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**IPO UNDERPRICING: AN EMPIRICAL ANALYSIS ON AIM ITALIA**

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## INTRODUCTION.

Going public is an important decision in the life of a firm. It provides the possibility to raise new financial resources in order to finance growth and to rebalance the capital structure. It enhances the reputation of the firm in the business and in the financial communities. It also offers to the existing owners the opportunity to realize a return for their efforts. However, going public is not a costless decision. Apart from the costs required to strengthen the organizational structure of the firm, the transaction costs in an IPO process are considerable. The most evident of these costs is the direct cost of listing, paid by the issuing firm in the form of fees. Instead, the indirect cost of underpricing is less visible. A vast empirical literature documents that when companies go public, the price of their shares tend to jump substantially on the first day of trading. This systematic price increase from the offer price is defined as underpricing. Clearly, it represents a cost because if the shares had been sold at the closing price rather than the offer price, the proceeds of the offering would have been higher or the same proceeds could have been raised by selling fewer shares, causing less dilution of pre-IPO shareholders. In practice, underpricing results in a sort of wealth transfer from the pocket of the issuing firm and its pre-issue shareholders to IPO investors. Researchers have long tried to find an explanation for this phenomenon. Hence, the literature they developed is broad and it offers a large number of explanations for underpricing.

The first theories developed are those based on information asymmetries. These theories assert that underpricing is caused by information frictions among the three key parties involved in the IPO process: the issuer, the underwriter and investors. Then, other theories which are not based on information asymmetries have been developed. According to these theories, underpricing is a way to insure against the risk of litigation or it is caused by trading in the aftermarket of investors and underwriters or they consider underpricing to be voluntarily set by the managers of the issuing firms in order to obtain specific advantages. The latest theories are those that explain underpricing with behavioural biases of the agents involved in the listing process.

Many studies try to verify empirically all these theories. However, the mainstream empirical literature focuses on the underpricing of IPOs occurred in the US and in the UK, while evidence from other countries is more limited. Hence, can we be sure that evidence obtained from Anglo-Saxon markets is really able to explain underpricing in all the remaining markets? This thesis wants to provide an answer to this question by analysing IPOs that has occurred in Italy, in detail those that have occurred on AIM Italia. This market has some characteristics that differentiate it from the markets generally analysed in the underpricing literature.

AIM Italia is a second market dedicated to small and medium firms with growth potential and it is also an exchange-regulated market. It is important to focus on AIM Italia because no one of the few empirical studies on underpricing in Italy concentrates exclusively on this market. This derives from the fact that the most recent study considers IPOs occurred in Italy up to July 2013, thus just one year after the birth of AIM Italia when very few IPOs could have been observed. In addition, it is useful to focus on AIM Italia because it offers an opportunity to small and medium private firms that could not meet all the requirements to get listed on the main market to raise financial resources to finance their growth. The access to capital markets provided by AIM Italia could be an important source of financing in a moment in which bank lending for SMEs has significantly contracted and other forms of equity financing – such as private equity – are not as developed as in other European countries.

For these reasons, it is useful to shed light on the characteristics of this market. In particular, the aim of this thesis is to verify which are the determinants of underpricing on AIM Italia and whether these determinants differ from those that explain underpricing on larger international markets. To do that, an empirical analysis is conducted on a sample of 58 IPOs occurred on AIM Italia in the period between March 2012 and July 2017. The results indicate that most of the causes that explain underpricing in international markets work similarly on AIM Italia. However, a few of other determinants is not found to be useful to explain underpricing on AIM Italia. This discrepancy is probably caused by peculiar characteristics of AIM Italia, such as the small size of its issuing firms, their relative youth, the supposed scarceness of investors specialised in small and medium firms and possibly the lower level of information possessed by investors in valuing IPOs.

The thesis is organised as follows. A review of the literature presenting the main theories on underpricing is proposed in chapter 1. Chapter 2 provides a review of the studies that propose explanations for the observed variation of underpricing over time and across countries. The main characteristics of AIM Italia are presented in chapter 3. Chapter 4 presents the empirical analysis conducted on AIM Italia IPOs and it explains the results. Finally, conclusions offer a summary of the key empirical findings.



## 1. IPO UNDERPRICING.

Systematic price increase from the offer price on the first day of trading of IPO shares has been widely documented. This phenomenon is referred to as underpricing<sup>1</sup> and is extensively discussed in the literature. Early evidence on the abnormal short-run returns of IPO shares was provided in the seventies by Logue (1973), Reilly (1973) and Stoll and Curley (1970). However, these authors were not able to find a convincing explanation for the short-term performance of initial offerings and underpricing remained completely unexplained. This gap started to be filled in the late seventies. The interest of researchers on IPO underpricing begun at that time and it is still alive nowadays. Hence, the literature developed in this timespan is quite broad. The objective of this chapter is to review it and to present the main causes of underpricing that have been identified in the literature. Each cause is then presented in a specific section of this chapter. In section 1.1, asymmetries of information are proposed as a cause of underpricing. The asymmetries involve different classes of investors (section 1.1.1) or are related to a principal-agent problem between the issuer and its underwriter (section 1.1.2). Still based on information asymmetries, section 1.2 highlights the role of signals in explaining underpricing. Signalling theories assume that owners of IPO companies have superior information about their firm and they want to communicate them to potential investors. A signalling strategy could lead either to an increase or to a reduction of underpricing, depending on the strategy adopted. Section 1.3 explains that underpricing could be voluntarily set by issuers and underwriters to reduce the risk to be sued by investors for poorly-performing IPOs. Sections 1.4 and 1.5 depict underpricing as caused by trading in the aftermarket. Theories presented in section 1.4 argue that large initial returns are caused by mean-reverting fads and by the over-optimism of certain investors. Instead, the price support activities of the IPO's lead underwriter are considered as affecting first-day returns in section 1.5. Section 1.6 analyses the effects on underpricing of strategic rationing applied by issuers and underwriters in oversubscribed issues. In recent years, a new strand of literature has been developed. Opposed to previous ones, it explains that underpricing is caused by some irrational characteristics of the behaviour of issuers and investors. Behavioural theories are presented in section 1.7.

Each of the theories presented in the following sections is supported by empirical evidence. However, none of them is able to explain entirely the underpricing phenomenon and this is the reason why IPO underpricing is still debated nowadays. Some of the causes are better able to

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<sup>1</sup> Ritter and Welch (2002) highlight that the terms first-day returns and underpricing are used interchangeably by academics.

justify abnormal initial returns for certain IPOs, while others perform better in explaining large first-day returns in other issues. Nevertheless, underpricing is explained better by a mix of all the theories presented in this chapter.

### 1.1. Information Asymmetries.

Among all the theories that aim at explaining the phenomenon of IPO underpricing, those based on information asymmetries are one of the first developed and they are now well established (Ljungqvist, 2007). When the research started to focus on underpricing, the strand of literature on information asymmetries received a lot of attention by academics and it became very popular. In the following years, researchers realized that despite being essential in explaining underpricing, information asymmetries were not able to justify the phenomenon in its entirety (Ritter & Welch, 2002). Nevertheless, this strand still receives great attention by the majority of research papers on underpricing.

The strand of literature on information asymmetries explain that underpricing is caused by the superior information owned by one of the three key parties involved in an IPO process: the issuing firm, the bank who underwrites the issue and the investors.

Rock (1986) assumes that in the issue market there are two types of investors, the informed and the uninformed. The uninformed investors have no information to assess an issue, so they subscribe all the IPOs. Instead, informed investors own information about new offerings, thus they are able to avoid to participate to overvalued IPOs. The result of this situation is that uninformed investors suffer a winner's curse. When they participate to overpriced issues, they receive all the shares they bid for while in underpriced issues their demand is partially crowded out by informed investors. Hence, in order to continue to participate to the IPO market, the uninformed require to be compensated with underpricing.

Baron (1982) and Baron and Holmström (1980) base their model of underpricing on the information asymmetry between the issuer and its investment bank. In their model, the investment bank which underwrites an issue has superior information regarding both the market and the price at which the shares could be offered. They argue that the bank may exploit its superior knowledge by offering the IPO shares at a lower price. Larger underpricing allows the investment bank to exert less effort in distributing an issue and it provides greater assurance about the success of an IPO. To reduce underpricing to an acceptable level, the issuer should negotiate with its investment bank a sub-optimal incentive contract.

Signalling theories are also part of the strand of literature of information asymmetries. Academic research has abundantly discussed about signalling and this is the reason why I have dedicated a large part of this chapter to it. These theories draw on information asymmetries between issuers and investors. Signalling requires the issuer to send a signal to market participants. By doing so, investors are able to distinguish firms that offer good investment opportunities from firms with bad future prospects. Welch (1989) argues that underpricing could be used as a signal to potential investors for firms who plan to return soon to the market with a seasoned equity offering. Other authors (Filatotchev & Bishop, 2002; Habib & Ljungqvist, 2001; Leland & Pyle, 1977) affirm that other types of signals – such as retained equity or underwriter reputation – could be used to communicate effectively to an investor the quality of the issuer. These signals have the effect to reduce the level of underpricing by reducing the information gap between issuers and investors.

In section 1.1.1 I will analyse in detail the winner's curse model of Rock (1986). Then, in section 1.1.2 I will present the model of Baron (1982). An extensive discussion about signalling theories is proposed in a different section, the 1.2.

#### 1.1.1. The Winner's Curse Model.

In the first case the underpricing phenomenon is attributed to information asymmetries among various classes of investors. This strand of literature is based on a model developed in the eighties by Rock (1986).

The Rock's model, also called the Winner's Curse model, relies on two important basic elements. The first element is that it identifies two classes of investors that use to participate in the initial public offerings market. These two categories differ for the level of information they own about new offerings. The first category is the one of the informed investors. Thanks to the research they conduct they have perfect information about the realized value of new issues. For this reason, they subscribe only those offerings that in their opinion have favourable prospects. The other category is the one of the uninformed investors. This category comprises all those investors that could not be defined as informed and according to Rock (1986) it comprises also the issuer<sup>2</sup>. Since the uninformed do not have information on new issues they are not able to

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<sup>2</sup> Rock (1986) claims that there are several reasons to consider the issuer as uninformed. First, he argues that an issuing firm gives up its informational advantage by revealing information to the public both directly and indirectly. An issuer reveals information directly to market participants by including them into the prospectus. In addition, even the price set by the issuer and the underwriter with respect to comparable offerings reveals how

discern those offerings that would guarantee positive economic results from those that wouldn't, so they subscribe all new issues.

The second basic element of the Rock's model is that it is set in a market for firm commitment offerings. In a firm commitment offering the issuing firm and the underwriter agree on the price and the quantity of shares to be issued. Once the price is fixed no adjustments could be made. Only the quantity offered could be increased by relatively small amounts if an overallotment option exists and it is exercised. Given this rigidity on prices and quantities, the initial public offering could face either excess supply or excess demand. The presence of one of the two conditions could be observed only after the offering date. In case of excess supply there will be unsold shares. In case of excess demand – oversubscription – the shares are rationed by the underwriter. The model of Rock assumes that oversubscription arises only when informed investors subscribe the new issue.

Combining information asymmetry between informed and uninformed investors and shares rationing in case of excess demand, the Rock's model explains the mechanism behind the underpricing phenomenon.

Consider an offering that is overpriced. In this case, only uninformed investors will subscribe the issuance because they do not have information about the true value of the IPO. Therefore, since the uninformed are not able to distinguish overpriced and underpriced issues, they participate to all the new offerings indiscriminately. On the other hand, if an offering is underpriced both informed and uninformed investors will participate. The formers participate because they expect positive returns on the first day of trading and the latter participate because they subscribe each new issue. In this case, the model assumes that there will be excess demand for the offering and rationing of shares will take place.

The result is that uninformed investors fully subscribe issues that offer negative returns in the first day of trading while they are assigned less shares than they would in underpriced issues due to excess demand. Rock (1986) says they are subject to the *winner's curse*. Namely, when uninformed are assigned the number of shares they want they suspect they are the winners because there has been poor demand due to the absence of informed investors, so when the offering is closed they understand they have participated to an overpriced issue.

The decision of an investor on whether to participate to the initial public offerings market depends both on the returns he expects and on the expected probability of being assigned a share of new issues. Given that uninformed investors expect to be assigned a disproportionate

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they assessed the firm's financial future. Second, Rock (1986) argues that even though an issuer and its underwriter know more than any single individual, they know less than all the market participants combined.

low level of underpriced issues, they revise downward their valuation of IPOs. They will continue to invest in the new offerings market if they get a return that is higher or equal to the riskless rate (Rock, 1986). If the return they get is lower than the risk-free rate they withdraw from the new issues market<sup>3</sup>.

In order to attract the uninformed to the initial public offerings market a finite discount on the offer price of new issues should be granted. This discount – namely underpricing – should compensate the uninformed investors for the biased allocation of new shares they receive. However, although it is useful to attract the uninformed, the level of underpricing should not be excessive: a decrease in the offering price provides an incentive to subscribe the new shares not only to the uninformed but also to the informed investors, thereby boosting the demand. In this way, the uninformed investors valuation of IPO shares is increased by the lower price while the probability of being awarded a share of the offering is lowered by the increased demand. Thus, the optimal equilibrium price is the one that let the uninformed earn the riskless rate. A certain degree of underpricing is also needed to compensate informed investors for the cost they bear to collect and analyse information on the new offerings.

The Winner's curse model is still considered in the extant literature as the starting point to analyse the effects of information asymmetries among investors on IPO underpricing (Katti & Phani, 2016; Koh & Walter, 1989; Levis, 1990). However, this model is developed only on theoretical grounds and Rock (1986) himself highlights the limited possibility to conduct empirical analysis to confirm it because underwriters are reluctant to release data on the rationing they apply to oversubscribed IPOs.

On the reliability of the Rock's model, Keasey and Short (1992, p.74) argue that the model "is based on conflicting assumptions and analysis which is contradictory with its core hypothesis ...[and] it produces largely untestable propositions". The aspects criticized by Keasey and Short (1992) concern both the assumptions and the internal consistency of the model. A critical point they identified in the Rock's model deals with the concept that underpricing should be granted to uninformed investors to compensate them for the winner's curse they suffer when they receive overpriced shares. If the winner's curse is to be considered as a new issues market phenomenon, the explanation of Rock suffers the free-riding problem. Each issuer wants its shares to be priced the highest while getting the full subscription of the new offering. For this reason, issuers would have the incentive to cheat and not to underprice since they offer their

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<sup>3</sup> The effect of the absence of uninformed investors in the market is not so clear in the analysis of Rock (1986). However, Katti and Phani (2016) argue that issuers need uninformed investors because they are perceived as strategic and they are expected to maintain their investment for longer periods.

shares in the IPO market only once. In this way, issuers would benefit from the higher offer price even though they damage the market by lowering returns for uninformed investors and pushing them out of the new issues market. This weak point is partially solved by Beatty and Ritter (1986) who argue that the equilibrium underpricing is enforced by investment banks since they are involved in several IPOs. An investment bank has its own reputational capital at stake at each offering. If it fails to underprice correctly, its reputation decreases and in the long-run it loses market shares. So, investment banks find optimal to enforce the right level of underpricing – thereby solving the free-riding problem – because they work repeatedly in the IPO market.

Another critical aspect of the Rock's model deals with the distinction between informed and uninformed investors. Keasey and Short (1992) wonder why uninformed investors do not become informed, thereby obtaining higher returns given that the model considers all the investors as having the same wealth and the same utility function. In support of Rock it could be argued that even in the seasoned equity market different categories of traders classified on the level of information that they own are identified (Harris, 2003). However, it should be highlighted that in the secondary market, traders of different categories do not share the same utility function, contrarily to the assumption of Rock (1986).

In addition, according to Keasey and Short (1992) it is not clear why informed investors do not have the incentive to sell their superior information to the uninformed and why the uninformed are willing to participate in the new issues market despite earning only the riskless rate in equilibrium.

Moreover, Keasey and Short (1992) raise doubts about the assumption that the issuer is regarded as uninformed. They say that the direct means used by the issuer to disclose its private information are not as broad and deep to reveal in full to the public all its private knowledge about the company. They support their hypothesis arguing that there is an entire strand of literature that explains underpricing through the information asymmetry between the issuer and the investors, partially solved with the use of signals. Furthermore, Keasey and Short (1992) find difficult to conceive the issuer and the underwriter as having less information than the market as a whole. According to them it is difficult to understand how the market can pool together the knowledge of investors before trading has started in the secondary market and no mechanism to transfer knowledge among individual investors is in place.

Another weak point of the Rock's model according to Keasey and Short (1992) is the assumption that if oversubscription occurs it results only from large orders placed by informed investors.

Although the Winner's curse model is conceived as a theoretical model and its untestable nature has been highlighted in the literature (Keasey & Short, 1992; Rock, 1986), Koh and Walter (1989) and Levis (1990) try to test the model empirically.

The key element to perform a practical assessment of the Rock's Model is to obtain evidence on the degree of rationing applied by underwriters. As Rock (1986) asserts, underwriters are reluctant to provide this information because they are sensitive in supplying data regarding their possible preferential behaviour in allocating shares or they do not want to provide to the public information about their quality since the degree of rationing reveals directly the underwriter's ability. To overcome this weakness, Koh and Walter (1989) and Levis (1990) base their tests on samples of IPOs obtained from two markets in which information on allocation could be observed. Levis (1990) bases his evidence on a sample of 123 IPOs on the London Stock Exchange between January 1985 and December 1988. The advantage of the British market was that information on the extent of over-subscription and allocation details were available. Instead, Koh and Walter (1989) build their test on a sample of 66 IPOs between January 1973 and June 1987 on the Singapore Stock Exchange. In the Singaporean market, in case of oversubscription the basis used for rationing are disclosed. Both papers commence their empirical analysis testing Rock's condition on the correctness of the model. Rock (1986, p. 205) claims that "if the model is correct, weighting the returns by the probabilities of obtaining an allocation should leave the uninformed investors earning the riskless rate". Both Koh and Walter (1989) and Levis (1990) obtain evidence that a strategy based on subscribing all new issues in the market as uninformed are supposed to do, leaves the investors earn a return that is not statistically different from the riskless rate. This result could be quite surprising considering the high raw returns observed in the first day of trading of new issues in the market: Levis (1990) identifies an average return of 8.64% over the risk-free rate while Koh and Walter (1989) report raw returns in excess of the risk-free rate of approximately 27%. However, the net return an investor obtains is much lower because the raw returns obtained only from assigned shares are reduced by the fixed costs borne to submit the offer. These fixed costs could be the opportunity interest cost on funds used to subscribe new issues (Koh & Walter, 1989; Levis, 1990) or they could be administrative costs (Koh & Walter, 1989).

Another evidence identified both by Koh and Walter (1989) and Levis (1990) is that negative first day returns are suffered not only by all the undersubscribed issues but also by a few oversubscribed issues. This evidence partially contradicts the assumption of the Winner's Curse model that states that "when oversubscription occurs, it is assumed to result exclusively from large orders placed by investors who have favourable information about the prospects of the offering" (Rock, 1986, p. 190). In this case the evidence is partially consistent with the model

because all the undersubscribed issues are overpriced since these issues are assumed to be subscribed only by uninformed investors. However, the evidence does not support the model when even oversubscribed issues are found to be overpriced. This means that – according to Rock’s assumption – informed demand causes oversubscription but informed investors are not always able to distinguish good issues that offer positive first day returns from bad issues that offer negative returns. The result is that even informed investors sometimes could suffer the winner’s curse. Nonetheless, the level of subscription is found to be positively and strongly correlated with the level of first day returns (Koh & Walter, 1989; Levis, 1990).

