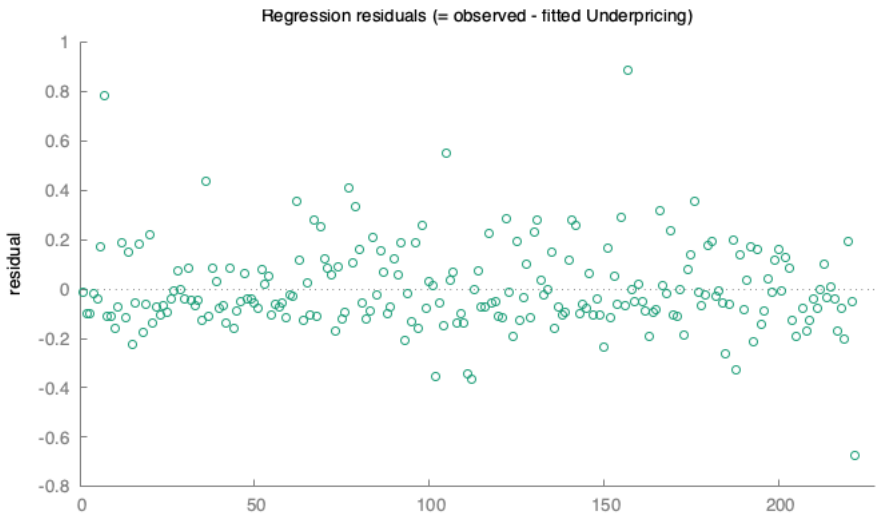
Additional statistical models have been employed with the aim of further validating the results of the multiple linear regression.

First, the Variance Inflation Factor test was applied to the regression's independent variables to check for a potential multicollinearity, which occurs when one or more variables are highly correlated with each other. Collinearity may negatively impact the reliability of the coefficients or may amplify the magnitude of the standard errors linked to each factor. The outcome of the test showed a VIF value for the E-S-G variables of 2.038, 2.165 and 1.105 respectively. As all values fall within the interval between 1 and 5, it can be stated there is no excessive collinearity in the model, thus the accuracy of the model is not impaired.

Secondly, the White's test has been used to detect the presence of heteroskedasticity in the multiple linear regression model. Heteroskedasticity occurs when the residuals of the regression do not have constant variance, and it can lead to biased results obtained from the MLR model. The outcome of the White's test disproves heteroskedasticity of the model thus confirming the reliability of the regression.

The presence of homoskedasticity can also be proved visually by looking at the graph which plots the residuals versus the fitted values (Underpricing in this case). It is clear the variability of the residuals doesn't change as the number of observation increases, hence there is no heteroskedasticity.

Figure 15: Results of the White's test



Discussion of results and conclusion

Findings associated to the multiple linear regression computed to test hypothesis 1 (H_1: Higher disclosure of each E-S-G pillar leads to lower underpricing) show negative correlation between each sustainability pillar and underpricing. However, the p-values associated to the coefficients of the social and governance pillar are not low enough to entail statistical significance of such relationship. While the environmental factor shows a statistically significant correlation in relation to observed underpricing. Not only, among the three coefficients it presents the highest value of inverse correlation in absolute terms.

This first result might entail investors are more likely to give relevance to environmentally material issues in terms of sustainability disclosure, which in turn is reflected on the price at which shares are offered in the context of an IPO. Indeed, environmental concerns are the most debated by the media and most often draw public awareness, to the point in which the term "sustainable" is mainly used in reference to the environment.

Moreover, climate risk is a serious threat to the planet and the costs associated to it are hefty. Given the relatively small amount of time available to address the issue, environmental concerns are a priority in the agendas of governments and corporations, most of which have already provided plans to reach net-zero targets in the future.

Contrasting results are drawn by the MLR testing the second and third hypotheses, which, as a reminder, state "individual E-S-G pillars' disclosure reduces underpricing of offerings in which secondary shares account for less than 30% (H_2) and 10% (H_3) of total shares offered".

Both regression models show no statistical significance between disclosure of each E-S-G pillar and first day returns.