Koh and Walter (1989) also try to verify another key element of the Rock’s model. They test the assumption that informed investors are able to earn greater returns than uninformed because they invest only in underpriced issues. Since data that identifies subscribers of new offerings by the information they own are not available, the authors assume the size of the application as a proxy of an investor’s level of information. According to their reasoning, large orders come from informed investors and small orders are placed by the uninformed. Consistently with the Rock’s model they observe that the strong correlation between the level of subscription and the degree of underpricing is driven mainly by the demand expressed by large – informed – investors, even though greater demand for underpriced issues is observed for all the classes of investors. Koh and Walter (1989) observe that large informed investors are much more reactive than uninformed to increasing levels of underpricing: they find that an additional one percent point of underpricing triggers a 10% increase in applications by the uninformed while the large informed investors increase their demand by 93%.

In conclusion, the analysis of Koh and Walter (1989) and Levis (1990) give empirical support to the Rock’s Model, even though Keasey and Short (1992, p.78) argue that the only way to verify the model would be to “observe the degree to which an offer was intentionally underpriced because uninformed shareholders would have had their offer applications rationed due to the influence of informed investors”. However, this internal process is impossible to be verified using published data, as argued by Keasey and Short (1992).

### 1.1.2. The Principal-Agent Problem Between Issuers and Underwriters.

Another relevant case of information asymmetry that has been identified as a cause of IPO underpricing is the one that occurs between the issuers of new securities and the investment bankers (Baron & Holmström, 1980; Baron, 1982). In a new offering the investment banker could offer three basic services to the issuer: underwriting, advise and distribution. If an



investment bank (or a syndicate) underwrites a new issue, it bears a part or all the risk linked with the proceeds of the new issue. An investment bank could also advise its clients on different aspects of new issues: for instance, it could guide the client in setting the main characteristics of the securities issued, it can support the issuer in setting the offer price and it could help in selecting the right timing for the issuance. The other service provided by the investment banker is distribution. In this case the banker sells the shares offered in the IPO.

Considering these three basic services provided by an investment bank, we could identify two main asymmetries of information. The first one emerges from the advising service. This function is valuable to the issuer if the investment bank has superior information on the expected demand for the new issue and on the state of capital markets. Clearly, this condition is generally satisfied because it is the core function of the investment bankers to operate into capital markets while the issuer does not have advanced skills on this matter since it should focus on its own core activities. The banker could be better informed either before contracting with the issuer (Baron, 1982) or after he performs preselling activities (Baron & Holmström, 1980). In conducting pre-selling activities, the banker meets with potential purchasers so he can gain a better understanding of the likely demand for the new issue. Although the banker is able to form an opinion on the right offer price for the issue he could not share his superior information with the issuer, since it is much better for the banker to market an issue priced below the level the market would pay. Underpricing an IPO would guarantee the banker to bear less risks since the offering is less likely to fail and may allow the banker to receive higher compensation.

The second moral hazard perpetrated by the investment bank emerges from the distribution function. The demand for an issue positively depends on the distribution effort exerted by the banker to convince investors to subscribe the offering or to influence investors' expectations. While it is in the issuer best interest that the banker distributes the issue with the maximum effort, the banker bears relevant cost the more he dedicates to the issue. Expanding the demand of potential purchasers requires increasing the salesmen time dedicated to the issue, granting rebates to purchasers, losing customers goodwill or reducing the effectiveness of future offerings if the issue is overpriced (Baron, 1982). This conflicting interest between the two parties together with the fact that the issuer is not able to observe the effort exerted by the banker creates the incentive for the latter to underprice the offering in order to reduce its distribution costs. Both the information asymmetries identified are detrimental to the interest of the issuer. In order to reduce the incentives for the investment banker to underprice the issue, Baron (1982) and Baron and Holmström (1980) argue that a suboptimal contract that protects both the interests of the banker and those of the issuer should be created. Compared to a situation of

symmetry of information the contract should provide the right incentives to the banker to exert an acceptable level of effort in distributing the issue and not to underprice excessively the offering, compensating him for the use of his information. In addition, the moral hazard perpetrated by investment banks is partially restrained by specific characteristics of the market in which bankers operate. The first characteristic is that in the investment banking industry reputation plays a fundamental role (Beatty & Ritter, 1986). If the investment bank has its reputational capital at stake in each IPO and it gets a return on that capital, it has the incentive not to cheat and to underprice correctly. If it cheats and underprices too much it will lose in part its reputation and its market share will decrease (Baron & Holmström, 1980; Beatty & Ritter, 1986). If the banker underprices too little or if it overprices, investors will gain too low first-day returns and they stop doing business with that banker (Beatty & Ritter, 1986). Another condition that prevent the banker to underprice excessively is to deal with sophisticated issuers (Baron & Holmström, 1980). If the issuer is sophisticated enough the banker has less possibilities to exploit information asymmetries and so it has the incentive to price close to the market.

## 1.2. Signalling Theories.

A lot of markets are characterized by asymmetries of information between buyers and sellers. The IPO market is not an exception and information asymmetries between issuers and investors who participate in the new issues market have been recognized as playing an important role in explaining the underpricing phenomenon (Allen & Faulhaber, 1989; Leland & Pyle, 1977; Welch, 1989). In order to simplify the discussion in the initial part of this section I do not provide a clear distinction between the issuing firm and the firm owners<sup>4</sup> since I'm interested in discussing the role of information asymmetries between the two broad categories of buyers and sellers. For this reason, the issuers and the firm owners could be considered both as part of the same large category of sellers.

The theories developed in this strand of literature assume the issuer as owning an informational advantage over investors. Undoubtedly firm owners have the opportunity to develop a clearer idea about the quality of the firm that they own. As in the automobile market described by

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<sup>4</sup> In the literature, a clear distinction between the issuing firm and its owners is not provided. For example, Welch (1989) refers to the party owning superior information sometimes as the firm owner and sometimes as the issuer. Instead, Ritter and Welch (2002) refer to this party as the issuers. This assumes that inside information on a firm is held not only by the managers but also by the owners. This presumes that before the IPO most of shareholders are actively involved in running their businesses. This is consistent with the assumption of Spiess and Pettway (1997) who consider the primary shareholder as being also the president and CEO of his firm.

Akerlof (1970) cars owners have the opportunity to form good ideas about the quality of their cars before selling them, also entrepreneurs form better ideas about the quality of the firms that they own. They do this because they obtain private information about the quality of the firm by running day by day the business. Obviously, investors would benefit from knowing the true characteristics of the firm they are going to buy. However, moral hazard prevents the direct transfer of information from the issuer to the investors. Issuers and firm owners are incentivized not to be totally straightforward in sharing their own information since they can earn significant rewards overstating positive qualities of their firms while they know that verification of true information by investors may be expensive or even impossible (Leland & Pyle, 1977). In this situation, characterized both by information asymmetries and firms of different quality, the new issues markets will perform poorly (Akerlof, 1970; Leland & Pyle, 1977). In order to simplify the reasoning, firms could be grouped in two broad categories: those of high quality are referred to as “good firms” and firms of lower quality are called “bad firms”. Owners of issuing firms have superior information but investors are not able to distinguish between good and bad firms. Therefore, in pricing new issues the market will reflect the average firms’ quality. The average value offered by the market has opposed implications for owners of bad firms and owners of good firms. The formers will greatly benefit from the market valuation since it is higher than the value attributable to low quality firms and for this reason the share of bad firms offered in the new issues market increases. On the other hand, the owners of good firms will find too costly to issue shares of their firms in the market because the average value identified by the market is lower than the intrinsic value of high quality firms. For this reason, good firms’ shares are no more offered in the new issues market. The consequence is that the average quality of IPO firms declines dramatically and consequently the average value offered by the market for new issues decreases. From this reasoning, it could be easily derived that in a new offerings market characterized by informational asymmetries only bad firms could be offered and potential investors value new issues knowing that they are of bad quality. Obviously, this is a critical situation because good quality firms – that may represent potential profitable opportunities for investors – are completely excluded from the IPO market. In order to let good firms to participate in the new issues market, information transfer must occur. A credible direct transfer of information is difficult to be implemented since all the issuers have the incentive to exaggerate positive qualities of their firm. The method identified by the literature to effectively transfer credible information is the use of signals. According to the signalling theory, information about the true quality of a firm could be transferred to potential investors through observable actions performed by the issuers or by their owners. Such actions have the potential to signal inside information in a credible way if they are unlikely to be replicated by low quality

issuers and if they could be observed by potential investors. Many types of signals have been identified in the literature as an effective way to transfer private information. Some authors (Allen & Faulhaber, 1989; Welch, 1989; Welch, 1992) argue that underpricing itself could be used to signal the quality of firms. Other authors (Carter & Manaster, 1990; Cohen & Dean, 2005; Filatotchev & Bishop, 2002; Habib & Ljungqvist, 2001; Lee & Wahal, 2004) claim that there are other signals which have the ability to communicate the quality of the issuing firm to investors, thereby partially solving the information asymmetry while they are also key to explain the level of underpricing. In the next paragraphs, I will explain the two broad categories of signals that I have just outlined here.

### 1.2.1. Underpricing as a Signal.

A strand of literature perceives underpricing as a voluntary signal (Allen & Faulhaber, 1989; Welch, 1989; Welch, 1992) sent by good quality firms to solve the information asymmetry with potential investors. In this case, issuers own superior information about their own prospects and investors are at a disadvantage. It is assumed that underpricing is a credible signal because it speaks louder than words (Welch, 1989).

The main point is to understand why good firms voluntarily (Ritter & Welch, 2002) choose to leave money on the table through underpricing. Allen and Faulhaber (1989) and Welch (1989) argue that firms choose to underprice to “leave good taste in investors’ mouths” so that future offerings could be sold at attractive prices. Hence, firms signal their quality by playing in a two-period model. At the IPO, good firms deliberately choose to underprice their issues. In so doing, they expect to recoup the money left on the table at the seasoned equity offering when their quality is known by the investors. Therefore, the return to the equity market through a seasoned offering is part of a predetermined strategy.

At this point it could be argued that all the firms have the incentive to underprice in order to be considered as good firms and to receive a high valuation. The key element in the Welch (1989) model is that at a certain point in time – between the IPO and the seasoned offering – nature may reveal the true quality of a firm and investors know when this occurs. This phenomenon is defined revelation. For example, revelation happens when an oil-exploration company finds an oil fountain emerging from the drilling site (Welch, 1989), when a bio-tech company files for a patent, when Meryll Lynch rates the company as a definite buy (Welch, 1996) or in similar circumstances.

In addition, a high-quality firm can undertake costly activities that only good firms find optimal to incur. If a firm bears these costs it is said that it operates. The costs of operating are optimal for high quality firms because they incur them in any case. On the other hand, these costs are completely wasteful for bad firms. For example, a bad oil-drilling company would prefer to farm its land (Welch, 1996). Instead, it may invest in oil-drilling equipment only to imitate good oil-drilling firms, even though it will not earn profits from that investment. Investors are able to observe if a company operates or not and from this information they could obtain a better understanding of the quality of the firm. For this reason, bad firms may find convenient to imitate good firms' strategy by incurring the cost of operating even if it is worthless to them. However, a bad firm faces a trade-off at the IPO. If it does not operate, it gets the value assigned to low quality firms without the need to underprice its shares. Instead, if it operates it may face two opposed outcomes. On the one hand, if nature reveals its true quality, a bad firm incurs the costs of offering its shares at a discount at the IPO (even though that discount was applied to the value of high quality firms), it also bears the useless cost of operating and finally it gets a low-quality firm valuation when its shares are issued at the seasoned offering. In practice, it incurs very high imitation costs that make the imitating strategy unprofitable in respect to revealing its own quality. On the other hand, if revelation does not occur, bad firms obtain a positive outcome – they are valued as good firms – and firms are rewarded by applying this strategy. Clearly, since issuers and firm owners are rational, they adopt the strategy that is expected to maximize their total proceeds. Good firms, in order to be identified as such by potential investors and to be distinguished from bad firms, should set underpricing at a level that makes unfeasible for bad firms to imitate their strategy. Since the probability of revelation is assumed exogenous in the Welch (1989) model, good firms should control the level of underpricing at which they offer their shares. The lower the probability that nature reveals the true quality of a firm, the larger is the level of underpricing that should be set by good firms to obtain a separating equilibrium. Similarly, if the market valuation of good firms increases, high-quality firms should increase the underpricing of their issue. If they don't do that, imitating incentives for bad firms increase since the differential between good and bad firms valuation increases and the potential gain from the imitation of good firms rises. Therefore, high-quality firms should strategically underprice their IPOs to increase the imitation costs incurred by bad firms, thereby making unprofitable for low-quality firms to imitate good firms strategy. Hence, by manipulating underpricing, good firms force bad firms to reveal their true quality to the market.

If good firms successfully communicate their superior quality to the market they can obtain higher proceeds at the seasoned offering than at the IPO. Good firms signalling their quality have the incentive to reduce at the lowest possible level the amount of claims offered at the costly underpriced IPO. Welch (1989) assumes that the minimum amount of proceeds that should be raised corresponds to the cost to implement the operating activities. Nevertheless, the amount of claims issued at the IPO could be increased taking into account the probability of revelation and the differential in value between good firms and bad firms. In any case, good firms find convenient to issue substantial amounts of claims at the seasoned offering. At that point in time, their quality has been revealed and they find optimal to issue larger amounts of claims since they can issue shares at a price closer to their intrinsic value.

Additional considerations could be made on the value of outstanding shares upon the news of a seasoned offering. Typically, we could expect a price decline for multiple reasons (Čornanič & Novák, 2015). The market could suppose that managers – which are better informed – are issuing a capital increase because they believe that the shares of their company are overpriced. In this case the seasoned offering gives negative signals on the intrinsic value of the firm. Alternatively, investors may suppose that the firm is trying to recover financial resources raising equity capital because it is not able to finance its investments using cheaper financing sources, as retained earnings or debt. Instead, if investors understand that the seasoned offering is part of a rational signalling strategy they react in a different way. In this case, Welch (1989, p.442) argues that “the value of outstanding shares falls less upon news of a seasoned offering when a firm has played an underpricing equilibrium”.

The Welch (1989) model has been extended in the following years by Welch (1996) himself. The new model considers the timing decision on when to issue the seasoned offering as an additional separating mechanism that works jointly with the underpricing signal. The extended model argues that the longer a firm waits before issuing seasoned equity, the higher is the probability of revelation. For this reason, a good firm will wait longer before returning to the market because it will benefit from the higher probability of revelation experienced in the meantime. Additionally, high-quality firms would benefit from the longer wait because of the increased probability that nature reveals the true quality of bad firms imitating high-quality firms' strategy. Welch (1996) asserts that in the sample of IPOs he analysed, revelation occurs with 30% probability in a year.

The drawback of the longer wait for good firms is that they lose the full benefit of adequate and timely funding, thereby not exploiting possible opportunities and suffering a reduction in their

value. According to the empirical evidence reported by Welch (1996), waiting costs to a firm a 15% decrease in value.

In any case, if revelation occurs before the time planned to return to the market, good firms issue seasoned equity earlier. In this situation, high-quality firms suffer a lower level of capital starvation, experiencing a smaller decrease in value. Good firms early-issuing a seasoned offering experience U-shaped after-market returns. Initially, firms set a significant IPO return, then returns dwindle due to the decreasing firm value as a consequence of capital needs and finally stocks experience price run-ups when news on early seasoned offering start to circulate. Upon news of an early follow-on offering, investors expect the firm to be able to satisfy its financial needs. In this way, the firm can exploit new opportunities and its value increases. In conclusion, the extended Welch (1996) model asserts that good firms – to be distinguished from bad firms – should underprice more and wait longer before reissuing, unless nature reveals their quality earlier.

The Welch (1989) model is not the only one that explains underpricing as a signal used to solve information asymmetries between issuers and investors. Also Allen and Faulhaber (1989) develop a model that is quite similar to the ones of Welch, even though it presents some differences. Similarly to Welch (1989), Allen and Faulhaber (1989) distinguish the companies offering shares in IPOs between good and bad firms. At the IPO, good firms signal their superior quality by aggressively underpricing their shares. They do this to leave good taste in investor's mouth in order to sell future offerings at attractive prices. In addition, they argue that a substantial level of underpricing has the beneficial effect of conditioning investors to interpret more favourably the following dividend results. The main difference with the Welch (1989) model stands in this point. In the Allen and Faulhaber (1989) model, bad firms do not have to incur direct imitation costs to mimic good firms. Furthermore, revelation does not occur by chance and because of exogenous facts. In this model, investors learn more about a firm quality by observing its dividend stream. If dividends distributed by a firm are high, investors believe that the company is of high quality. Conversely, if dividends are low they believe that the firm is of bad quality. In addition, the Allen and Faulhaber (1989) model assumes that if good firms fail to skilfully implement their innovation<sup>5</sup> they may become bad firms while bad firms remain bad. Clearly, the signal that investors receive incorporates some noise. This is due to the

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<sup>5</sup> Allen and Faulhaber (1989) assume that firms are founded with an innovation. The innovation may be good or bad. If a firm relies on a bad innovation it is a bad firm. Instead, if it relies on a good innovation and implements it skilfully, it is a good firm. Conversely, a good innovation with a bad implementation makes a firm to be bad.

assumption of Allen and Faulhaber (1989) that bad firms could pay high dividends, even though they do so with a lower probability than good firms.

In conclusion, the Allen and Faulhaber (1989) model states that high IPO returns make investors believe that probably a firm is of high quality. Subsequently, if they observe that high dividends are paid by the firm they presume that the firm is good with a high probability. Instead, if they observe low dividends they revise downward their beliefs about the company probability of being of good quality.

The models (Allen & Faulhaber, 1989; Welch, 1989; Welch, 1996) proposed to explain the role of underpricing as a signal used to partially solve information asymmetries between issuers and investors have been tested empirically by several authors and the results provided are conflicting.

Welch provides evidence that backs his theories. To support the first version of his model he provides some preliminary evidence on the reissuing activities of IPO firms (Welch, 1989). He uses a sample of 1028 IPOs from 1977 to 1982 on US equity markets, namely NASDAQ and AMEX. He also collects data about the follow-on offerings of these IPO firms occurred between 1977 and 1987.

He observes that a significant share of IPO firms returns to the market in the subsequent years and most of these firms do so in the first three years after the initial offering. This gives partial support to his assumption that the seasoned offering is part of a strategy determined at the IPO. In addition, consistently with the assumption that good firms prefer to issue substantial amounts of claims at the seasoned offering instead of at the IPO, he finds that the average ratio of seasoned offering proceeds over IPO proceeds is in excess of three. Nevertheless, it could be argued that this ratio is characterized by a very high variability and this does not undeniably support his assumption.

Additionally, Welch (1996) provides empirical evidence to support his extended model. He bases his analysis on a sample of 574 reissuing underpriced IPO firms that went listed in US capital markets between 1973 and 1982. As before, he observes that companies returns to the market on average in three years even though the mode is one year. He also provides evidence that a firm that underprice by an extra 10% waits an additional year before returning to the market. This is consistent with the idea that also timing plays a role as a separating mechanism. Furthermore, he finds that the price trend between the initial and the seasoned offering is coherent with the U-shaped pattern of after-market returns that he hypothesised.



Opposed to the results of Welch (1996), Spiess and Pettway (1997) do not obtain evidence that support the theory of underpricing as a signalling mechanism. They test the signalling hypothesis focusing on a different perspective. Up to here, I have identified information asymmetries between issuer/firm's owners and investors. I have assumed that both the issuing firm and its owners are part of the same large category of sellers, thereby standing on the same side of the asymmetry. Therefore, as specified before, I did not differentiate between the issuing firm and its owners because they are considered as sharing the same objectives. However, Spiess & Pettway (1997) argue that the issuing firm and its shareholders may obtain different outcomes in pursuing a signalling strategy. Therefore, they use two empirical measures to test the effects of using underpricing as a signal. The first measure is used to consider the benefits obtained by the issuing firm. This measure is the present value of the cash flows to the firm, defined as the combined net proceeds from the IPO and the seasoned offering. This is useful to identify whether the cost of providing underpriced shares at the initial offering can be recouped at the seasoned issuance. The second measure verifies the wealth change experienced by firm insiders. Differently from the issuing firm, owners and managers bear the cost of underpricing in two ways. Selling shares at a price lower than the fundamental value implies a wealth transfer from current shareholders to the new ones. In addition, if current owners and managers participate at the IPO by selling their own shares they suffer the cost of reduced proceeds since they could have sold those shares after the IPO at higher prices.

Spiess and Pettway (1997) base their empirical analysis on a sample of 172 IPOs of industrial firms that went public in U.S. between 1987 and 1991 and which reissued shares within three years. They discover that firms that reissue do so in less than a year, as stated by Welch (1996). However, they do not identify the typical U-shaped pattern of after-market returns for firms experiencing revelation. Instead, they find that firms that reissue quickly experience substantial price run-ups between the IPO and the seasoned offering.

Regarding the effect of underpricing on the cash flows received by a firm, Spiess and Pettway (1997) show that the combined net proceeds – defined as the present value of the IPO and the seasoned offering proceeds – are inversely related to the IPO returns. This means that the higher the underpricing, the lower are the proceeds raised by an issuer. This is the opposite of what is purported by the Welch (1989) model. In addition, they argue that there is no evidence of positive correlation between underpricing and wealth change for directors and original shareholders. This means that owners and managers who signal the superior quality of their firm through underpricing do not benefit by applying this strategy. Also, Spiess and Pettway (1997) claim that if the Welch model holds, current shareholder would prefer to sell their shares after the IPO because they can do that at higher prices. Instead, they observe that current owners

sell part of their shares at the IPO and this behaviour is even more common in firms that underprice their shares.

Possible explanations about the weak support provided by empirical analysis to the Welch (1989) model are proposed by Francis, Hasan, Lothian, and Sun (2010) and Čornanič and Novák (2015).

Francis et al. (2010) argue that not all the good firms have to underprice to signal their superior quality. Only those that have to raise funds to operate need to do so<sup>6</sup>. For this reason, the weak support to the Welch model stems from the inability of researchers to identify those firms that value underpricing as a signalling device among all the firms that underprice.

Another key element in explaining the signalling model of Welch are the conditions of the environment in which a firm issues its shares. Welch (1989) asserts that three different equilibriums could emerge with different market conditions. The conditions of the market could be identified by the different probability of revelation of the quality of a firm. If a firm faces a low probability to be revealed as a good or a bad firm, the signalling mechanism does not work. Bad firms would have the incentive to underprice to be identified as good firms since revelation is very unlikely to occur, so underpricing loses its credibility as a signal. In this case, no distinction is made between firms of different quality and a pooling equilibrium emerges. The opposite occurs if the revelation probability is very high. In this situation, bad firms do not imitate good firms because they are quite sure to be discovered. Therefore, good firms do not have to send signals and underpricing is not needed. The only situation in which good firms find convenient to underprice is when the probability of revelation is between these two extremes.

The probability that a firm is revealed as good or bad is clearly related to information problems. If markets are characterized by low transparency and difficulties in circulating information we could imagine that the quality of a firm is revealed with lower probability. These conditions could be found in segmented capital markets or in emerging markets where the institutional framework is very weak. Francis et al. (2010) perform their analysis on foreign firms issuing equity on US markets<sup>7</sup>. These firms come both from financially integrated markets and from segmented markets. Firms from segmented markets may face direct and indirect barriers to the

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<sup>6</sup> This assertion of Francis et al. (2010) is based on one of the assumptions used in the Welch model. Welch (1989, p.424) assumes that "firms are so wealth constrained that they must raise the capital necessary to fund their operations". Francis et al. (2010) argue that it is not necessary for all good firms to signal their quality using underpricing if they are not financially constrained.

<sup>7</sup> The sample consists of 413 IPOs of firms domiciled outside the U.S. which went public between 1985 and 2000 on the NYSE, AMEX or NASDAQ. The sample also includes 70 seasoned equity offerings of these IPO firms occurred within three years from the initial issue.

free flow of capital. This could seriously limit their ability to raise external financial resources. To overcome this limitation, firms from segmented markets may decide to list or cross list in integrated markets. In this way, they can substantially increase liquidity and they may find easier to raise financial resources. Foreign firms and in particular those from segmented markets have a strong incentive to adopt a signalling strategy. Since they are not known by US investors, they should devote significant resources in informing and making themselves known to the investors community. Francis et al. (2010) identify that firms from segmented markets experience higher IPO returns than foreign firms from integrated markets. In addition, they observe that firms from integrated markets tend to underprice for reasons that are different from that of signalling their quality to potential investors. On the contrary, firms from segmented markets are likely to use underpricing as part of a signalling strategy and they are more likely to issue seasoned equity. Additionally, they tend to reissue quickly, consistently with Welch (1996). They also tend to issue larger portions of capital in seasoned offerings and they experience just small price declines when they announce a seasoned issue. Contrary to the evidence reported by Spiess and Pettway (1997), firms from segmented capital markets adopt a strategy that seems to support the theory proposed by Welch (1996). Instead, evidence based on firms from financially integrated markets rejects the Welch (1996) model.

Other empirical evidence supporting the Welch (1996) model is that brought by Čornanič and Novák (2015). They focus their analysis on a sample of 153 IPOs on the Warsaw Stock Exchange between 2005 and 2009 and the 34 seasoned offerings realised by these firms within three years from the IPO date.

The Polish market is characterized by low levels of transparency and disclosure (Čornanič & Novák, 2015). Furthermore, corporate insiders earn higher returns from insider trading compared with mature markets and Poland is considered to have one of the weakest rule of law in the European Union. Despite these facts, the Warsaw Stock Exchange is a quite large and relatively active market. For these reasons, Čornanič and Novák (2015) argue that the Polish market provides a good environment in which to test the signalling theory since it could be considered a rather active emerging market. Emerging markets are characterized by a weak institutional framework and significant information asymmetries. The evidence found by Čornanič and Novák (2015) is consistent with the signalling model. They observe that firms that underprice more are more likely to issue a seasoned offering and they do so sooner. In addition, these firms tend to issue higher amounts of equity at the seasoned offering than at the IPO. However, Čornanič and Novák (2015) do not find evidence of a more favourable reaction of the market to the announcement of a seasoned issue for firms that apply a signalling strategy,

as stated by Welch (1996). They argue that this is probably due to the different implications that a seasoned offering announcement has in emerging markets than in mature markets. In emerging markets, firms are mainly growing companies and their return to the market could emerge from the need to finance new investment opportunities without considerations on the adequacy of the current stock price or on the pecking order of financing sources. For this reason, the announcement of a follow-on offering is not perceived as bad news by the market.

As I have reported, the Welch model (Welch, 1989, 1996) has been tested empirically and the results obtained are mixed. Anyhow, there is a way to interpret these results.

It could be observed that empirical evidence – other than that of Welch (1989, 1996) – obtained on US markets does not support the hypothesis that underpricing is used as a signal to solve information asymmetries (Spiess & Pettway, 1997).

On the contrary, evidence obtained from markets characterized by lower transparency and higher barriers is fully in line with the predictions of the Welch model. This means that the use of underpricing to signal the quality of firms in IPOs is a practice particularly diffused in emerging markets while it is not used in mature ones. This suggests that the more pronounced are the information asymmetries (Čornanič & Novák, 2015) and the higher is the need to raise capital (Francis et al., 2010), the higher is the incentive for good firms to signal their superior quality through underpricing. This does not happen in the US markets where the well-developed institutional framework reduces the level of information asymmetries. Instead, it happens in emerging markets where a weak institutional environment and low transparency facilitate the entrance of bad firms. This – together with higher information asymmetries – increases the incentives for good firms to signal their quality to potential investors leaving more money on the table at the IPO.

### 1.2.2. Signalling to Influence Underpricing.

In the introduction to section 1.2 I have highlighted that the level of underpricing is not the only signal that could be sent to the market to solve – at least partially – the asymmetry of information between issuers and potential investors. This type of information asymmetry could also be resized by issuers by adopting a different kind of signals. The objective of these new signals is still to communicate to the market the real quality of firms. However, they have two fundamental characteristics that make them different from the use of underpricing as a signal. The first distinguishing characteristic is that they contribute to reduce underpricing by communicating private information. Therefore, by decreasing the level of initial returns they

behave in the opposite way of signalling by voluntarily increasing underpricing. Obviously, these new signals could be employed simultaneously with a deliberate higher level of underpricing in order to combine the effects of the two signalling strategies, thereby communicating the true quality of a firm.

The second main characteristic that makes these signals different from the use of underpricing as a signal is that they do not require the issuing firm to return to the market with a seasoned offering. Therefore, the issuing firms and their owners capture the benefits of employing these signals directly at the IPO. This happens because these signals communicate information to investors, thereby reducing uncertainty and affecting the level of initial returns. Instead, signalling through underpricing requires firms to voluntarily underprice their shares at the initial offering to recoup higher proceeds at the seasoned offering, when the quality of the issuer is known.

These new signals share the characteristic of being substantially different from the use of underpricing as a signal. However, even though they share this feature they are not homogenous. The owners and managers of IPO firms can control different features of their firms to communicate the true quality of their undertakings to potential investors. The range of signals they can use is quite broad and the research is still documenting new signals nowadays. Among the signals widely reported in the literature there are the amount of retained equity at the IPO, the ownership of companies, the quality of the top management team, the reputation of the advisors hired by the issuing firm and many others.

However, the informative effect of these signals varies significantly depending both on the environment in which they are received and on the ability of recipients to discern the signals from noise. In addition, the effectiveness of signals could be compromised by IPO prospectuses characterized by low information clarity. Therefore, information ambiguity and environmental uncertainty play a crucial role in determining the success of a signalling strategy. In the following paragraphs, I analyse in detail the main signals.

### *Retained Equity.*

One of the most important signals identified in the literature is the percentage of equity retained by the original entrepreneurs at the IPO (Allen & Faulhaber, 1989; Leland & Pyle, 1977). The amount of equity to be retained is a voluntary decision taken by the original owners. It is also observable, since it is an information that should be disclosed to comply with regulation (Leland & Pyle, 1977).

There are a few reasons why retained equity is perceived as an effective signal by market participants. First of all, it transfers information about the quality of a firm from original owners to potential investors because it expresses the willingness of the agent with inside information – the owner – to invest in the firm. A reasonable entrepreneur would maintain the highest possible level of investment in his company the higher is the expected return from that investment. For this reason, the perception of investors about the quality of a firm is enhanced by the share of equity retained by the original owners. The second reason why retained equity could be used as a signal is that it is not replicable by low-quality firms' owners. This is ensured by the welfare cost suffered by the entrepreneur in employing this signal. The welfare cost comes from the fact that the owners are induced to take a larger equity position in their firm than the one that would be optimal if information could have been transferred directly (Leland & Pyle, 1977). In this situation, the entrepreneur increases the risk that he is facing since his investment portfolio is less diversified (Keasey & Short, 1997). The condition that separates good firms and bad firms stands right here. An entrepreneur would accept to bear the risk of concentrating his investments in his own firm only if he has favourable prospects about the operating and financial performances of his firm. In case the owner has negative expectations about the future results of his company he would find optimal to increase the diversification of his investment portfolio. To do this he should reduce the amount of equity retained at the IPO, with the objective to limit the losses or low returns expected from the investment in his firm.

Despite these characteristics, the effectiveness of this signal is brought into question in the literature (Keasey & Short, 1997). One of the doubtful elements is that in some situations a firm may issue share with the only objective to raise capital to finance a specific investment project. In this case, the equity retained by the owner is a function only of the planned capital expenditures. Anyhow, even the value of planned investments of a firm could be a valuable signal for market participants.

Other weaknesses of the usage of retained equity as a signal are raised by the wealth and agency arguments (Keasey & Short, 1997). The wealth argument suggests that the higher the value of a firm, the lower is the amount of equity to be issued to raise a specific amount of money. This suggests that the more valuable a firm is, the larger is the amount of equity retained by the original owners. This reasoning stems from the same assumption adopted by the previous critique of Keasey and Short (1997) to the Leland and Pyle (1977) model: both assume that an issue is performed only to raise financial resources used to fund capital expenditures. The agency argument affirms that higher levels of equity retention are related to higher firm values because original owners have greater incentives to control management.

Another criticality of the ability of retained equity to signal the quality of a firm is raised by the entrenchment hypothesis (Keasey & Short, 1997). According to Morck, Shleifer, and Vishny (1988), insiders – whether managers or directors in the board – who own a substantial fraction of the firm may adopt non-value-maximizing actions. These decisions may be adopted by insiders in case there are the conditions for entrenchment (voting power, control of the board, status of founder...). In general, these conditions occur when insiders own a substantial share of equity. If insiders own small stakes of equity the convergence of interests with shareholders prevail and the value of the firm is maximized. The entrenchment hypothesis highlights that the amount of equity retained at the IPO could be an effective signal but it should be analysed in combination with other information, in this case it should be considered who are the original shareholders.

Another weak point of signalling through retained equity is that the original shareholders may sell their shares even after the IPO. The Leland and Pyle (1977) model assumes that owners have no opportunities other than the initial issue to sell shares. In practice, shareholders may sell their shares in the secondary market as well as at the time of the IPO (Keasey & Short, 1997). Since they can do that, they may increase the amount of equity they retain at the IPO to signal the quality of their firm. Afterwards, they can sell their shares in order to reduce the risk they face in concentrating their investments in their firm. In this way, they may leave less money on the table at the IPO thanks to the signal employed and then they can diversify their portfolio at an optimal level immediately after the offering. However, if this happens the level of retained equity will be no more perceived as a credible signal by market participants. Actually, retained equity is still considered in many academic papers as a signal used by real firms to convey private information to the market. This may suggest that retained equity is still reputed to be an effective signal and that the critiques reported by Keasey and Short (1997) do not hold.

Among the possible reasons that may support the usage of retained equity as a signal there could be the limitation to the opportunistic behaviour of original shareholders guaranteed by rules that impose limits to stocks sales around the IPO and by the widespread adoption of the lock-up provision in initial offerings. The lock-up provision prohibits to sell shares for a specified period of time after the offering date. Mohan and Chen (2001) affirm that this provision is requested by the most influential buyers, presumably the better-informed investors. So, it is a clause that is agreed between existing shareholders and informed investors. In this manner, the original owners can't sell their stocks immediately after the IPO and they are forced to maintain the level of equity that they retained at the initial issue for a certain period of time. In this period, the new shareholders have the opportunity to assess additional information about the company and the true value of the firm may be revealed. The existence of a lock-up

provision is not only useful to support the usage of retained equity as a signal. It could be used itself as a signal (Mohan & Chen, 2001). The duration of the lock-up is not given. The clause may be effective for a period of time that could vary substantially. In general, the normal lock-up provision is effective for 180 days after the offering date and this period should be considered the norm. Departures from the norm are associated with more uncertainty about the firm value and result in higher underpricing at the IPO (Mohan & Chen, 2001). Lock-up clauses that last more than 180 days signal that better-informed investors have required a longer lock-up because of the higher risk of the issuing firm. Lock-up periods shorter than 180 days could be due to the fact that not all the issuers agree with the requirements of better-informed investors. In this case, the investment in the firm is riskier since a lock-up provision that prevents the opportunistic behaviour of owners is not working as expected. For this reason, investors are compensated with higher underpricing.

#### *Top Management Team.*

Another category of signals that could be employed to communicate the quality of a firm is the one related to governance issues. Investors are found to be sensitive in assessing the value of a firm to information regarding the quality of the top management team, the composition of the board of directors and the presence of the founder in the management team.

The top management team is fundamental to enhance the legitimacy of an organization (Lester, Certo, Dalton, Dalton, & Cannella Jr., 2006). Legitimacy is essential for an IPO firm because it suffers from a liability of market newness. This liability originates from the fact that the IPO firm has been privately held since that moment. The disclosed track record of the company is much poorer than the one available for listed firms. Governance and control systems probably have been strengthened and improved for listing purposes since they may have been much weaker when the company was privately-held. For these reasons, potential stakeholders are not aware of how the management will react to pressures and to the rigour of capital markets. Therefore, managers must convince market participants that the firm has long-term potential (Lester et al., 2006). The legitimacy required to companies could be defined as “the perception that the IPO firm would act in a manner consistent with shareholder wealth generation, as well as trust that the firm’s economic potential is accurately reflected in information provided to the investors” (Cohen & Dean, 2005, p. 684).

Clearly, the concept of legitimacy for an organization is really a soft one. It may be very complicated for a potential investor to assess in practice whether a company will “act in a



manner consistent with shareholder wealth creation". Cohen and Dean (2005) and Lester et al. (2006) argue that the most effective way to evaluate the legitimacy of an IPO firm is to look at the legitimacy of its top management team. Basically, an organization could be considered the reflection of its top executives (Lester et al., 2006). In this way, the top management legitimacy contributes to the legitimacy of the entire organization, enhancing investors perception of the firm. For this reason, the top management team legitimacy could be considered a signal that conveys the quality of a firm.

However, to be considered as an effective signal it should not be replicable by low-quality firms. That is, bad firms should not be able to acquire an excellent management team. According to Cohen and Dean (2005) this is what happens in reality. They argue that the most legitimate managers will avoid firms without a viable strategy and without substantial economic potential. Managers avoid to work for these firms for several reasons: they think their time is better spent somewhere else, they risk their long-term reputation if they are associated with bad ventures and since they use to allocate part of their financial assets into the firm, they prefer to obtain higher returns. Considering that a prestigious top management team communicates the legitimacy of a firm and that it could be possessed only by good firms, top management team legitimacy could be considered an effective signal.

Anyhow, at this point a definition of the legitimacy of a managerial team is needed. Cohen and Dean (2005) define the legitimacy of the top management team as a function of the legitimacy of individual top managers. They also add that legitimacy is characterized by diminishing returns. There are many factors that could convey legitimacy to managers. One of these factors is the previous experience in the industry. Industry-specific experience implies the knowledge of the environment and a better ability to choose only good firms to work with. Another factor associated to legitimacy is the previous top management experience. Also, education is important to obtain legitimacy. It signals knowledge, skills and intellectual capacity even though the role of education does not result as statistically significant in the Cohen and Dean (2005) empirical analysis<sup>8</sup>. Even the age of the managers is considered relevant to increase legitimacy. Age implies knowledge, experience and most importantly, established networks. Lester et al. (2006) stress the importance of networks. They affirm that prestigious top managers are better able to form relationships since many other actors enjoy the higher status resulting

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<sup>8</sup> Cohen and Dean (2005) base their empirical analysis on a sample of 221 IPOs selected randomly among those occurred in U.S. markets between 1998 and 1999. They observe a negative correlation between the top management team legitimacy and underpricing. They also test the relationship between different factors that convey legitimacy to managers (namely prior top management team experience, industry experience, age and education) and underpricing. All these individual factors are significantly negatively correlated with underpricing, except for education that is not statistically significant.

from these affiliations. Expanding the networks of an organization is the effect of firm legitimacy and this helps the company to better integrate in the environment, thus increasing investors valuation. So, the selection of the top management team is not only critical to increase the legitimacy of a firm, thereby reducing underpricing at the IPO. It is also fundamental to ensure that excellent strategies are developed, hence ensuring long-term value creation for shareholders.