At a first glance, such findings may lead to the conclusion that ESG disclosure does not mitigate information asymmetries within offerings in which most shares are newly issued, thus assuming investors do not consider sustainability issues in such scenarios.

However, a behavioural bias might influence the degree of underpricing in offerings with a smaller percentage of secondary shares.
By taking into consideration the "realignment of incentive" hypothesis proposed by Ljungqvist and Wilhelm (2003), such findings may be the result of an agency problem. Standard principal-agent theories predict that agents will spend less effort monitoring on behalf of their principals when the agent's stake in the transaction is smaller.
Indeed, when few or no existing shareholders and insiders sell secondary shares through an IPO, the incentive for the CEO and the C-suite to bargain a better price with the IPO investors is less pronounced.
Again, as in Ljungqvist and Habib (2001, p. 434), "the extent to which owners care about underpricing depends on how much they sell at the IPO. Owners who sell very few shares suffer only marginally from underpricing. Conversely the more shares they sell, the greater the incentive to decrease underpricing". Such phenomenon is even more distinct when the issuer presents a dispersed ownership structure. Higher ownership fragmentation leads to a moral hazard problem among shareholders collectively, since the benefit is smaller for the shareholder who bears the cost of monitoring.
In sum, owners care about underpricing only to the extent that they stand to lose from it, with such losses being proportional to the number of secondary shares sold.
Furthermore, owners can mitigate underpricing through the costs they incur in promoting the issue, thus no promotional efforts are undertaken by shareholders who sell few or no secondary shares.

As a result, a possible explanation for the findings related to H_2 and H_3 is that the relationship between the absence of secondary shares sold, and underpricing is greater than the informational benefits of ESG disclosure in mitigating underpricing.
Despite these contributions, this research study presents some limitations. ESG disclosure is a relatively new phenomenon, and its application is on a voluntary basis for most companies included in this sample. Indeed, the absence of a common reporting framework and the absence of fines for not disclosing all ESG data, might depict a misrepresentation of companies' efforts in addressing sustainability issues.

Moreover, this study is entirely based on Bloomberg's proprietary scoring system for ESG disclosure. As it has been briefly described in chapter one, ESG scoring systems vary greatly depending on the ESG provider and, as such, lead to a wide variance of results, including results for academic research purposes.
Finally, findings may vary depending on the geographical area and the time period considered for the sample, both of which can be suggested avenues for future research.

References

- Aggarwal, R.K., Krigman, L. and Womack, K.L., 2002. Strategic IPO underpricing, information momentum, and lockup expiration selling. *Journal of Financial Economics*, 66(1), pp.105-137.
- Akyol, A.C., Cooper, T., Meoli, M. and Vismara, S., 2014. Do regulatory changes affect the underpricing of European IPOs? *Journal of Banking & Finance*, 45, pp.43-58.
- Amihud, Y., 2002. Illiquidity and stock returns: Cross-section and time-series effects. *Journal of Financial Markets*, 5(1), pp.31-56.
- Ang, J.S. and Brau, J.C., 2003. Concealing and confounding adverse signals: Insider wealth-maximizing behavior in the IPO process. *Journal of Financial Economics*, 67(1), pp.3-35.
- Bannenberg, L. and van der Sar, N., 2019. The interplay of IPO underpricing and offer size.
- Baron, D.P. and Holmstrom, B., 1980. The investment banking contract for new issues under asymmetric information: Delegation and the incentive problem., 35, pp.1115-1138.
- Beatty, R. and Ritter, J., 1986. Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics*, 15, pp.213-232.
- Benveniste, L.M., Ljungqvist, A., Wilhelm, W.J. and Yu, X., 2003. Evidence of information spillovers in the production of investment banking services. *The Journal of Finance*, 58(2), pp.577-608.
- Berg, F., Kölbel, J. and Rigobon, R., 2019. Aggregate confusion: The divergence of ESG ratings. *Review of Finance*. (Forthcoming).
- Berk, J. and DeMarzo, P., 2014. Corporate finance. 3rd ed. Boston: *Pearson*.
- Bernoussi, A., Dereeper, S. and Schwienbacher, A., 2013. Underwriting syndicate structure and lead manager reputation: An empirical study on European stock markets. Finance, 34(2), pp.7-34. *Presses Universitaires de Grenoble*.