#### *Board of Directors Composition.*

Another governance-related aspect that is able to signal the quality of a firm to potential investors is the composition of the board of directors (Filatotchev & Bishop, 2002). The composition of the board is fundamental for an IPO firm to obtain access to the right relationships network and to take advantage of the right skills and experiences. Directors competences and external ties may help the IPO firm to receive assistance from social and political elites. Having access to external networks increase the legitimacy of firms since they are associated with organizations and social groups that already have legitimacy. Directors may also provide valuable strategic contributions. Their assistance in strategic development is crucial when a firm operates in a highly uncertain environment, when the firm is in its growth phase and in particular when the experience of top managers is quite weak. In these situations, the emphasis of the board may shift from financial control and evaluation of management decisions to strategic control, focusing on long-term value creation.

Filatotchhev and Bishop (2002) perform an empirical analysis<sup>9</sup> and they discover that all these considerations are taken into account by potential investors when assessing the value of an issuing firm. In particular, they find that the higher is the board diversity the lower is the underpricing. Board diversity is enhanced by the number of non-executive directors, the number of directorships each director holds in other firms and directors position in stakeholders organizations. Even though non-executive directors provide the right relationships, facilitate the acquisition of resources and provide competences to issuing firms, Filatotchev and Bishop (2002) discover that if the absolute number of non-executive members and the number of their individual external directorships are excessive, investors assessment of firm value is negatively impacted. This is due to the fact that boards efficiency is reduced if they are very large and the members are not focused on the firm.

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<sup>9</sup> Their empirical analysis relies on a sample of 251 IPOs on the London Stock Exchange and on the Alternative Investment Market between December 1999 and December 2000.

Considering the board of directors, another important aspect deserves attention. Certo, Covin, Daily and Dalton (2001) assert that the presence of a CEO that is also the founder of the firm increases the level of underpricing. This is due to the different perception of a founder CEO by investment banks and investors. In the eyes of an investment banker, a founder CEO represents untested management. Founders are known for lacking objectivity when analysing the environment, the weaknesses and the strategy of their firms. They also tend to be overoptimistic about the strengths and the opportunities of their companies. Thus, their decisions may be unrealistic and may be regarded as poor management decisions. In addition, founders tend to find very difficult to move to a professional-style management. This is very dangerous as the organizational context evolves and new skills are required. For all these reasons investment bankers tend to apply a founder-bias discount in their valuations, resulting in a greater level of underpricing. On the other side, investors do not attach any negative consideration to the fact that a CEO is also the founder of the undertaking. Certo et al. (2001) affirm that investors are influenced by the pro-entrepreneurship bias of popular business press and that they may just consider the founder CEO as a successful entrepreneur. The result of these two opposed views is that underpricing increases. This happens because investment bankers apply a founder discount in their valuation and investors do not consider this situation neither positive nor negative.

However, in case of a founder CEO the role of outside directors changes with respect to what has been described by Filatotchev and Bishop (2002). The combination of outside directors and founder CEO is positively perceived by potential investors, since they consider outside directors as offering their capabilities and networks to the firm and they consider the founder as a successful entrepreneur. Instead, investment bankers view the founder CEO as limiting the ability of outside directors to add value as part of the firm governance structure. In this situation, investment bankers appreciate a larger presence of inside directors in the board. Insiders are deemed to provide qualified assistance to the founder in maintaining the strategic focus and to complement the CEO.

To sum up, governance-related signals – namely top management team legitimacy, board of directors composition and the presence of a founder CEO – are analysed in the empirical literature, such as in Certo et al. (2001), Cohen and Dean (2005) and Filatotchev and Bishop (2002) and many times these signals prove to be significant in explaining part of the underpricing phenomenon.

Park, Borah, and Kotha (2016) reperform entirely all the three studies that I have just cited using a much recent sample. The empirical analysis of Park et al. (2016) relies on a sample of 234 IPOs occurred in U.S. markets between January 2010 and May 2013. They argue that they have chosen specifically this time period because the way in which firms, customers and investors gather information changed significantly after 2009. Relying on this new sample, they do not find evidence that support the effectiveness of governance-related signals. Park et al. (2016) propose a possible explanation for this result. They argue that the advances in information technology led to “the democratization of IPO and IPO-related information” (Park et al., 2016, p. 2375). They affirm that media coverage of initial offerings has increased substantially thanks to the development of dedicated TV channels and business websites. In addition, detailed information on IPO firms is now readily available on PCs and mobile devices through company websites, media websites such as Yahoo Finance, online databases (among others the EDGAR service of SEC) and even social media platforms such as Facebook and Twitter. Therefore, they claim that the increased availability of fine-grained information about issuing firms has reduced the need to rely on signals to spread information.

#### *Venture-Capital Backing.*

Even information related to the identity of individual shareholders may communicate to investors information regarding the quality of a firm. One type of ownership that is relevant for investors’ assessment purposes is the one of venture-capital firms.

Meggison and Weiss (1991) argue that venture capitalists exert a certification role for the firms in their investment portfolio. In practice, venture capital firms are deemed credible in certifying the true value of a company and they are supposed to monitor the performance of firms in which they invested. Consistently with their hypothesis, the empirical analysis<sup>10</sup> of Megginson and Weiss (1991) reports that underpricing is lower in case of venture-capital backed IPOs.

In contrast with Megginson and Weiss (1991), Lee and Wahal (2004)<sup>11</sup> find that venture-capital backed IPOs experience higher levels of underpricing. They provide a few reasons to support their finding. Lee and Wahal (2004) warn the reader that their result may be caused by endogeneity issues. Anyhow, the most prevalent explanation they report is the grandstanding

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<sup>10</sup> The analysis of Megginson and Weiss (1991) relies on a comparison between a sample of venture-capital backed IPOs and a sample of non-venture-capital backed IPOs. Each of the two samples is made of 320 IPOs issued between January 1983 and September 1987. The firms in the two samples come from the same industries and they are as close as possible in offering size.

<sup>11</sup> The empirical evidence of Lee and Wahal (2004) relies on a sample of 6413 IPOs issued in U.S. markets between 1980 and 2000. The 37% of the firms in the sample is backed by a venture-capital firm.

hypothesis. Venture capital firms have a definite life, after which they have to liquidate their investments and give the money back to investors. A way to exit their investments is by taking companies public. The typical work – in a simplified way – of the venture capitalist consists in raising financial resources from investors, looking for the right firms to invest in, invest money and then exit the firms trying to obtain a return for investors and for the venture capital managing team. Since venture capital firms repeat this cycle many times during their life, they need to acquire good reputation to obtain flows of investments. To build reputation, venture capital firms have to signal to investors their quality. An effective way to do this is to take public the firms in their investment portfolio. In doing so, they accept to leave money on the table in order to take most of their firms public. Lee and Wahal (2004) observe that venture capitalists who take public most of their firms obtain larger investment flows at the following financing rounds. This is what the grandstanding hypothesis suggests.

In conclusion, the signalling role of venture capital backing may be a reasonable one. A company participated by a professional investor – as a venture capitalist – may be perceived as of higher quality thanks not only to the monitoring role of the venture capital firm but also for the fact that among a large number of candidates, it has been chosen by a venture capitalist as the one offering the best prospects. Anyhow, implications related to the functioning of the venture capital industry may add confusion to the role of venture capital backing in signalling the quality of a firm.

#### *Underwriters and Auditors Reputation.*

An additional category of signals that allows potential investors to infer the quality of an issuer is the one that involves the reputation of the investment bank (Carter & Manaster, 1990; Habib & Ljungqvist, 2001) and of the auditors (Beatty, 1989). Therefore, in an initial offering the choice of which investment bank and auditor to hire is a critical one because market participants may assign to these agents a certification role. This means that in the eyes of potential investors a reputable investment bank can certify that an issue is well-priced. Similarly, an audit firm with excellent reputation is considered much more credible in certifying that an issuing firm's financial statements give a true and fair representation of its economic and financial situation. The certification role played by these two advisors is useful to provide a higher level of assurance about the value of a firm. In this way, part of the uncertainty related to the quality of the company is dissipated and underpricing is reduced.

The certification role of investment banks and auditors builds upon their reputation. Their reputational capital has been built in years of operation but it is non-salvageable in case of

errors. If an investment bank ensures – thanks to its reputation – that an issue is correctly priced but in the first day of trading it reveals to be mispriced, the investment bank erodes its reputational capital. Investment banks that systematically fail to certify their issues lose their market shares (Beatty & Ritter, 1986).

Given that the choice of which auditors and investment banks to hire is critical to certify the quality of an issue, IPO firms should consider this selection as part of a strategy to promote their initial offerings. Reputable advisors charge higher fees for their services and these costs are borne by the issuing firm. Anyhow, the higher is the reputation of the advisors, the lower is the underpricing at the IPO. In practice, there is a sort of trade-off between the higher fees for top advisors to certificate the issue and underpricing (Habib & Ljungqvist, 2001). Value-maximizing firms will choose the advisors with a reputational capital that equates the marginal benefit of lower underpricing with the marginal cost of a higher quality advisor (Beatty, 1989). The signal provided by top investment banks and auditors is hard to be replicated by low-quality firms. A reputable investment bank has a better experience in pricing an issue and if it fails to do so it damages its non-salvageable reputational capital. Similarly, a high-quality audit firm is considered more capable to verify the correctness and completeness of financial statements and if it issues a wrong opinion, its reputation will be negatively affected.

Since investment banks and auditors have their reputational capital at risk they are expected to depict in a more precise way the real value of an issuing firm (Beatty, 1989). A large part of the empirical evidence supports this negative relation between investment bank and auditors reputation with underpricing at the IPO (see, among others Carter and Manaster (1990) who analyse the role of underwriters reputation on underpricing and Beatty (1989) for a detailed description of the role of auditors). However, Spiess and Pettway (1997) find no evidence of a relation between investment bank reputation and underpricing. Habib and Ljungqvist (2001) find a positive relation between investment bank reputation and underpricing. Anyhow, they also provide an explanation for their result. They argue that the most reputable underwriters are hired by the companies whose values are harder to be determined. These firms are those who have the most to gain from the certification of a reputable underwriter. So, they are willing to pay larger fees to benefit from lower underpricing. Therefore, they assert that by accounting for the reasons behind the choice of the investment banker, the relation between investment bank reputation and underpricing turns negative, as expected.

### *The Role of Ambiguity.*

After having identified some of the possible signals that could be adopted by issuing firms to transfer private information to potential investors, some remarks are needed. First of all, using signals is costly. For instance, an excellent top management team may require higher compensation, board members with external directorships and relevant skills should be paid more and top-flight investment banks and audit firms will charge higher fees. Interpreting signals is also a costly process for signals recipients (Allen & Faulhaber, 1989) and this cost increases the more ambiguous are the signals (Park & Patel, 2015). For these reasons, it may be appropriate for an issuing firm to reduce at the lowest possible level the ambiguity of information presented in its prospectus. Even though a substantial part of information reported in IPO prospectuses is standardized, there is still discretion on what information about a firm to include and how to present them. This allows issuing firms to disclose information with a different level of clarity. Some studies (Beatty & Ritter, 1986; Park & Patel, 2015) affirm that the higher is the ambiguity – or the lower the clarity – of the information presented into the prospectus, the larger is the underpricing suffered by a firm. This is caused by the fact that investors are not able to assess the true value of an issuing firm in a reliable way, so they find it safer to value ambiguous firms as bad firms and this leads to larger initial returns.

Park and Patel (2015) assert that unambiguous information in a prospectus may also act as a signal, separating firms that are able to provide clear information from those that prefer to disclose information ambiguously. The separation is enforced by the fact that bad firms who provide false information to increase clarity may incur penalties when the information will prove to be wrong.

To sum up, an issuing firm should not only care about which signals to adopt to convey private information to market participants. It should also be careful to prepare an IPO prospectus that discloses information in the most clear and unambiguous way.

### *The Role of the Environment.*

When dealing with signalling strategies, a critical aspect to be considered is the environment in which signals are received. Signal recipients are boundedly rational decision makers who can interpret signals in different ways. The accuracy of their interpretation is affected by firm and environmental factors (Park & Patel, 2015). In particular, environmental uncertainty impacts on investors valuations (Lester et al., 2006). Environmental uncertainty hinders the accurate

prediction of future states and makes it difficult for managers to formulate and implement proper strategies. So, there are situations in which the signals received by potential investors can't be properly interpreted. As a consequence, an equilibrium in which good firms can be distinguished from bad firms may fail to emerge. Some of the environmental and firm-specific conditions that affect the ability of investors to assess accurately the value of IPO firms are related, among others, to the level of strategic conformity in the industry, the heterogeneity in the valuation of firms in an industry or to firm characteristics such as size and age.

The level of strategic conformity is critical for investors to evaluate accurately the value of a company (Park & Patel, 2015). The strategic conformity of a firm is assessed looking at the degree to which it conforms to strategic norms in the industry. If conformity is low, investors find it difficult to evaluate a firm accurately. This happens because they have access only to public information and they may find it hard to evaluate – from an external point of view – strategies that are dissimilar from those adopted by competitors in the industry. Strategies that do not conform to the norm have not been tested by other firms and investors may not feel comfortable in assessing their future outcomes. However, deviating from industry norms could not generate only bad results. New strategies may also have a large upside potential. This is particularly true for younger firms or those who operate in nascent markets. In this case, low strategic conformity could be helpful to serve new market niches and to redefine boundaries. Anyhow, it has been observed that conformance to industry norms is important for a firm to acquire legitimacy (Lester et al., 2006). In particular, in situations of high environmental uncertainty, firms are forced to imitate more established firms, thereby increasing their strategic conformity to industry rules (Lester et al., 2006).

The heterogeneity in firms valuation in a certain industry influences the assessment of firms by investors (Park & Patel, 2015). If heterogeneity is high, potential investors will have limited foresight in valuing issuing firms. In this situation, even firms that present prospectuses characterized by high ambiguity may not suffer large discounts since investors find difficult to discern which part of noise is due to industry-level factors and which to firm-specific factors. In any case, the use of signals by IPO firms in an industry with a great variance in firms valuation will unlikely result in an equilibrium characterized by the separation of high-quality and low-quality firms.

Firms size and age are two characteristics that are not under the direct control of management. Nevertheless, they are essential in assessing firm value. Size and age signal how established a



company is and they are important factors to determine firms' prospects. For these reasons, they could be considered as indicators of the uncertainty surrounding the IPO (Reber & Vencappa, 2016). Recent firms have a short operating history, thus investors can't observe their past financial and operating performance over many years (Reber & Vencappa, 2016). Small firms are also subject to greater probability of default and greater information asymmetry (Park & Patel, 2015). They lack legitimacy and information they provide is perceived as less credible by the market. In addition, they suffer limited media and analyst coverage. Given this uncertainty, IPO investors require price protection in the form of higher underpricing. However, Park and Patel (2015) assert that size is critical to explain higher initial returns not only for small firms but also for large firms, if they present ambiguous information. They claim that if the level of information asymmetry is high, even the uncertainty faced by investors is high. Given that the potential magnitude of losses for large firms is much higher than that of smaller firms, investors require a higher level of underpricing to be compensated for this risk. Being between these two extremes, medium-sized firms would enjoy lower levels of underpricing in case of ambiguous information into the prospectus. Although the explanation of the lack of legitimacy experienced by small firms may credibly affect investors' expectations and increase underpricing, it is difficult to figure out why investors should be more averse to losses of larger firms than of smaller firms. A loss is potentially faced by investors whether they own shares in small or large firms. The fact that the aggregate potential loss is broader for larger firms does not affect the extent of the loss borne by investors. Investors are affected by losses in proportion with the stake they own into the company. If they want to limit their exposure to the risk of single firms, they can limit the amount of their investment in that firm and diversify their investments.

The relationship between size and age of a firm and underpricing at the initial offering has been tested empirically many times. Firm size and age are included in several empirical models as variables to control for ex-ante uncertainty in an IPO (see among others, Certo et al. (2001), Lester et al. (2006) and Reber and Vencappa (2016)). The results of the empirical research report a decreasing level of underpricing as the size and the age of a firm increase, even if this relationship is rarely statistically significant (Certo et al., 2001; Reber & Vencappa, 2016). Park & Patel (2015) find evidence that support the hypothesis that medium-sized firms get the lowest levels of underpricing for high ambiguity firms. Chambers and Dimson (2009) analyse the phenomenon of underpricing on the London Stock Exchange on the long-run and they conclude that firm age is of limited significance in explaining underpricing considering the entire sample period. However, they report that the importance of size and age to explain first-day of trading

returns varies considering different time periods. Dell'Acqua, Etro, Teti and Murri (2015) find evidence that while size is key in explaining underpricing, firm age is not significant.

### 1.3. Insurance Against the Litigation Risk.

Not all the literature explains underpricing as caused by asymmetries of information among different agents.

The strand of literature illustrated in this section attributes part of the underpricing phenomenon to the will of issuers and underwriters to avoid litigation with investors (Tiniç, 1988; Lowry & Shu, 2002). This litigation-avoidance hypothesis affirms that large initial returns reduce the probability that an issuing firm will face a lawsuit. In addition, if a litigation takes place, the amount that plaintiffs could recover is lower the larger is the underpricing.

The effects of underpricing on lawsuit probability have been observed in the U.S. after the Securities Act of 1933 was approved<sup>12</sup> (Tiniç, 1988). The law imposes liability for material untruths or omissions in the IPO prospectus or into the registration statement filed with the SEC. The aim of this regulation is to provide relief to investors against those who distribute securities to the public with false or misleading information (Drake & Vetsuypens, 1993). Clearly, responsibility for material misstatements is not only of issuing firms but also of underwriters, auditors, directors in the board and all those who signed the registration statement<sup>13</sup> (Tiniç, 1988). For the purposes of this explanation, we could summarize the prescriptions of the U.S. Securities Act in this way (Drake & Vetsuypens, 1993): plaintiffs should be refunded if they took their investment decisions on the basis of untrue material information in the prospectus; the amount of the relief granted to investors is the difference between the offer price (or the price at which the security was bought in the secondary market) and the price of shares at the time of the lawsuit. Having this legislative framework in mind, it may be more clear how larger initial returns reduce the probability of a lawsuit. If unfavourable news negatively impact the share price of a firm, the larger was underpricing, the larger should be the price drop to make it convenient for investors to sue the firm. This happens because if the price increased substantially after the initial offering, the subsequent price decline should be very large to make the difference between offer price and market price to turn negative. If this difference is not negative enough, investors will not find it convenient to sue the issuer

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<sup>12</sup> The litigation-avoidance hypothesis originates from the provisions of the Securities Act of 1933. Even though it is US law, it may be argued that the same litigation-avoidance explanation of underpricing could be applied in countries with similar legislation.