- Biais, B. and Faugeron, A.M., 2002. IPO auctions: English, Dutch, French and Internet. *Journal of Financial Intermediation*, 11, pp.9-36.
- Bloomberg, 2024. Global ESG assets predicted to hit $40 trillion by 2030 despite challenging environment, *forecasts Bloomberg Intelligence*.
- BNP Paribas, Sustainable finance action plan regulation memo.
- Boffo, R., and R. Patalano (2020), "ESG Investing: Practices, Progress and Challenges", OECD Paris,
- Bollazzi, F., Risalvato, G. and Zanatta, G., 2017. IPO and CSR: An analysis on last performance in Italian Stock Exchange. *China-USA Business Review*, 16(1), pp.12-23.
- Booth, J. and Chua, L., 1996. Ownership dispersion, costly information, and IPO underpricing. *Journal of Financial Economics*, 41, pp.291-310.
- Boulton, T.J., 2023. Mandatory ESG disclosure, information asymmetry, and litigation risk: Evidence from initial public offerings. *European Financial Management*. (Forthcoming).
- Boulton, T.J., Smart, S.B. and Zutter, C.J., 2020. Worldwide short selling regulations and IPO underpricing. *Journal of Corporate Finance*, 62.
- Brealey, R.A., 2000. Principles of corporate finance. Boston: *Irwin McGraw-Hill*.
- Brennan, M.J. and Franks, J., 1997. Underpricing, ownership and control in initial public offerings of equity securities in the UK. *Journal of Financial Economics*, 45(3).
- Byard, D., Darrough, M. and Suh, J., 2021. Re-examining the impact of mandatory IFRS adoption on IPO underpricing. *Review of Accounting Studies*, 26, pp.1-46.
- Carter, R.B. and Manaster, S., 1990. Initial public offerings and underwriter reputation. *Journal of Finance*, 45, pp.1045-1067.
- Chemmanur, T.J. and Fulghieri, P., 1994. Investment bank reputation, information production, and financial intermediation. *The Journal of Finance*, 49(1), pp.57-79.
- Chen, H.-C. and Ritter, J.R., 2000. The seven percent solution. *The Journal of Finance*, 55(3), pp.1105-1131.

- Claessens, S. and Laeven, L., 2003. Financial development, property rights, and growth. *The Journal of Finance*, 58(6), pp.2401-2436.
- Colaco, H.M.J., Ghosh, C., Knopf, J.D. and Teall, J.L., 2009. IPOs, clustering, indirect learning and filing independently. *Journal of Banking & Finance*, 33(11), pp.1952-1963.
- Dealogic & Wall Street Journal, 2024. Global market share of revenue of leading investment banks as of June 2024 [Graph]. Statista.
- Derrien, F. and Womack, K.L., 2003. Auctions vs. book building and the control of underpricing in hot IPO markets. *The Review of Financial Studies*, 16, pp.31-61.
- Diamond, D.W. and Verrecchia, R.E., 1987. Constraints on short-selling and asset price adjustment to private information. *Journal of Financial Economics*, 18(2), pp.277-311.
- Dimson, E., Karakaş, O. and Li, X., 2015. Active ownership. *Review of Financial Studies*, 28, pp.3225-3268.
- Duong, H.N., Goyal, A., Kallinterakis, V. and Veeraraghavan, M., 2021. Market manipulation rules and IPO underpricing. *Journal of Corporate Finance*, 67.
- Engelen, P.-J. and van Essen, M., 2010. Underpricing of IPOs: Firm-, issue- and country-specific characteristics. *Journal of Banking & Finance*, 34(8), pp.1958-1969.
- Fenili, A. and Raimondo, C., 2021. ESG and the pricing of IPOs: Does sustainability matter? *SSRN*
- Ferri, S., Tron, A., Colantoni, F. and Savio, R., 2023. Sustainability disclosure and IPO performance: Exploring the impact of ESG reporting. *Sustainability*, 15(6), pp.5144-5162.
- Habib, M.A. and Ljungqvist, A.P., 2001. Underpricing and entrepreneurial wealth losses in IPOs: Theory and evidence. *The Review of Financial Studies*, 14(2), pp.433-458.
- Hanley, K.W. and Hoberg, G., 2012. Litigation risk, strategic disclosure and the underpricing of initial public offerings. *Journal of Financial Economics*, 103(2), pp.235-254.