<sup>13</sup> All the parties involved in the IPO are jointly and severally liable for the damage payments to plaintiffs.

since the amount they could recover is negligible and it may not cover the fees of lawyers. Instead, if investors find it convenient to take the issuer and underwriters to court, the difference between these two prices will be still lower than what it would have been if underpricing was lower. Therefore, the refund to be paid to investors will be smaller and it lets issuers and underwriters to pay less than what they would have paid if they underpriced less. So, underpricing could be perceived as a sort of insurance against future lawsuits. An insurance may be needed because potential liabilities emerging from future litigations could have serious financial consequences not only for the issuer but also for investment bankers (Tiniç, 1988). In addition, there are sizable indirect costs related to lawsuits (Lowry & Shu, 2002). For instance, these costs are the reputation costs for the IPO firm and the underwriter, the fees paid to lawyers and the opportunity cost of the management time dedicated to the lawsuit instead of operating activities.

Drake and Vetsuypens (1993) perform an empirical analysis based on a sample of 93 IPOs of firms sued under the Federal Securities Act between 1969 and 1990. However, they do not find evidence supporting the insurance role of underpricing. They find no correlation between the returns of the first day of trading and the probability of a lawsuit. They also argue that if underpricing is a way to insure against future litigations, it is an expensive insurance. They affirm that considering the magnitude of liabilities emerging from a lawsuit, the probability to be sued should be very high to justify underpricing as an insurance against the litigation risk. They suggest that a careful due diligence performed by underwriters and auditors is a much better tool to reduce the risk of a lawsuit. Lowry and Shu (2002) dismiss the Drake and Vetsuypens (1993) analysis arguing that it is affected by endogeneity. Instead, their empirical analysis – based on a sample of 1841 IPOs on U.S. markets (of which 84 sued under the Securities Act) – supports the insurance role of underpricing. Support to this theory is also provided by Tiniç<sup>14</sup> (1988). However, both Drake and Vetsuypens (1993) and Lowry and Shu (2002) observe that sued firms are generally quite large. They argue that this is explained by the ‘deep pocket’ theory. In practice, since the fixed costs of litigations are quite high, plaintiffs initiate a lawsuit only if they expect the damage recovery to be sufficiently large. So, the incentives to sue small issues are low since the benefits may not justify the costs. Instead, the benefits to sue large firms are larger because they have ‘deep pockets’ and they will likely have sufficient funds to meet damage payments. In addition, given that lawyers receive a percentage

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<sup>14</sup> He bases his empirical analysis on two samples. One of 70 IPOs issued during 1923 to 1930, therefore before the approval of the 1933 Securities Act. The other sample consist of 134 IPOs issued from 1966 to 1971, when the Securities Act was yet in force.

of the refunds, they have more incentives to mount an aggressive defence if the amount to be recovered is high.

To summarize, the costs of facing a litigation for material misstatements and omissions is quite high. To reduce the risk of facing a lawsuit, investment banks should perform a careful due diligence. In addition, issuers and underwriters could agree to price the issue below the expected market value of the securities. The underpricing resulting from this choice has the effect to reduce the probability of being sued and to limit the damage refund to be paid to investors in case of litigation.

#### 1.4. Aftermarket Trading Activity.

An alternative explanation for the abnormal returns observed in the first day of trading of new issues is provided by Aggarwal and Rivoli (1990) and Ritter (1991). Contrary to the predominant theory, they argue that high initial returns are not caused by new issues offered at a discount to IPO investors. They affirm that new issues are subject to first-day abnormal returns because they are not priced at the intrinsic value in the early aftermarket. Therefore, in this case we could not refer to underpricing. Issues are priced quite correctly when they are offered. Instead, high initial returns are due to inefficiencies in the early aftermarket. So, in this situation it is better to refer to abnormal initial returns rather than underpricing.

The explanation identified by this strand of literature for abnormal first-day returns is that the early IPO aftermarket is characterized by informational inefficiencies that lead investors to overvalue new issues. This explanation supports the hypothesis that IPOs are subject to mean reverting fads. Aggarwal and Rivoli (1990, p.47) define fads as “temporary overvaluations caused by over-optimism on the part of investors”. They also suggest that the IPO market is prone to be affected by fads for several reasons. First, they argue that fads are likely to occur if intrinsic values are difficult to be estimated because of great uncertainty. Second, fads take place if rationality is weakened, as in case of over-optimism. Over-optimism results in high levels of noise trading. Third, fads may occur if prices are volatile because of the trading of more speculative investors, as IPO investors are.

Empirical evidence<sup>15</sup> shows that most of price adjustments take place in the first trading day (Aggarwal & Rivoli, 1990). The fads theory is tested empirically observing the long-term after-

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<sup>15</sup> The empirical evidence reported in this section refers to Aggarwal and Rivoli (1990), Ritter (1991) and Ellis (2006).

Aggarwal and Rivoli (1990) analyse empirically the phenomenon of fads in IPOs using a sample of 1598 initial offerings in U.S. markets between 1977 and 1987. Ritter (1991) relies on a sample of 1526 U.S. IPOs in the period 1975-1984 to test fads and over-optimism in the new issues market. Ellis (2006) performs an analysis aimed at

market price behaviour of new issues. It has been observed that while first-day returns greatly over-perform the market, the long-term returns significantly under-perform it. This is considered consistent with the fads explanation. In the first trading day, over-optimistic investors drive the market prices of new issues over the intrinsic value. In the following months, fads disappear, so the market becomes efficient again and prices revert to the intrinsic value of firms. The aftermarket performance of new issues is found to be affected by specific factors (Ritter, 1991). First, issues with high initial returns tend to experience the worst aftermarket performance. This phenomenon is particularly relevant for small firms, who experience larger first-day price run-ups. Second, average initial returns and the following price performance vary substantially across industries. Third, the after-market performance of IPOs varies significantly among different years of issuance. The evidence suggests that the long-run performance is more negative for issues occurred in “hot periods” than for issues that took place in “cold periods”. In hot periods, much more companies go public. Probably, they take this decision because of the willingness of investors – who are driven by over-optimism – to pay higher multiples. The high level of optimism leads to higher initial returns. Subsequently, the negative after-market performance results from investors’ realization that firms cash flows are lower than expected. Fourth, a strong negative monotone relationship between age and both initial returns and poor after-market performance is observed. The result is that young small firms that go public in hot periods in certain industries experience the highest levels of initial returns and of negative long-term performance.

Aggarwal and Rivoli (1990) observe that the trade volume in the early aftermarket is huge if compared with average volumes. It has been documented that the volume of shares traded in the first days is equivalent to more than 70% of shares offered at the IPO (Ellis, 2006). In addition, Ellis (2006) argues that among the first-days investors there could be a substantial presence of flippers and day traders. Their presence does not help to stabilize the market price of an issue (Aggarwal & Rivoli, 1990). Therefore, they may increase “noise trading”, creating the conditions for the development of fads.

In summary, abnormal initial returns may be caused by mean-reverting fads and investors’ over-optimism that drive the first-day of trading price away from the intrinsic value. In addition, if this theory proves to be the main reason of underpricing, it has important implications for finance professionals. Investment bankers may not be accused of incorrectly pricing new issues. Issuers may perceive no more abnormal initial returns as money left on the table and investors may find profitable opportunities in short-selling.

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identifying the classes of traders who trade in the early after-market. She relies on a sample of 311 Nasdaq IPOs issued between October 1996 and June 1997 for which she has detailed transaction data.

## 1.5. Price Stabilization.

Mean-reverting fads and over-optimistic investors are not the only theories that explain abnormal initial returns as caused by aftermarket trading. Even underwriters influence the first days returns with their own trading. Underwriters may trade in the first few weeks after the offering – and in particular in the first day – to support the price of the IPOs they manage (Aggarwal, 2000; Asquith, Jones, & Kieschnick, 1998; Ellis, Michaely, & O'Hara, 2000). Price support for new issues is intended to stabilize the price in the early aftermarket. It facilitates the distribution of the securities (Ellis et al., 2000) and it may decrease the probability for an underwriter to be sued for poorly performing issues (Asquith et al., 1998).

Underwriters price support influences first-day IPO returns by hiding the real initial returns distribution (Asquith et al., 1998) and by giving the spurious impression that abnormal returns are a persistent characteristic of IPOs (Reber & Vencappa, 2016). This happens because price support is provided by underwriters by actively trading in the early aftermarket. So, the closing price on the first-day is not only the result of investors' trading. The closing price is also affected by the trades of the underwriter.

The aftermarket activities used by underwriters to support the price of IPOs in the first few weeks are essentially three (Aggarwal, 2000):

- *Pure stabilization.* Underwriters post a stabilizing bid to buy shares at a price that is no higher than the offer price. This activity is quite visible and risky. The risk for underwriters is to buy a disproportionately high number of shares, thus facing an increasing inventory risk. Large inventories of lead underwriters are observed in the early aftermarket by Ellis et al. (2000) and Ellis (2006). However, they notice that after accounting for the over-allotment option and short-positions, underwriters carry very little inventories.
- *Aftermarket short covering.* Underwriters may decide to sell more shares than the amount originally offered. They can do this by taking a short position prior to the issuance. After the IPO, they can cover this short-position in two ways. In offerings with high demand – hot issues – they can exercise the overallotment or “green-shoe” option. This option allows the underwriting syndicate to sell additional shares up to a maximum of fifteen percent more than the original offer. The option could be exercised after the issue and before thirty calendar days from the IPO. So, underwriters can cover their short-position by exercising the green-shoe option. Instead, if the demand for the issue

is weak, prices will decline. This happens in cold-issues. In this situation, underwriters can easily cover their short-position by buying shares in the secondary market.

- *Penalty bids.* Underwriters may penalize those members of the syndicate who allocate shares to “flippers” by taking away their selling concession. Flippers are those investors who receive an allocation of shares at the IPO and swiftly sell that allocation in the secondary market in the first few days of trading. Flippers are considered as one of the main responsables of the high trading volume that characterize new issues in the first day. In case of hot issues, underwriters welcome flipping and the trading commissions that flippers generate. However in case of weak demand, the selling activity of flippers puts under downward pressure the market price, thus underwriters should intervene to stabilize it.

The first two of these activities are aimed at supporting the price by stimulating demand for the issue. The last activity supports the price by limiting supply. Clearly, underwriters may use a combination of these activities to stabilize prices. The underwriter begins to delineate the strategy to be adopted to stabilize the price during the road show. In this phase, it gets indications of interest from potential investors. Investors’ interest is useful for the underwriter to assess the demand for the IPO. If the demand is expected to be low, the lead underwriter may have to support the price in the aftermarket. Before the IPO, the underwriter has to set its short position and to define the penalty bid. If the demand is weak, the short position will be covered by buying the shares sold by flippers. The aim of this activity is to absorb the selling pressure of flippers with open-market purchases by the lead underwriter, who buys the shares to cover its short position. The effectiveness of the price support depends on the size of the short position of the underwriter with respect to the volume of flipping. If the short position is not large enough to contrast the selloff of flippers, the price will plummet unless the underwriter takes a long-position. In the latter case, the underwriter would accumulate shares of the new issue and the inventory risk that it faces increases. The underwriter may also limit flipping by exercising the penalty bid.

Instead, if the demand for the IPO is high, flippers will not cause the price to drop and the underwriter will cover its short position – up to fifteen percent – by exercising the overallotment option.

The empirical analysis of Aggarwal (2000)<sup>16</sup> and Ellis et al. (2000)<sup>17</sup> confirm the underwriter role to support prices of new issues. However, Aggarwal (2000) find no evidence that pure stabilization activities are carried out by lead underwriters. This is probably due to the high visibility and to the large potential costs of this practice.

Ellis et al. (2000) affirm that price stabilization is performed only by the lead underwriter, who acts as a market maker. All the other investment banks part of the syndicate are not found to play an active role in supporting prices.

Another interesting point analysed both by Aggarwal (2000) and Ellis et al. (2000) is the profitability of price stabilization. Aggarwal (2000) argues that the costs of short covering are minimal. Ellis et al. (2000) claim that price support practices could even be profitable. However, the profits that underwriters generate with these activities are negligible if compared to the underwriting fees, which remain the main profit source for underwriters.

In summary, underwriters actively trade in the first few weeks to support the price of new issues. Therefore, their trading influences the first-day returns of IPOs. For the purpose of analysing the factors influencing underpricing, the effect of price stabilization is to blur the distribution of returns that reflects the valuation of IPO investors. This happens because underwriters trading is not motivated by long-term investment decisions. In addition, price support activities contribute to explain why the share of new issues characterized by negative first-day returns is so low. Anyhow, underwriters trading is essential in weak issues to counterbalance the negative effects of flippers. In doing so, underwriters may reduce the risk faced by early investors. Aggarwal (2000) argues that investment banks' reputation for price support makes IPOs underwritten by reputable banks to be considered as less-likely to be overpriced. For these reasons, investors may prefer to invest in IPOs in which price support is expected.

## 1.6. Ownership and Control.

The separation between ownership and control is essential for managing a firm in the best way. In particular, the distinction between shareholders and managers becomes even more relevant for firms that are issuing shares in the capital markets for the first time. The listing process requires the adoption of defined governance structures and control systems that may be

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<sup>16</sup> The evidence of Aggarwal (2000) is based on a sample of 114 IPOs issued in U.S. markets between May and July 1997. For each of these IPOs, the author has detailed records on aftermarket short covering transactions.

<sup>17</sup> Ellis et al. (2000) draw their analysis on a sample of 306 Nasdaq IPOs issued during the period September 1996-July 1997 for which they obtained data on transactions from a proprietary database.



implemented by issuing firms specifically for the IPO. However, the separation between shareholders and managers creates an agency problem. The stockholders are outside the firm and they assess management conduct only by evaluating the limited amount of information they are provided. Managers can take advantage of this situation to extract benefits for themselves by taking decisions that are in their own interest but not in the interest of the firm.

The theories developed in this strand of literature (Booth & Chua, 1996; Brennan & Franks, 1997; Stoughton & Zechner, 1998) explain underpricing as a way to create oversubscription. In turn, oversubscription creates the conditions for strategic rationing. In case rationing is applied, the issuer together with the underwriter may decide to allocate shares to preferred investors. The result is that the post-IPO shareholding base depends on the choices of pre-IPO investors and directors. So, these theories consider underpricing as an effective tool to achieve the desired shareholding structure after the IPO.

The effect of strategic rationing is debated. Brennan and Franks (1997) argue that underpricing fosters the agency problem between owners and management, resulting in a decrease in firm value. Instead, Stoughton and Zechner (1998) claim that rationing favours large investors who are able to monitor the management conduct, thereby promoting an increase in firm value.

The study of Brennan and Franks (1997) relies on the so called “reduced monitoring hypothesis”. According to them, incumbent managers and directors want to favour the highest possible level of dispersion of ownership after the IPO. This objective is achieved by strategically rationing an oversubscribed issue. Oversubscription is fostered by a higher level of underpricing. Underpricing is positively related with oversubscription since investors are attracted by abnormal initial returns. Once investors subscribe for more shares than those offered, rationing takes place. In this case the issuer and the underwriter could decide to allocate shares to small investors as more as possible, hence discriminating large shareholders. The effect of strategic rationing is to obtain a highly-dispersed ownership post-IPO.

Brennan and Franks (1997) associate to high shareholders dispersion two important benefits for incumbent management. First, since new shareholders hold just a small stake in the firm’s equity, they have not the incentive to monitor the management. Monitoring the management conduct is a costly activity for shareholders. In addition, it is also subject to free-riding. The costs of monitoring are borne only by the shareholder who performs it. Instead, the benefits – namely higher efficiency in management decisions – are enjoyed by all the others. Therefore, small shareholders do not find convenient to monitor the management conduct since the cost of monitoring is higher than the benefits that it could generate. Managers benefit from low

monitoring since they could seek their own objectives, even if they are in contrast with the interests of shareholders. However, the opportunistic behaviour of management may result in a decrease in firm value. Second, higher dispersion prevents investors to be allocated a large amount of shares. Hence, investors may find it not profitable to assemble large blocks of shares in the secondary market if the ownership structure is dispersed and shares are publicly traded. The result is that dispersion prevents investors to acquire large ownerships in a firm, thereby limiting the risk for a firm to be subject to an hostile takeover. In this situation, current management is not forced to adopt a more efficient behaviour since the threat of takeover is low enough that it does not incentivize management to increase the firm value.

The reduced monitoring and the lower risk of being subject to an hostile takeover are not the only reasons that justify the adoption of higher underpricing to stimulate investors demand and ration shares, discriminating larger applicants. Booth and Chua (1996) claim that underpricing could be used strategically to obtain broader dispersion of ownership after the IPO and to favour the creation of a liquid secondary market for the underpriced shares. They argue that underpricing may be used to promote<sup>18</sup> an issue, boosting demand and resulting in oversubscription. In this case, investors are not only attracted by the abnormal returns granted by underpriced issues. They are also attracted by the compensation offered by underpricing for the costly activities of information acquisition and processing they carried out<sup>19</sup>. Once oversubscription takes place, rationing is applied and it favours smaller investors. This discrimination results in a broadly dispersed ownership. However, opposed to Brennan and Franks (1997), a dispersed ownership has the effect to facilitate the development of a liquid secondary-market. Investors positively perceive the presence of a liquid aftermarket and they increase their valuation of the issuing firm. In summary, according to Booth and Chua (1996) underpricing is a powerful tool to promote an issue and to obtain a highly dispersed ownership through strategic rationing. The effect of a dispersed shareholders base is to increase liquidity in the secondary market, thereby increasing investors' valuation of the firm. So, Booth and Chua (1996) argue that an issuer may achieve a certain degree of ownership dispersion and secondary market liquidity by choosing the appropriate level of underpricing.

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<sup>18</sup> Promotion is useful to attract investors and underpricing may not be the only way to promote an issue. Habib and Ljungqvist (2001) claim that even the choice of the underwriter, auditors and lawyers as well as the costs of the road-show and of listing are good promotion tools. They also argue that underpricing and alternative promotion activities are in a trade-off since they are both costly. You just need to decide whether you prefer to bear the cost of underpricing or that of other promotion activities.

<sup>19</sup> Booth and Chua (1996) assume that only those investors who collect and analyse information on new issues – namely informed investors – become part of the potential-investor base.

A theory opposed to that of Brennan and Franks (1997) is the one developed by Stoughton and Zechner (1998). Similarly to previous studies, they argue that underpricing is an instrument that could be used in an IPO to obtain the desired shareholding structure after the issuance. However, they argue that in case of oversubscription and strategic rationing, the issuer will prefer to allocate shares to large shareholders instead of favouring the smaller ones. Large shareholders are considered to be institutional investors who have developed procedures to monitor management activities and influence their behaviour. Small shareholders may not be able to observe the management conduct or given their limited investment in the firm, it may be not profitable for them to engage in monitoring activities. Therefore, large investors are preferred in case of strategic rationing because their monitoring activities would ensure that management decisions are taken in the best interest of shareholders. The realignment of interests caused by the monitoring activities of large investors determines an increase in the value of a firm. This value increase is captured not only by large investors but also by small shareholders, who free-ride on the monitoring activities of institutional investors and enjoy the positive externality that these activities create. In summary, Stoughton and Zechner (1998) argue that underpricing and strategic rationing are positively correlated. When strategic rationing takes place, it favours large investors who are better equipped to monitor management behaviour. The benefits of monitoring are enjoyed by all shareholders, even smaller ones. Considering their reasoning, they claim that underpricing should be higher for those companies that have short operating history or that operate in growing industries, as high-tech companies. This because these firms exhibit a large benefit-to-cost ratio for monitoring activities, so large investors should be part of the post-IPO ownership structure.

In conclusion, despite these three theories are all part of the same strand of literature, they come up with opposite results. In particular, the conclusions of Brennan and Franks (1997) and Stoughton and Zechner (1998) are completely opposed. Brennan and Franks (1997) find empirical support for their theory. They base their empirical analysis on a sample of 43 IPOs issued in UK between 1986 and 1989. Instead, Stoughton and Zechner (1998) only derive some empirical implications from their theory to be tested in future studies.

### 1.7. Behavioural Theories.

This strand of literature is more recent than the previous ones (Ljungqvist, 2007). The theories part of this strand explain underpricing as an effect of the behaviour of different agents involved in the IPO. The informational cascades of Welch (1992) argue that underpricing is due to the

irrational investment decisions of IPO investors. Ljungqvist, Nanda and Singh (2006) attribute underpricing to the overoptimistic valuations of sentiment investors. Instead, Loughran and Ritter (2002) claim that underpricing is caused by pre-issue shareholders who are subject to behavioural biases and so they fail to put pressure on underwriters to reduce underpricing.

All these theories are characterized by the fact that they share a common assumption. They all consider that some of the agents involved in the IPO process are not fully rational. So, behavioural theories claim that underpricing is caused by specific features of the irrational behaviour of issuers and investors.

In the following sections, behavioural theories are presented in detail.

#### 1.7.1. Informational Cascades.

The theory of “informational cascades” (Welch, 1992) posits an explanation of underpricing based on a sort of irrational behaviour of individual investors. Informational cascades may develop in IPOs where distribution channels of investment banks are limited, so it takes time for them to approach investors. In this situation, investors take their investment decisions sequentially. Therefore, later investors can observe how well an issue has sold to date or at least, how it has sold relative to previous offerings of the same underwriter. Thus, later investors are able to infer information from early investors, even though they can’t observe the signals that these investors hold. In this situation, Welch (1992) argues that investors approached later ignore the information they have about the issuing firm and take their investment decision relying entirely on the decisions of early investors. So, the bid of later investors depends entirely on the bid of investors approached earlier. The result is a cascade of information. Successful initial sales are interpreted by subsequent investors as an evidence that previous investors had favourable information about the offering. This gives to later investors the incentive to bid, regardless of the information they possess. Instead if initial sales are disappointing, later investors are discouraged to invest, no matter the information they own. Information cascades result in demand for offerings that either snowballs or remains low. Therefore, it is clear that early investors are key to determine the success or the failure of an offering. If they bid, all subsequent investors will bid. If they don’t, all other investors will abstain from bidding. In order to make an IPO to succeed, it turns out to be fundamental for issuers to convince early investors to bid. The incentive to invest for early investors is provided by the underpricing. Since informational cascades give market power to early investors, they can demand higher underpricing to invest and to trigger a positive cascade. In this way, underpricing could be explained by informational cascades.

Informational cascades originate from the investors' behaviour that may not be completely rational. In this sense, the market ability to aggregate information and to price correctly may not be respected. However, cascades are not inevitable (Ljungqvist, 2007). If investors can't observe the sales performance of an offering or if they can communicate freely and observe the entire distribution of signals, cascades will not develop.

### 1.7.2. Investors Sentiment.

Inside the strand of behavioural theories there is a model that explains underpricing as an issuer's response to the presence of sentiment investors. These investors are of interest because they tend to affect the stock price. The effect on prices of sentiment investors may be quite large for IPOs. This happens because issuing firms are "young, immature, and relatively informationally opaque and hence hard to value" (Ljungqvist, 2007, p. 412).

Ljungqvist, Nanda and Singh (2006) are the first to model an IPO firm optimal response to the presence of sentiment investors. They argue that the demand side of the IPO market is made of two types of investors. One type is that of sentiment investors. These investors are quite small, unsophisticated and they are prone to episodes of optimistic or pessimistic sentiment about the stock market. Sentiment originates from the inability to discern noise from relevant information and this results in incorrect beliefs about the fundamental value of a firm. The other type of investors is that of "rational". These investors are able to form beliefs about a firm's value that correspond to the fundamental value of the firm. Institutional investors can be regarded as being part of this category. It should be highlighted that this model does not rely on private information or information asymmetry. The two types of investors know each others' beliefs and still agree to disagree on the valuation of issuing firms (Ljungqvist et al., 2006).

In case sentiment investors are overoptimistic, the objective of the issuer is to capture most of the excess valuation of these investors. To do this, Ljungqvist et al. (2006) claim that issuers should not flood the market with shares, since this would depress the price. Instead, issuers should sell their shares in stages to capture most of the surplus of sentiment investors. However, this strategy – known as "staggered sale" – is prohibited by the law. In order to circumvent this limitation, underwriters may allocate shares to "regular" – or institutional – investors. Then, regulars will sell shares gradually to sentiment investors who arrive over time. Regulars preserve stock prices by keeping IPO stocks in their inventories and restricting shares availability in the market. However, this technique increases the inventory risk borne by regular

investors. Eventually, nature reveals to all investors the fundamental value of a firm and when this happens the stock price of this firm falls. In this situation, institutional investors who still hold IPO shares in their inventories suffer from the price drop. In the model of Ljungqvist et al. (2006), the role of underpricing is that to compensate regular investors for the inventory risk they bear. Issuers still benefit from using this strategy since they can set an offer price that is higher than would otherwise be the case. An excessive offer price can be coupled with higher underpricing because sentiment investors are willing to pay high prices. So, the losses suffered by sentiment investors are transformed into gains for issuers and regulars.

A weakness of this strategy is that if regular investors are more than one, they have the incentive to cheat and to sell all their IPO shares in the early aftermarket. In this way, regulars can minimize their inventory risk by selling shares in a very short period to sentiment investors at high prices. If all regular investors cheat, shares are no more sold in stages and the model of Ljungqvist et al. (2006) does not work. For the inventory-holding strategy to work effectively, there should be a dominant investor or the underwriter should be able to impose cooperation among regular investors by offering inducements or by threatening punishments.

Another weakness of the model of Ljungqvist et al. (2006) is that if the price exceeds the intrinsic value of shares by a large amount, informed traders may be attracted by this profitable opportunity and they may short-sell the overvalued shares. If short-selling takes place, the stock price declines and both sentiment and regular investors suffer losses. Therefore, in case of short-selling the inventory risk borne by regular investors is excessive and they would not apply the staggered sale strategy. However, as Ljungqvist et al. (2006) highlight, short-selling is quite rare in this situation. Short-sellers would have to borrow shares from owner-managers or regulars, who are the only investors with a long position. Owners-managers can't lend shares due to the lock-up provision and regulars do not have the incentive to lend stocks. Therefore, short-sellers would profit from the presence of sentiment investors in an IPO. However, they can't borrow shares from other investors and short-selling becomes impossible.

Dorn (2009) provides empirical evidence that supports the existence of sentiment investors in the market for initial offerings. He analyses the proprietary daily records of the transactions undertaken by the customers of a large retail broker in the pre-IPO German market. The transactions concern 91 IPOs on the Frankfurt Stock Exchange between August 1999 and May 2000. The author observes that sentiment investors participate at the pre-IPO market. When sentiments bid, they tend to pay a sizeable premium relative to prices in the immediate after-market. In addition, overpaid shares in the pre-IPO market experience a large demand by retail investors even in the early after-market. However, in the long-run these shares tend to under-

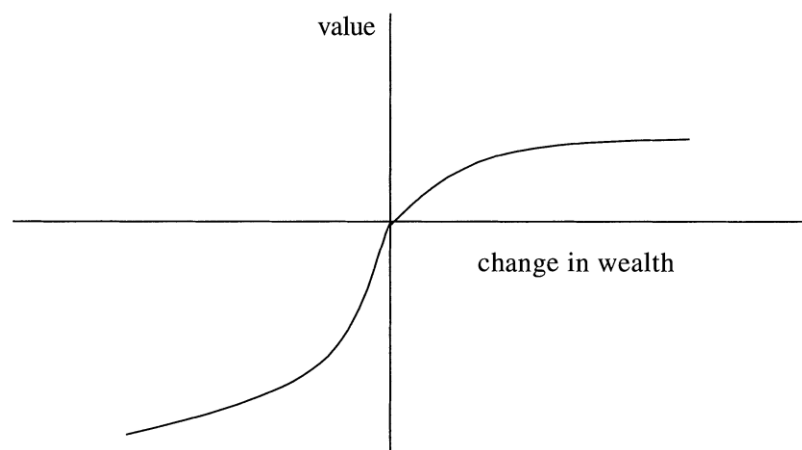
perform in respect to both the whole market and the group of IPOs ignored by sentiment investors.

### 1.7.3. Prospect Theory and Mental Accounting.

Another theory in this strand of literature explains underpricing as emerging from behavioural biases of decision makers in an issuing firm, rather than biases in the behaviour of investors. This explanation of underpricing – called “prospect theory” – is developed by Loughran and Ritter (2002). They wonder why issuers don’t get upset about leaving money on the table at the IPO. They come up with a response based on the limited rationality of the mental accounting process that issuers adopt in recognizing gains and losses.

The key point is that in an IPO, issuers are subject to two opposed wealth changes. They suffer a negative wealth change due to underpricing. Underpricing implies a wealth transfer from issuers to new shareholders in two ways. First, given the abnormal price run-up of the IPO shares in the first day, issuers could have offered shares at a higher price, thereby raising more proceeds. Second, to raise a certain amount of money, less shares could be offered the higher is the offering price. If the IPO suffers underpricing, it means that the offer price may have been higher and the amount of shares to be offered would have been lower, thereby resulting in lower dilution for the pre-issue shareholders.

The positive wealth change experienced by issuers comes from the good news that they are much richer than they thought to be. Since stocks appreciate in the first day of trading, pre-issue shareholders discover that the shares they retained are now much more valuable. Before the IPO, they value their stocks at the offer price. After the IPO, they find that the shares they still hold are priced more than they thought and therefore they feel wealthier. Clearly, the net wealth change depends on the number of shares sold and retained at the IPO.



**Figure 1. Value function of a pre-IPO shareholder.** It represents an individual’s preference over gains and losses. Source: Loughran and Ritter (2002, p.422).

Loughran and Ritter (2002) argue that pre-IPO shareholders value the net wealth-change they experience in a way that is not completely rational and this explains why they do not get upset about leaving money on the table. Pre-issue shareholders value gains and losses using their own value function, represented in figure 1.

This value function is similar to an utility function, but it is defined in terms of gains and losses instead of levels. The characteristics of this value function are that it is concave in gains and convex in losses and that it is steeper for losses than for gains. The latter characteristic suggests that pre-issue shareholders are loss-averse. The prospect theory of Loughran and Ritter (2002) affirms that an individual who faces two related outcomes can either treat them separately (segregation) or that he can integrate the two outcomes by treating them as one. In case an individual faces two gains, he segregates them because of the concavity of the value function for gains. Instead, if he faces two losses he prefers to integrate them, given the convexity of the function. In case of a gain and a loss, an individual decides whether to integrate or separate them considering their magnitudes. The result is that a pre-issue shareholder, given his value function can feel good about the outcome coming from the integration of the loss (underpricing and dilution) with the gain (increase in value of retained shares).

Clearly, this result is not fully rational. If issuers value the opportunity cost of underpricing stand-alone they would be much more resistant to severe underpricing and they would put pressure on underwriters to reduce it. However, given that underpricing comes bundled with the news of a wealth increase, pre-IPO shareholders are much less resistant to severe underpricing. So, given the typical mental accounting process of individuals explained by the prospect theory, pre-issue shareholders do not end-up with the best outcome they could have achieved.

On the other hand, underwriters exploit the mental accounting processes of their clients to increase their profits. To do so they can't increase their direct fees since their clients would be reluctant to pay more. Instead, underwriters may consider to reduce the offer price of their client's IPOs, thereby increasing underpricing. The negative effect of this choice for the underwriters is that they reduce part of the direct fees they receive since these fees are computed as a percentage of the IPO proceeds. However, they benefit from lowering the offer price in two ways. First, they reduce their marketing costs since it is easier for underwriters to find buyers for an IPO. Second, investors would engage in rent-seeking behaviour to be allocated a share of the offering. Rent-seeking means that they trade with the brokerage division of the underwriter and that they overpay for commissions. In this way, underwriters increase their revenue. Clearly, increasing the level of underpricing is a much less transparent way to raise profits for underwriters than increasing direct fees. However, given the lower transparency and



the positive perception of issuers because of their limited mental accounting process, underpricing is an effective tool for underwriters to raise their gains from managing an IPO.

Investor's mental accounting and the prospect theory are not easy to be tested empirically because they involve the observation of the behaviour and of the mental processes of individuals. Nevertheless, there are some authors (Ljungqvist & Wilhelm, 2005; Lim, 2006) who verify empirically these matters, overcoming the limit of observing individuals' behaviour with the use of proxies.

Lim (2006) provides evidence that individuals do use the mental accounting process explained by Loughran and Ritter (2002) in valuing different outcomes. She uses a proprietary data-set containing the daily trading records of the customers of a large U.S. discount broker from January 1991 to November 1996. She finds evidence that investors prefer to bundle sales of losers – shares that are trading below their purchase price – on the same day instead of selling winners in bundle. These facts suggest that it is easier for traders to integrate losses if they sell losers in group while they prefer to sell winners on different days to segregate them. This confirms the mental accounting bias of investors in recognizing gains and losses, as described by Loughran and Ritter (2002). Even though Lim (2006) refers to traders in her research, she tests a behaviour that is typical of individuals, so her results may be extended to explain the behaviour of pre-IPO shareholders.

The prospect theory is tested empirically by Ljungqvist and Wilhelm (2005). They test whether CEO's satisfaction for an IPO influences the retention of the IPO underwriter even for the first seasoned equity offering. Their work relies on a sample of 1203 seasoned issues occurred before September 2003 of firms that went public in the U.S. between January 1993 and December 2000. They develop a proxy of CEO satisfaction for an IPO based on the wealth change faced by the CEO at the initial offering. This proxy is used as a behavioural measure of the IPO decision-maker satisfaction with the underwriter. Ljungqvist and Wilhelm (2005) find that if a CEO is satisfied, he is less likely to switch the underwriter at a later seasoned offering. Instead, if a CEO is not content with the underwriter at the IPO he will likely change the lead manager at a subsequent seasoned issue. In addition, in case of satisfaction, the underwriter is able to exploit the behavioural biases of the CEOs by extracting higher fees for subsequent transactions.

In summary, the studies of Lim (2006) and Ljungqvist and Wilhelm (2005) provide evidence that individuals adopt a non-rational mental accounting process in valuing gains and losses and that IPO firms take decisions that are consistent with a behavioural measure of the perception of the initial issue outcome (Ljungqvist, 2007).



## 2. UNDERPRICING VARIATION.

A review of the empirical literature on underpricing reveals that IPO markets are characterized by two interesting patterns. First, average underpricing levels fluctuate over time, even in the same market. Second, average initial returns vary across countries. These phenomena are observable in table 1. In this table, the underpricing levels reported by several academic studies are presented. Underpricing is reported as raw initial return and/or as market-adjusted initial return, depending on the method used in each research to compute underpricing<sup>20</sup>. It could be

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<sup>20</sup> Underpricing is generally defined as the price increase from the offer price of IPO shares in the first day of trading, expressed in percentage terms.

Anyhow as highlighted in table 1, the extant literature proposes two different methods to compute underpricing. The first one is the most used and it calculates underpricing as a raw initial return. According to this method, the underpricing experienced by a specific IPO firm is defined as

$$UP = RIR = \frac{P_1 - OP}{OP} * 100$$

Where:

- $UP$  is the underpricing of a specific IPO;
- $RIR$  stands for Raw Initial Returns. In this model underpricing is exactly equal to  $RIR$ ;
- $P_1$  is the first-day closing price of the IPO shares. Some authors (Beatty & Ritter, 1986; Drake & Vetsuypens, 1993) refer to  $P_1$  as the bid price at the end of the first trading day.
- $OP$  is the offer price of the IPO shares. It is the price at which shares were initially sold to investors.

This underpricing formula is the one adopted by most researchers and it is used, among others, by Beatty and Ritter (1986), Filatotchev and Bishop (2002) and Francis et al. (2010).

The second method used in the literature (Aggarwal & Rivoli, 1990; Aggarwal, 2000; Dell'Acqua, Etro, Teti, & Murri, 2015) to compute underpricing takes into account market movements in the first day of trading. This is motivated by the fact that price run-ups in the first trading day are not only caused by underpricing but also by the volatility of markets. So, this method requires to adjust raw initial returns for the returns of the market in the same period. Therefore, the formula of the market-adjusted initial returns is

$$UP = MIR = \frac{P_1 - OP}{OP} * 100 - R_m$$

Where:

- $MIR$  stands for market-adjusted initial returns;
- $R_m$  is the one-day market return. Market returns are approximated with the returns of an appropriate index.

A criticality of this method is that it compares the returns of IPOs with those of the market, thereby assuming they have the same systematic risk. However, Aggarwal and Rivoli (1990) argue that the betas of IPOs are generally larger than one, so the systematic risk of new offerings is higher than that of the market.

A limited number of studies do not compute underpricing on the first trading day but on a longer period. For instance, Carter and Manaster (1990) and Cohen and Dean (2005) compute market-adjusted initial returns on a timespan of two weeks, therefore larger than the one day usually employed to compute underpricing. However, Ljungqvist (2007) claims that calculating underpricing on a larger timespan typically makes little difference. This is confirmed by Aggarwal and Rivoli (1990) who report that most of price adjustment takes place on the first trading day. Anyhow, in case underpricing is computed on larger periods the formulas presented by these models should be adjusted to take into account the dividends possibly paid by the firm, as proposed by Stoll and Curley (1970). Therefore, the underpricing formulas become

observed that average initial returns of IPOs in markets of the same country vary from a time period to another. For instance, underpricing in U.S. markets was on average 22.1% between 1975 and 1984, it dwindled in the following years reaching an average of 10% over the period 1987-1991 and it increased to an average of 35.7% at the end of the nineties. Similar fluctuations are observable in other countries.

Table 1 also provides evidence of cross-country variation of underpricing. In particular, it could be observed the stunning difference of average initial returns between some western and emerging markets. For instance, in the eighties average underpricing in advanced economies was approximately in the range of values between 10% (U.S. 1987-91) and 16% (U.K. 1985-88) while in Brazil was 79% and in China reached the astonishing level of 949% (1987-95) for domestic shares traded in Shanghai and Shenzhen and reserved to Chinese nationals.

Table 1 also highlights that the average underpricing of initial offerings that take place in European second markets is generally higher than that registered for IPOs issued in all the market segments.