- Hensler, D.A., 1995. Litigation costs and the underpricing of initial public offerings. *Managerial and Decision Economics*, 16(2), pp.111-128.
- Hoberg, G., 2003. Strategic underwriting in initial public offerings. *Yale University*.
- Hong, H., Hung, M. and Lobo, G., 2014. The impact of mandatory IFRS adoption on IPOs in global capital markets. *The Accounting Review*, 89, pp.1365-1397.
- Horton, J., Serafeim, G. and Serafeim, I., 2013. Does mandatory IFRS adoption improve the information environment? *Contemporary Accounting Research*, 30, pp.388-423.
- Hughes, P.J. and Thakor, A.V., 1992. Litigation risk, intermediation, and the underpricing of initial public offerings. *The Review of Financial Studies*, 5(4), pp.709-742.
- Innocenti, L., 2023. Italia tra nazionalizzazioni, privatizzazioni e azionariato diffuso. *Rivista Impresa Sociale*.
- Jagannathan, R. and Sherman, A.E., 2006. Why do IPO auctions fail? *NBER Working Papers* No. 12151, National Bureau of Economic Research.
- Kaneko, T. and Pettway, R.H., 2003. Auctions versus book building of Japanese IPOs., 11(4), pp.439-462.
- Katti, S. and Phani, B.V., 2016. Underpricing of initial public offerings: A literature review. *Universal Journal of Accounting and Finance*, 4(2), pp.35-52.
- La Porta, R., Lopez-De-Silanes, F., Shleifer, A. and Vishny, R., 2002. Investor protection and corporate valuation. *The Journal of Finance*, 57, pp.1147-1170.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R.W., 1997. Legal determinants of external finance. *The Journal of Finance*, 52(3), pp.1131-1150.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R.W., 1998. Law and finance. *Journal of Political Economy*, 106(6), pp.1113-1155.
- Lee, I., Lochhead, S., Ritter, J. and Zhao, Q., 1996. The costs of raising capital. *Journal of Financial Research*, 19, pp.59-74.
- Leone, A.J., Rock, S. and Willenborg, M., 2007. Disclosure of intended use of proceeds and underpricing in initial public offerings. *Journal of Accounting Research*, 45(1), pp.111-153.

- Lin, H.L., Pukthuanthong, K. and Walker, T.J., 2013. An international look at the lawsuit avoidance hypothesis of IPO underpricing. *Journal of Corporate Finance*, 19, pp.56-77.
- Ljungqvist, A. and Wilhelm, W.J., 2003. IPO pricing in the dot-com bubble. *The Journal of Finance*, 58, pp.723-752.
- Loughran, T. and Ritter, J., 2004. Why has IPO underpricing changed over time? *Financial Management*, 33(3), pp.5-37.
- Lovin, M.B., Sushka, M.E. and Bendeck, Y.M., 1994. Seasoned common stock issuance following an IPO., 18(1), pp.207-226.
- Macey, J.R., Market for corporate control. *Library of Economics and Liberty*.
- Mergers & Inquisitions, IPO process. *https://mergersandinquisitions.com/ipo-process/*
- Michaely, R. and Shaw, W.H., 1994. The pricing of initial public offerings: Tests of adverse-selection and signaling theories. *The Review of Financial Studies*, 7(2), pp.279-319.
- Miller, E.M., 1977. Risk, uncertainty, and divergence of opinion. *The Journal of Finance*, 32(4), pp.1151-1168.
- PwC UK, 2024. Total number of initial public offerings (IPOs) in Europe from 2009 to 2023 [Graph]. Statista.
- PwC, 2024. Roadmap to IPO.
- Reber, B., Gold, A. and Gold, S., 2022. ESG disclosure and idiosyncratic risk in initial public offerings. *Journal of Business Ethics*, 179(3), pp.867-886.
- Ritter, J.R., 1984. The "Hot Issue" market of 1980. *Journal of Business*, 57, pp.215-240.
- Rock, K., 1986. Why new issues are underpriced. *Journal of Financial Economics*, 15, pp.187-212.
- Slovin, M.B., Sushka, M.E. and Bendeck, Y.M., 1994. Seasoned common stock issuance following an IPO. *Journal of Banking & Finance*, 18(1), pp.207-226.
- Spiess, D.K. and Pettway, R.H., 1997. The IPO and first seasoned equity sale: Issue proceeds, owner/managers' wealth, and the underpricing signal. *Journal of Banking & Finance*, 21(7).