Considering the underpricing variation over time and across countries it is possible that the studies reviewed in the previous chapter which focus on specific countries and periods have missed some of the determinants of underpricing. In particular, there could be time-specific and country-specific factors that influence underpricing over and above issue and firm specific factors. In fact, some researchers have studied the causes of underpricing variation. Those who studied the variability of underpricing over time observe that specific factors may have come into play and caused average underpricing to peak in some periods with respect to others. The hypotheses of these authors are analysed in detail in section 2.1.1. However, it seems that different periods of high initial returns are determined by different factors. Hence, no comprehensive explanation of underpricing variation over time has been developed. Other authors focus on the cross-country variation of underpricing and their studies are reviewed in section 2.2. In particular, researchers identify that cross-border variation of initial returns are caused both by differences in the institutional and legal framework of different countries (section 2.2.1) and by cultural and behavioural issues (section 2.2.2). Anyhow, it should be

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$$RIR = \frac{P_t - OP + D_t}{OP} * 100 \quad \text{or} \quad MIR = \frac{P_t - OP + D_t}{OP} * 100 - R_m$$

Where:

- $t$  refers to the  $t$ -th day after the IPO date;
- $P_t$  is the closing price of shares at day  $t$ ;
- $D_t$  refers to the amount of dividends paid by the firm up to day  $t$ .

Underpricing can also be computed in monetary terms (Ljungqvist, 2007), instead of in percentage terms. In this case, we refer to it as “money left on the table”. Money left on the table is computed as the difference between the price of shares in the first day of trading (closing price or the last bid price) and the offer price, multiplied by the number of shares offered at the IPO.

highlighted that initial returns variation may also be explained by the causes presented in the previous chapter, since time and country specific factors may make the impact on underpricing of these causes to vary in magnitude over time and across countries.

**Table 1. Literature overview of underpricing.** The studies are classified on the basis of three characteristics of the samples they use in their empirical analysis: the nationality of the markets considered (Country), the number of IPOs (Sample Size) and the period analysed (Time Period). The average level of underpricing identified in each study is reported in columns Avg. Raw Initial Returns or Avg. Market-Adjusted Initial Returns, depending on the way it has been computed. The first part of the table reports underpricing by country and period for all the markets considered in the sample of each study. The second part of the table reports underpricing observed in some of the European second markets.

Country	Time Period	Sample Size	Avg. Raw Initial Returns	Avg. Market-Adjusted Initial Returns	Study
U.S.	1975-1984	2215	22.1%	-	(Beatty, 1989)
	1977-1982	1028	16.3%	-	(Ritter, 1984)
	1977-1987	1598	-	10.67%	(Aggarwal & Rivoli, 1990)
	1987-1991	172	10.0%	-	(Spiess & Pettway, 1997)
	1991-1995	1376	13.8%	-	(Habib & Ljungqvist, 2001)
	Oct 1996-June 1997	311	11.29%	-	(Ellis, 2006)
	1996-2000	2178	35.7%	-	(Ljungqvist & Wilhelm, 2003)
	May – July 1997	114	16.22%	15.82%	(Aggarwal, 2000)
U.K.	1917-1945	610	8.04%	-	
	1946-1986	1943	12.09%	-	(Chambers & Dimson, 2009)
	1987-2007	1987	19.00%	-	
	1985-1988	123	-	15.9%	(Levis, 1990)
	Dec 1999-Dec 2000	251	29.6%	-	(Filatotchev & Bishop, 2002)
Italy	1985-2001	182	21.87%	19.25%	(Cassia, Giudici, Paleari, & Redondi, 2004)
	1999-2007	151	12.2%	-	(Baschieri, Carosi, & Mengoli, 2015)
	2001-2012	129	6.52%	6.75%	(Dell'Acqua et al., 2015)
Germany	1970-1993	189	10.57%	-	(Ljungqvist A. P., 1997)
	1997-2002	435	42.34%	-	(Hunger, 2003)
France	1992-1998	99	9.68%	-	(Derrien & Womack, 2003)
Poland	2005-2009	153	14.0%	-	(Čornanič & Novák, 2015)
China	1987-1995	308	948.6%	-	(Su & Fleisher, 1999)
	1992-1997	701	-	298%	(Chen, Firth, & Kim, 2004)
Brazil	1980-1990	62	78.5%	-	(Aggarwal, Leal, & Hernandez, 1993)
	2004-2012	138	4.5%	-	(Minardi, Moita, & Castanho, 2015)
European Second Markets					
Italy	2001-2012	17	16.32%	14.85%	(Dell'Acqua et al., 2015)
Germany	1997-2002	298	53.64%	-	(Hunger, 2003)
France	1997-2000	172	22.7%	-	(Chanine, 2008)
U.K.	1995-2004	896	14.94%	-	(Esenlaub, Khurshed, & Mohamed, 2012)

## 2.1. Underpricing Variation Over Time.

As highlighted in the previous section, IPO markets are characterized by high variability of underpricing over time. In particular, some periods exhibit average initial returns that are abnormally high with respect to the average first-day performance of IPOs. In this situation, IPO markets are referred to as “hot issue”<sup>21</sup> markets (Ibbotson & Jaffe, 1975). Conversely, in other periods markets are characterized by low underpricing on average and in this case they are called “cold issue” markets.

Ibbotson and Jaffe (1975) analyse a sample of 128 U.S. IPOs issued from January 1960 to October 1970. They discover that average initial returns in subsequent months are serially dependent. In practice, hot issue markets can be predicted since months characterized by high initial returns tend to be followed by other months with large underpricing. In addition, the authors observe that serial dependence occurs for IPO volumes, too. Therefore, months in which the number of issues is higher than the average tend to be followed by other months characterized by large IPO volumes. For this reason, Ibbotson and Jaffe (1975) argue that even the number of new issues offered in a given month can be predicted.

Serial dependence of both IPO returns and volumes is also observed by Lowry and Schwert (2002) and Ritter (1984). The empirical evidence of Ritter (1984) is based on a sample of 1028 IPOs issued between 1977 and 1982 in the United States. Lowry and Schwert (2002) base their analysis mainly on a sample of U.S. IPOs occurred between 1985 and 1997.

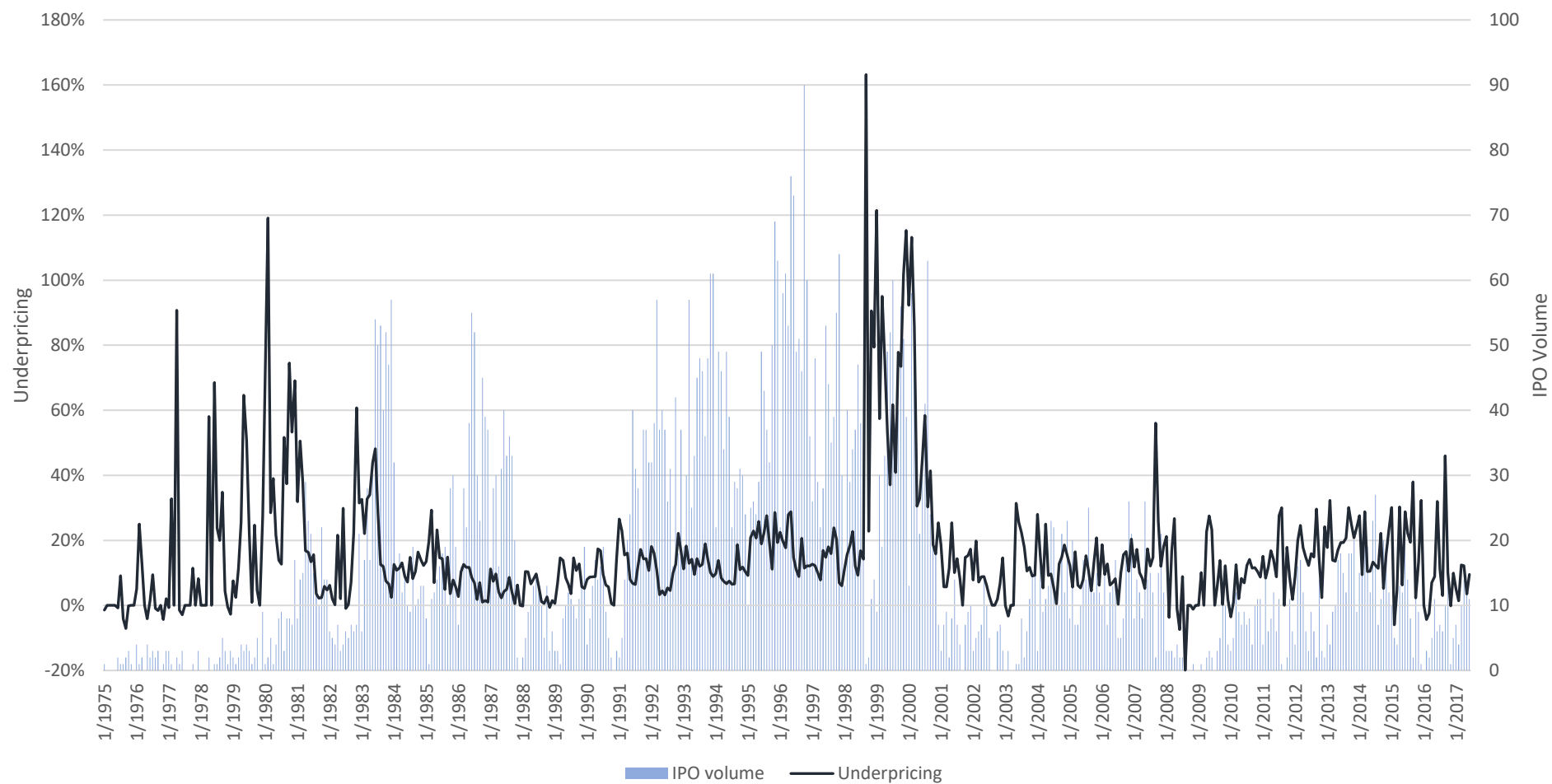
Another interesting characteristic of new issues markets is that periods in which the IPO volume is particularly high tend to follow periods of high initial returns. This phenomenon is observed by Ibbotson and Jaffe (1975) even if they do not find empirical support for this observation. Their lack of evidence is filled by Lowry and Schwert (2002) who find that initial returns and future IPO volumes are significantly and positively related.

From this explanation of IPO market fluctuations, Ibbotson and Jaffe (1975) and Ritter (1984) derive which is the best moment for issuers to go public. They both argue that firms that issue shares in the high-volume period immediately after an hot issue market raise higher proceeds and leave less money on the table at the IPO.

Fluctuations over time of initial returns and IPO volumes could be observed in figure 2. This graph is based on the monthly IPO data provided by Ritter (2017) on his website and it shows the variability of underpricing and of the number of initial offerings in U.S. markets from 1975

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<sup>21</sup> The term “hot issue” market derives from the jargon used in the financial community to refer to IPOs that experience initial price run-ups significantly larger than the average in the market. These IPOs are called in fact “hot issues”.



**Figure 2. Underpricing and volume of U.S. IPOs per month.** All the IPOs issued between January 1975 and June 2017 are included, except for IPOs of closed-end funds, REITs, acquisition companies, offer prices below \$5, ADRs, limited partnerships, units, banks and S&L. It could be observed that the U.S. IPO market is characterized by periods of high average initial returns and periods of large IPO volume. In addition, it is visible that the IPO volume increases after a hot issue market.

Source: my elaboration of monthly IPO data prepared by Professor Jay R. Ritter (Warrington College of Business, University of Florida) and made available on his website at <http://site.warrington.ufl.edu/ritter/ipo-data/>

to 2017. It is interesting to observe the large increase in the volume of IPOs after periods of large first-day returns. This phenomenon is particularly evident looking at what happened to the number of issues in the months after the hot issue market of 1980 and after the huge increase in underpricing of the dot-com era at the end of the nineties.

### 2.1.1. The Determinants of Underpricing Variation Over Time.

Several authors (Ljungqvist & Wilhelm, 2003; Loughran & Ritter, 2004; Ritter, 1984) try to identify the determinants of hot issue markets and underpricing fluctuation over time.

The first of them is Ritter (1984). He concentrates on the hot issue market of 1980 that lasted 15 months. In this period, the average first-day return was 48.4% compared with an average of 16.3% in the remainder of the sample. His initial hypothesis is that periods of high initial returns are caused by an unusually large fraction of risky firms that go public. A firm is risky when investors face a lot of uncertainty in determining its fundamental value. When these firms go public, underpricing is used as a compensation provided to investors who accept to bear the risk of these IPOs. Therefore, if a disproportionately high number of risky firms are brought to the market in the same period, average underpricing increases and a hot issue market develops. However, Ritter (1984) has not found evidence in support of his changing risk composition hypothesis. He observes that the hot issue market of 1980 is attributable almost entirely to the IPOs of firms in the industry of natural resources. He reports that for natural resource issues, underpricing was 110.9% in the hot issue period and 18.3% during cold-issue periods, a stunning difference of 92.6%. Instead, for non-natural resource issues the difference was just 5.2%. In addition, the autocorrelation of monthly average initial returns was 0.5 for natural resource IPOs and just 0.27 for the others. Hence, an interesting question is why natural resource firms were so underpriced in 1980. Ritter (1984) proposes three explanations and for one of these – the monopsony power hypothesis – he finds empirical support. According to this hypothesis, in 1980 underwriters intentionally underpriced natural resource issues and earned profits by allocating offerings to preferred customers. This underwriters' behaviour was feasible because the IPO market was segmented, given that natural resource issues were concentrated in a regional market. In this situation, natural resource IPOs were subject to exploitative underwriters, who extracted larger returns. Clearly, this was an unstable situation and indeed it collapsed in a few months.

Another explanation of hot issue markets is provided by Ljungqvist and Wilhelm (2003). They rely on a sample of 2178 U.S. IPOs issued between January 1996 and December 2000. They



observe that underpricing averaged about 17% in 1996, it went up to 73% in 1999 before decreasing to 58% in 2000. This hot issue market coincided with the so-called dot-com bubble. It is possible to imagine that in this period information asymmetries have significantly affected underpricing but the reasons behind these huge initial returns should be found elsewhere. Ljungqvist and Wilhelm (2003) argue that the hot issue market at the end of the nineties was caused by the heightening of the principal-agent conflict between issuers and their investment banks, as described by Baron (1982). In practice, underpricing increased substantially because issuers reduced their commitment in monitoring underwriters' marketing effort and pricing behaviour. This happened for several reasons. First, pre-IPO insider ownership decreased substantially from 1996 to 2000. In particular, CEO ownership shrunk from 22.7% to 11.6% (it almost halved in 5 years). This impacted directly on the incentives of CEOs to monitor effectively the underwriters behaviour and to actively bargain in pricing IPOs. Second, ownership became more fragmented and in turn it reduced the incentives for shareholders to monitor underwriters. Third, the frequency and the magnitude of secondary sale of shares at the IPO decreased sharply in 1999 and 2000. In particular, the frequency of secondary sales by CEOs declined from 15.3% in 1996 to 0.8% in 2000. The reduction of sales of seasoned stocks at the initial offering determined a decrease in the interest of pre-IPO shareholders to control underpricing, since the benefits they obtained from monitoring underwriters were reduced. Fourth, the popularity of directed share programs (also called DSPs) increased strikingly during the dot-com bubble. In fact, the share of IPOs including DSPs grew from 24.7% in 1996 to 92.6% in 2000. DSPs are also referred to as friends and family programs. In DSPs, a fraction of the IPO is set aside by the issuer to be allocated to specific individuals such as family members, executives and board components or to members of certain groups such as employees, customers and so on. As a consequence, underpricing is much more tolerated in this situation since the benefits are partially accrued to "friends and family".

In summary, Ljungqvist and Wilhelm (2003) argue that the hot issue market during the dot-com bubble was caused by the lower incentives of insiders to monitor underwriters behaviour due to changes in the ownership structure of IPO firms and to the selling behaviour of pre-IPO shareholders. Anyhow, they do not provide explanations – but only suppositions – for this significant change in incentives occurred at the end of the nineties.

The explanations of hot issue markets provided till now aim at explaining specific hot periods of IPO markets. In particular, Ritter (1984) concentrates on the hot issue market of 1980 while Ljungqvist and Wilhelm (2003) focus on the hot issue period during the dot-com bubble. Instead, a comprehensive view of the variability of underpricing over time is provided by

Loughran and Ritter (2004). Their objective is to explain why average initial returns fluctuate over time and they do this by considering the low-frequency movements of underpricing that occur more rarely than hot and cold issue markets. Their empirical analysis relies on a sample of 6391 U.S. IPOs that took place over the period 1980-2003. As it is also observable in figure 2, Loughran and Ritter (2004) report that average underpricing increased from 7% in the period 1980-1989 to 15% during 1990-1998, then skyrocketed to 65% during the dot-com bubble and finally it turned down to 12% from 2001 to 2003. In order to explain this variability in underpricing they propose three hypotheses. The first is the so called changing risk composition hypothesis. In practice, it is the theory proposed by Ritter (1984) to explain the hot issue market of 1980. The two authors observe that even though there have been minor changes in the characteristics of the firms going public, these changes cannot account for a large part of underpricing variation occurred between 1980 and 2003. So, consistently with Ritter (1984) they do not consider this as a credible explanation of underpricing variability. The second hypothesis proposed by Loughran and Ritter (2004) is the realignment of incentives. This is the explanation suggested by Ljungqvist and Wilhelm (2003). However, Loughran and Ritter (2004) find little support for this hypothesis. In particular, they argue that it is true that CEO ownership declined in the dot-com era but this did not reduce the incentives for insiders to monitor underwriters because in those years valuations of firms increased and the CEO ownership despite decreasing in percentage terms was increasing in dollar terms. This would have increased the incentives for CEOs to monitor underwriters and not the opposite. In addition, they argue that the changes in the ownership structure may have been a response to increasing underpricing and not the cause of underpricing. The third hypothesis that Loughran and Ritter (2004) propose is the changing issuer objective function hypothesis that consists of the analyst lust hypothesis and the spinning hypothesis. According to the analyst lust hypothesis, issuers are more willing to accept underpricing because they want to acquire analyst coverage. Analyst coverage became critical for listed firms in the last decades for two reasons. First, starting from the nineties growth opportunities of firms increased and their net present value rose relative to the value of assets in place. As both the value of growth opportunities and the valuation of firms increased, analyst coverage became more important for issuing firms. Second, the great visibility offered by internet and business TV channels to analyst recommendations during the dot-com bubble increased the importance for issuing firms to receive analyst coverage in order to attract investors.

Given the importance to be covered by analysts, issuing firms try to acquire analyst coverage by hiring underwriters with an highly ranked analyst, whatever is the underpricing level charged by those underwriters. So, issuing firms are willing to accept higher levels of underpricing the

more they see analyst coverage as important. In this case, underpricing is a way to compensate underwriters for the costly analyst coverage they offer to issuers. Therefore, while in the eighties investment bankers were chosen as underwriters mainly on the basis of the valuation they provide to issuers, as growth opportunities became more important in firms valuation, issuers based on the analyst coverage offered by investment banks to choose the underwriter. Anyhow, this results in a local oligopoly of underwriters and it leads to even larger underpricing.

The other theory part of the changing issuer objective function hypothesis is the spinning hypothesis. The spinning hypothesis is based on a conflict of interest between who decides which is the underwriter to hire and the other pre-IPO shareholders. According to this hypothesis, decision makers choose underwriters with a reputation to underprice because these bankers compensate them with side-payments. In practice, decision-makers set up brokerage accounts where underwriters allocate shares of hot IPOs. Initially, the executives of an issuing firm lose wealth because money is left on the table at the IPO of their firm but then they benefit from the hot IPOs that they are allocated in their brokerage account. Loughran and Ritter (2004) argue that spinning became popular in the nineties and that it could justify part of underpricing in that period. However, after the dot-com era, tighter regulation reduced spinning dramatically and this can explain the lower level of underpricing observed by the authors after 2000.