- Sterngold, J., 1987. U.S. underwriters face losses on BP offering. *The New York Times*. 29 October.
- Stock Analysis, 2024. Number of IPOs in the United States from 1999 to 2023 [Graph]. Statista.
- Tanda, A. and Manzi, G., 2020. Underpricing of venture backed IPOs: A meta-analysis approach. *Economics of Innovation and New Technology*, 29(4), pp.331-348.
- Tinic, S.M., 1988. Anatomy of initial public offerings of common stock. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship*.
- Tiniç, S.M., 1988. Anatomy of initial public offerings of common stock. *The Journal of Finance*, 43(4), pp.789-822.
- Welch, I., 1989. Seasoned offerings, imitation costs and the underpricing of initial public offerings. *Journal of Finance*, 44, pp.421-450.
- Wilson, R., 1979. Auctions of shares. *The Quarterly Journal of Economics*, 93(4), pp.675-689.
- Zattoni, A., 2020. Corporate governance: How to design good companies. *Bocconi University Press,* pp. 1-385.
- Zheng, S.X. and Li, M., 2008. Underpricing, ownership dispersion, and aftermarket liquidity of IPO stocks. *Journal of Empirical Finance*, 15(3).
- Zingales, L., 1995. Insider ownership and the decision to go public. *Review of Economic Studies*, 62, pp.425-448.

Appendix: list of figures and tables.

Figure 1: IPO comparison by year. Source: Statista

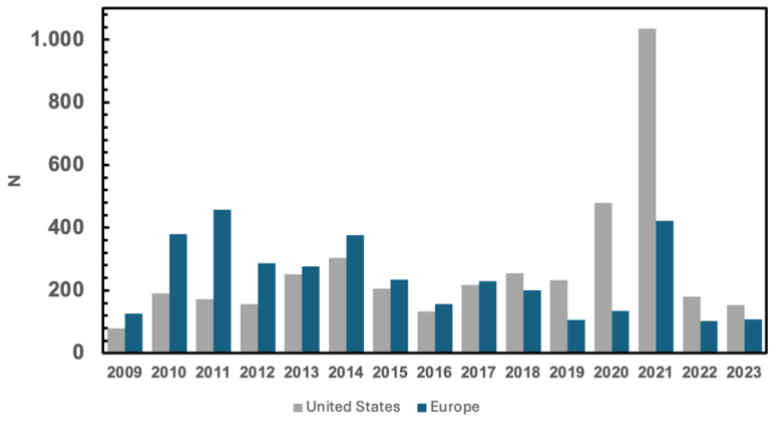
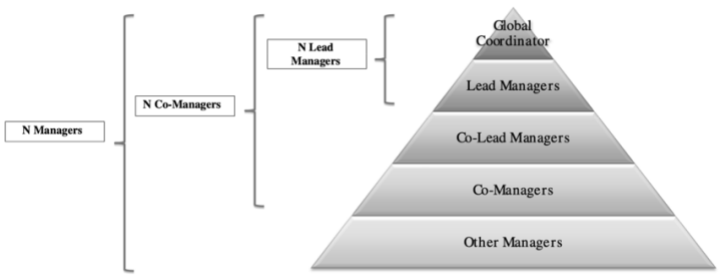


Figure 2: Syndicate structure.



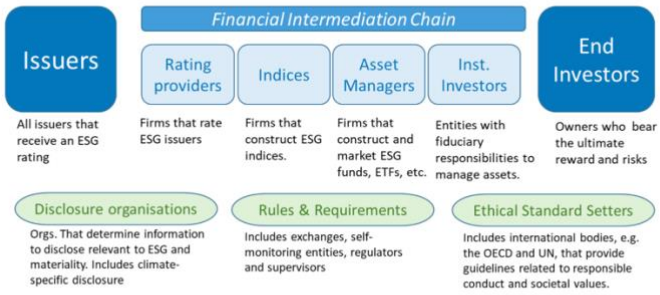
Source: Underwriting Syndicate Structure and Lead Manager Reputation: An Empirical Study on European Stock Markets, (2013).

Figure 3: ESG criteria – major index providers

Pillar	Thomson Reuters	MSCI	Bloomberg
Environmental	Resource Use	Climate Change	Carbon Emissions
	Emissions	Natural resources	Climate change effects
	Innovation	Pollution & waste	Pollution
		Environmental opportunities	Waste disposal
			Renewable energy
			Resource depletion
Social	Workforce	Human capital	Supply chain
	Human Rights	Product liability	Discrimination
	Community	Stakeholder opposition	Political contributions
	Product Responsibility	Social opportunities	Diversity
			Human rights
			Community relations
Governance	Management	Corporate governance	Cumulative voting
	Shareholders	Corporate behaviour	Executive compensation
	CSR strategy		Shareholders' rights
			Takeover defence
			Staggered boards
			Independent directors
Key metrics and submetrics	186	34	>120

Source: ESG investing practices, progress and challenges, OECD, 2020.

Figure 4: ESG financial ecosystem



Source: ESG investing practices, progress and challenges, OECD, 2020.

Table 5: IPOs sorted by country of incorporation

Country	N	Mean Underpricing	Median Underpricing
Sweden	222	2,64%	0,00%
Great Britain	176	16,59%	7,14%
Italy	166	14,76%	6,67%
Norway	93	20,01%	1,16%
France	82	3,34%	0,38%
Denmark	55	23,18%	5,63%
Finland	48	7,83%	2,36%
Germany	41	5,69%	2,07%
Other	38	6,36%	0,65%
Switzerland	19	22,40%	8,99%
Netherlands	18	9,33%	0,87%
Spain	16	6,41%	2,04%
Belgium	10	2,75%	2,76%

Table 6: IPOs sorted by sector

Sector	N	Mean Underpricing	Median Underpricing
Technology	228	11,80%	4,12%
Industrials	179	10,37%	1,89%
Consumer Discretionary	134	7,66%	2,00%
Health Care	132	7,40%	0,54%
Energy	72	13,31%	4,01%
Communications	67	9,35%	8,48%
Materials	63	9,71%	4,58%
Consumer Staples	53	15,40%	3,56%
Real Estate	40	6,43%	0,60%
Utilities	16	66,53%	5,98%

Figure 7: Number of IPOs by year

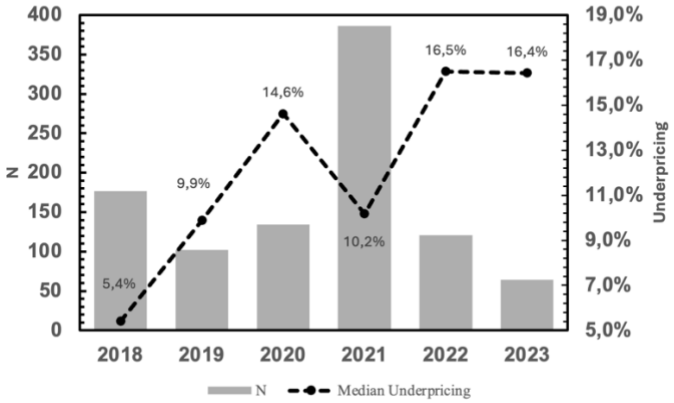


Table 8: Distribution of ESG reporting companies by sector and year

Sector	**N**	**%**
Technology	52	23,4%
Consumer Discretionary	50	22,5%
Industrials	48	21,6%
Health Care	15	6,8%
Materials	13	5,9%
Communications	12	5,4%
Consumer Staples	11	5,0%
Energy	10	4,5%
Real Estate	7	3,2%
Utilities	4	1,8%
IPO year	**N**	**%**
2018	34	15,3%
2019	26	11,7%
2020	30	13,5%
2021	113	50,9%
2022	13	5,9%
2023	6	2,7%
Total	**222**	

Table 9: z-Test: Two Samples for Means

	NON-ESG	*ESG*
Mean	0,119561214	0,08338968
Known variance	0,298	0,031
Observations	723	221
Hypothesized mean difference	0	
z	1,538945478	
P(Z<=z) one-tail	0,061908804	
z critical one-tail	1,281551566	

Figure 10: Scatter plots of ESG factors vs Underpricing

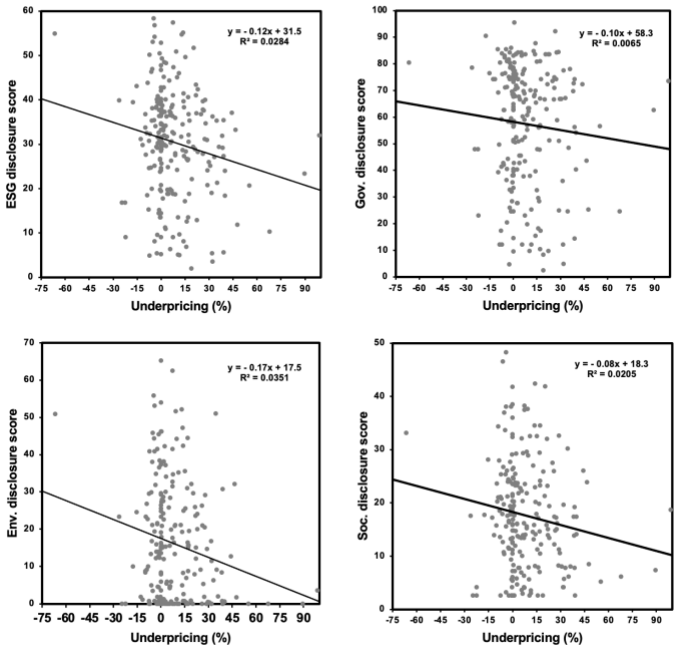


Table 11: Correlation matrix

	Underpricing	Environmental	Social	Governance
Underpricing	1			
Environmental	-0,1861	1		
Social	-0,1436	0,7132	1	
Governance	-0,0812	0,1941	0,3064	1

Table 12: Multiple linear regression model with ESG factors

Dependent variable	**Underpricing**
Independent variable	
Environmental	**-0,191***
	(0,105)
Social	**-0,105**
	(0,171)
Governance	**-0,036**
	(0,054)
Constant	**13,625**
	(3,42)
Observations	221
R-squared	0,037
F (3, 217)	2,76
P-value (F)	0,043

Standard error in parenthesis.

* Indicates statistically significant level of 10%.

Table 13: MLR for IPOs with less than 30% secondary shares

Dependent variable	**Underpricing**
Independent variable	
Environmental	**0,143**
	(0,180)
Social	**-0,340**
	(0,292)
Governance	**-0,072**
	(0,079)
Constant	**13,983**
	(4,42)
Observations	87
R-squared	0,036
F (3, 83)	1,02
P-value (F)	0,386

Standard error in parenthesis.

Table 14: MLR for IPOs with less than 10% secondary shares

Dependent variable	**Underpricing**
Independent variable	
Environmental	**0,200**
	(0,252)
Social	**-0,331**
	(0,418)
Governance	**-0,11**
	(0,104)
Constant	**15,52**
	(5,4)
Observations	67
R-squared	0,042
F (3, 63)	0,911
P-value (F)	0,44

Standard error in parenthesis.

Figure 15: Results of the White's test