To sum up, underpricing fluctuation over time is a well-documented phenomenon and hot issue periods are considered recurring events. Given that these fluctuations follow specific patterns, several authors tried to explain them. Anyhow, different hot issue markets seem to be caused by different factors. The hot issue market of 1980 was caused by the large number of natural resource firms taken public by exploitative underwriters. Instead, the hot issue period during the dot-com bubble may have been caused by a change in the ownership structure and selling behaviour of issuers according to Ljungqvist and Wilhelm (2003) or by the spinning and analyst lust hypotheses according to Loughran and Ritter (2004).

The common characteristic of all these explanations is that underpricing increased because of the ability of underwriters to exploit these situations to extract profits for themselves. Underwriters benefit from higher underpricing in many ways: for instance larger underpricing reduces the effort in marketing an issue, it reduces the probability to be sued by investors for poorly performing issues, it gives the possibility to earn large returns by exercising the overallocation option and it allows underwriters to exploit investors who engage in rent-seeking behaviour to be allocated a share of underpriced IPOs.

## 2.2. Cross-Country Variation of Underpricing.

As presented at the beginning of this chapter, underpricing varies not only over time but also across countries. Cross-country variation of underpricing is not a recent phenomenon but it has attracted the interest of researchers only in the last few years. For this reason, this strand of literature is quite young and the evidence on the phenomenon is still scarce (Hopp & Dreher, 2013).

Researchers focus on explaining the determinants of the variation of underpricing across countries. They identify that cross-country variation of initial returns could be explained by differences in the legal and institutional environment of different countries or by cultural and behavioural characteristics of investors. Therefore, underpricing is affected not only by firm and issue specific factors but also by country-level characteristics. These strands of literature are presented in the following sections.

### 2.2.1. The Effects of the Institutional and Legal Environment.

This strand of literature assigns a critical role to the institutions and to the legal framework of a country to explain the cross-border variation of underpricing.

In particular, the protection that a legislation provides to investors is considered an important country-level factor that explains first-day variation of initial returns. Hopp and Dreher (2013) base their hypothesis on the ownership and control theory proposed by Brennan and Franks (1997) and analysed here in section 1.6. To recall, Brennan and Franks (1997) argue that directors of IPO firms want to maintain control even after the offering to safeguard the private benefits they obtain by pursuing activities that are in their own interest but not in the interest of shareholders. In order to engage in these value-destroying activities, directors need not to be monitored by new shareholders. According to Brennan and Franks (1997), this objective is achieved by stimulating demand for an issue through underpricing and then strategically allocating shares to small investors, who do not find convenient to engage in monitoring activities. In practice, a dispersed ownership grants directors the possibility to maintain control over the firm. However, the possibility to keep control over a firm is also affected by the legal protection that different countries provide to investors. If investors protection is low, controlling owners can easily dilute the rights of outside minority shareholders after the IPO. In this situation, after the issuance the loss in value of private benefits of control for insiders is lower, so less underpricing is needed for directors to maintain benefits at the desired level. Instead, if

sound investor protection is in place, new shareholders are able to dilute the controlling benefits of incumbent owners to a larger extent. In this case, directors would prefer to obtain an even more dispersed ownership after the IPO, so they require more underpricing. In brief, Hopp and Dreher (2013) hypothesize that in countries with a stronger investor protection, directors buy – through underpricing – a more dispersed shareholder base that reduces monitoring. Therefore, a sound protection of investors causes higher levels of underpricing<sup>22</sup>. Anyhow, a sound investor legislation is not effective if it is poorly applied. Therefore, law enforcement is a matter considered by Hopp and Dreher (2013). They argue that weak rules can be compensated by strong enforcement because functioning and active courts can effectively safeguard the interests of outside investors, thereby limiting the risk they face to be expropriated by inside managers. Thus, strong law enforcement increases the incentives for directors to raise underpricing in order to keep control over their firm, hence creating the same effects of a sound investor protection legislation. Hopp and Dreher (2013) test their hypothesis using a sample of more than three hundred IPOs from 23 countries over the period 1988-2005. However, they obtain only mixed evidence about the relation between underpricing and IPO investors protection while they obtain evidence that with better law enforcement the level of underpricing decreases, hence opposed to what they supposed<sup>23</sup>. Banerjee, Dai, and Shrestha (2011) and Engelen and Van Essen (2010) propose an explanation of the relation between investor protection and underpricing that is more in line with the empirical evidence obtained by Hopp and Dreher (2013). Engelen and Van Essen (2010) argue that the quality of the legal protection offered by

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<sup>22</sup> Another study relies on ownership and control theories to explain cross-country variation of underpricing. Banerjee, Dai and Shrestha (2011) base on Stoughton and Zechner (1998) hypothesis (described in section 1.6) that underpricing is used to create oversubscription. However, in this case oversubscription is used to strategically allocate shares to large investors, discriminating against smaller applicants. Large investors are supposed to have both the incentive and the ability to monitor management conduct. Monitoring leads to better management decisions and consequently to greater firm value. Anyhow, Banerjee et al. (2011) argue that large investors suffer the costs of un-optimal investment diversification. Therefore, issuers compensate large owners with underpricing.

In sum, Banerjee et al. (2011) claim that underpricing is a way to entice block-holders who provide monitoring activities that benefit all shareholders. The level of underpricing to be offered to attract block holders differs across countries, depending on the home-country bias of local shareholders.

The conclusions of Banerjee et al. (2011) and Hopp and Dreher (2013) are similar in the sense they predict that underpricing is an instrument used to obtain the desired ownership structure after the IPO. However, they differ for the effect that underpricing has on the post-IPO shareholder base, hence reproducing the discrepancy between the studies on which they are based – namely Brennan and Franks (1997) for Hopp and Dreher (2013) and Stoughton and Zechner (1998) for Banerjee et al. (2011).

<sup>23</sup> An explanation for the lack of support to the Hopp and Dreher (2013) hypotheses is provided by Engelen and Van Essen (2010). They argue that having a dispersed ownership is just one out of several mechanisms that could be used by incumbent managers to retain control over their IPO firm. In addition, only in U.S. and U.K. it is common for pre-IPO shareholders not to retain control after going public. In Continental Europe and Asia it is much more frequent that pre-issue shareholders maintain the majority of their firms after the IPO. Hence, in these countries there is no need to use underpricing to retain control and the Brennan and Franks (1997) theory does not hold.

a country to investors affects underpricing in two ways. First, low investor protection increases the ex-ante uncertainty faced by investors in valuing a firm. This happens because investors are uncertain about the strategies that management will adopt after the IPO and they fear that management conduct could negatively affect firm value, given that the legal framework offers only weak protection to investors. Second, if the quality of legal protection is low, investors are uncertain about how realized value will be distributed among corporate constituents. They fear that managers and controlling shareholders have more opportunities to transfer profits or assets outside the firm, thereby damaging minority shareholders. Hence, in case of weak legal protection investors face the risk of being expropriated, so they are uncertain about the return they will realise on their investment. In case of weak protection, a higher level of underpricing is used to compensate investors for the uncertainty they face in assessing the firm value and for the probability of ex-post expropriation. Engelen and Van Essen (2010) test their theory empirically using a sample of 2920 IPOs from 21 countries issued from January 2000 until December 2005. They observe that a higher degree of investor protection, a better legal system and superior law enforcement lead to a lower level of underpricing. Similarly, Banerjee et al. (2011) posit that investors fear the risk of being expropriated after the IPO by managers or original owners and they react by withdrawing from the IPO market. To attract these investors back, issuing firms should reassure them by offering an upfront discount in the form of underpricing. Therefore, the higher is the risk of being expropriated the larger is underpricing, as affirmed also by Engelen and Van Essen (2010). Anyhow, the risk of expropriation is reduced by an efficient investor protection legislation that is effectively enforced. Banerjee et al. (2011) provide also empirical support to their explanation of cross-border variation of underpricing. Their empirical analysis relies on a sample of 8776 IPOs from 36 countries that took place between January 2000 and December 2006.

To sum up, investor protection and law enforcement are two characteristics of the legal and institutional environment of a country. Thus, they are country-specific factors that affect underpricing over and above issue and firm specific factors discussed in the previous chapter. So, cross-border variation of underpricing is due even to legal frameworks of different quality. In particular, the relation of investor protection and enforcement with underpricing is found to be negative (Banerjee et al., 2011; Engelen & Van Essen, 2010).

Another aspect that is related to the institutional and legal environment of a country and that has been identified as a cause of cross-border underpricing variation is the risk of litigation. This strand of literature is based on the theories of Lowry and Shu (2002) and Tiniç (1988) analysed in section 1.3. To recall, these authors claim that underpricing is strategically used by

issuers and underwriters as an insurance against the risk of litigation. Investors may sue issuers in case of omissions or untruths in the IPO prospectus and registration statement. In order to reduce the probability of being sued and to reduce the refund to be paid to investors in case of litigation, issuers and underwriters prefer to underprice IPOs. Therefore, by leaving a larger amount of money on the table at the IPO, issuers and underwriters reduce their exposure to the monetary and reputational costs of litigation with investors. Obviously, the higher is the risk to face a litigation, the higher is the propensity of issuers to ‘buy’ a costly insurance against that risk.

Banerjee et al. (2011) argue that the risk of litigation varies across countries and this could explain part of cross-border variation of underpricing. Litigation risk is rooted into the legal system of a country. In jurisdictions where the legal recourse is simple and accessible, the litigation risk tends to increase because investors find it easier and affordable to start a lawsuit. In this situation, issuers and underwriters are considerably exposed to litigation and to the losses they will suffer due to damage repayments. Thus, according to Tiniç (1988), they are induced to ‘buy’ a more expensive insurance against the risk of being sued. Therefore, they are prone to offer IPOs that are more underpriced.

This explanation of cross-country variation of underpricing is proposed also by Hopp and Dreher (2013) and it receives empirical support by Banerjee et al. (2011).

Instead, Engelen and Van Essen (2010) argue that a more accessible and affordable legal recourse has the effect to reduce underpricing. In this situation, investors have more possibilities to appeal to courts, so they feel more protected against the opportunistic behaviour of managers and controlling shareholders. Hence, they perceive as less likely the risk of being expropriated after the issue, so they require less underpricing as compensation at the IPO.

Cross-border variation of underpricing may also be determined by the level of information asymmetry in different countries. The availability of information in a country is connected with its institutional environment, so country-level information asymmetry may vary across the world. Hopp and Dreher (2013) argue that the availability of high quality information contributes to the reduction of asymmetries and makes stock prices more informative, thereby facilitating a better oversight of corporate decisions. So, they assert that greater accounting transparency eases monitoring of management by outside investors. Relying on Brennan and Franks (1997), they affirm that this has two opposed effects. On the one hand, it increases the difficulties to keep control over the firm, so the level of underpricing to be offered at the IPO in order to obtain an even more dispersed ownership should increase. On the other hand, it makes private benefits of control less valuable for insiders since information about their value-

destroying conduct are more visible. Therefore, lower underpricing is required to balance the benefits of control for insiders before and after the IPO.

The empirical analysis of Hopp and Dreher (2013) provides mixed evidence in support of their hypotheses. They observe that higher transparency and increasing disclosure of accounting information make underpricing to decrease. However, they also obtain evidence that support their hypothesis that lower information asymmetry increases underpricing.

Instead, Banerjee et al. (2011) claim that the level of information asymmetry is positively related to underpricing and their empirical evidence support their hypothesis.

To sum up, the institutional and legal environment of a country affects underpricing at country level, therefore over and above firm and issue specific factors. In particular, differences in investors protection, law enforcement, effectiveness and affordability of legal recourse and information availability across countries have been identified as determinants of cross-border variation of underpricing. However, there is no clear consensus on the direction of the effects of most of these factors on underpricing. This may be due to the different assumptions on which the studies considered rely upon and on the fact that this strand of literature is quite young and evidence is still scarce (Hopp & Dreher, 2013).

### 2.2.2. The Effects of Culture and Behaviour.

Cross-border variation of underpricing is not caused solely by institutional and legal differences across countries. Even cultural differences (Costa, Crawford, & Jakob, 2013) and investors bias for local stocks (Baschieri et al., 2015) affect first-day IPO returns in a different way in different countries.

Costa et al. (2013) analyse the effects of six cultural factors – based on Hofstede’s dimensions of national culture – on initial returns. Their empirical analysis<sup>24</sup> reveals that three of these dimensions are relevant to explain underpricing. The first relevant dimension is ‘power distance’. It represents how less powerful individuals in a society accept and expect inequality. Costa et al. (2013) affirm that IPO underpricing tend to benefit the wealthiest individuals, so the higher is the acceptance of inequality the better is the tolerance for larger underpricing. Therefore, they observe that power distance and initial returns are positively related. The second cultural dimension that is relevant to explain underpricing is ‘uncertainty avoidance’. It

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<sup>24</sup> The empirical analysis of Costa et al. (2013) relies on a sample of 39 countries. They combine the Hofstede’s cultural dimensions with underpricing data of Professor Ritter for each country in the sample.



expresses the acceptance of a society for uncertainty and ambiguity. Clearly, underpricing represents a source of uncertainty in initial offering markets. Costa et al. (2013) claim that in uncertainty avoiding countries firms are less inclined to underprice and investors prefer that an unambiguous price is set before the first day of trading. The opposite occurs in uncertainty accepting countries. The third dimension to explain initial returns is 'long term orientation'. Long-term oriented societies tend to prefer future rather than immediate rewards. They encourage savings, persistence and adaptation to changing situations. In this type of societies, managers focus on raising resources at the IPO for the long-term benefit of the firm. In doing so, they are prone to accept greater underpricing in order to raise the funds needed to meet the long-term goals of the company. Investors who receive an allocation of shares at the IPO are concentrated on the long-term so they are less inclined to quickly flip shares when trading starts in the secondary market. This shortage of sellers limits the downward pressure on the price of IPO shares on the first day of trading, thereby resulting in larger price run-ups at the end of the trading day. Thus, long-term orientation and underpricing are positively related.

In brief, Costa et al. (2013) affirm that keeping all else equal, underpricing is greater in countries that better accept inequality, that tolerate uncertainty and that are long-term oriented. Costa et al. (2013) claim that these three cultural dimensions are able to explain nearly 40% of underpricing variation across countries.

Another key issue that explains the geographical variation of underpricing is the so called 'local home bias' (Banerjee et al., 2011; Baschieri et al., 2015). It has been observed that investors have a preference toward local stocks. Thus, their investment portfolio comprises a disproportionately large share of local equity with respect to geographically more distant stocks. Local home bias originates from informational advantages on local stocks because proximity gives investors more value-relevant information on local firms. It may also stem from behavioural factors since investors prefer what is familiar and well known instead of what is unknown.

Baschieri et al. (2015) analyse how local home bias impacts on underpricing using a sample of 151 Italian IPOs from 1999 to 2007. They observe that firms receive a higher market valuation the richer is the area in which they are headquartered and the lower the number of listed firms based in the same area. This over-valuation – attributable to the local home bias phenomenon – is defined as 'location premium'. Location premium originates from the fact that a share of local wealth is invested in local stocks. Hence, the higher is local wealth, the higher is the demand for local equity. The supply of local investment opportunities is related to the number of listed local firms. If local investors demand is higher than the supply of local equity, the

market price of local firms is pushed up. Baschieri et al. (2015) argue that the local home bias phenomenon is not properly considered by the actors involved in the IPO process. Failing to assess correctly the location premium leads these actors to set offer prices that are lower than the market valuation and this makes the price to run-up in the first day of trading. Therefore, Baschieri et al. (2015) conclude that local home bias is positively related with underpricing. However, the local home bias does not impact on all local firms in the same way. Baschieri, Carosi and Mengoli (2017) argue that investors prefer to invest in stocks of nearby firms that are family-owned and still managed by the founder. The results of their empirical analysis<sup>25</sup> highlight that the local home bias is enjoyed only by family firms and in particular those having the founder serving as CEO, while non-family firms are completely excluded from this phenomenon. Probably, this fact is the consequence of the distinctive bond that family firms use to have with their local communities and this possibly drives the preference of locals toward nearby family firms.

Both the studies of Baschieri et al. (2015, 2017) analyse the phenomenon of the home bias at the local level in Italy. However, this phenomenon is observable in many other countries and the extent at which it affects underpricing varies from country to country.

Banerjee et al. (2011) focus on the home-country bias that – analogously to the local-home bias – defines the preference of investors for domestic stocks. The authors observe that the magnitude of the home-country bias varies across countries and since it affects underpricing it may explain cross-country variation of initial returns. However, opposed to Baschieri et al. (2015) they observe a negative relation between home-country bias and underpricing<sup>26</sup>.

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<sup>25</sup> The empirical analysis of Baschieri et al. (2017) is based on a sample of 2951 firm-year observations of companies listed in Italy in the period 1999-2011.

<sup>26</sup> Banerjee et al. (2011) note that other studies observe a positive relation between home-country bias and underpricing. They affirm that the positive sign of this relation is driven by the fact that information asymmetries are frequently associated with higher levels of home-country bias. Hence, given that information asymmetries are also related to higher levels of underpricing, the relation between domestic investment bias and underpricing is only a pseudo positive one.

### 3. THE ALTERNATIVE INVESTMENT MARKET ITALIA.

As many other stock exchanges in Europe, the Italian stock exchange is organized in segments, with the main market known as Mercato Telematico Azionario (MTA), the market for investment vehicles (MIV) and a second-tier market – called Alternative Investment Market Italia (AIM Italia) – dedicated to small and medium firms. The objective of this chapter is to discuss the main characteristics of AIM Italia because this equity market represents the setting of the empirical analysis on underpricing that is presented in the next chapter.

AIM Italia is not the only existing second-tier equity market. Several second markets have been developed in Europe in the last decades by various stock exchanges. Each of these markets has been created to address the needs of specific categories of firms. In practice, stock exchanges have segmented their offer (Ferragina, Mancaruso, & Palmas, 2008) in order to make more firms to list on their equity markets. This objective has been achieved considering that only 845 out of the 3755 IPOs occurred between 1995 and 2009 on the exchanges of London, Paris, Frankfurt and Milan took place on main markets (Vismara, Paleari, & Ritter, 2012) while the remaining 2910 initial offerings occurred on second markets.

Despite the great success in terms of IPO volumes, not all the second markets proved to be successful in the long-run. Vismara et al. (2012) argue that of the eleven second markets launched in UK, Germany, France and Italy since 1995, only five still exist in 2009. In particular, second markets are quite successful in hot periods while they tend to collapse in cold ones (Vismara et al., 2012).

However, it has been observed that the survival of a second market depends on the model on which it is built. Vismara et al. (2012) identifies three basic models on which second markets have been built in the past decades. The first category of markets relies on the sequential segmentation model. The markets part of this category are conceived as a sort of ‘feeder’ for the main market. In practice, small firms list on a second market with a simplified regulation and if they are successful they move to the main market. The second category is the one based on the sectorial segmentation model. This category of markets has been developed to take public high-tech companies during the Internet bubble. The last category of markets is the one based on the demand-side segmentation model. These markets are exchange-regulated, so they are not subject to national listing authorities. This category is considered to be the most successful of the three. For this reason, all the second markets currently existing in the four main European economies are exchange-regulated.

The most important exchange-regulated second market in Europe is the Alternative Investment Market (AIM) managed by the London Stock Exchange (LSE). AIM was established in 1995, it became an exchange-regulated market in October 2004 (Ferragina et al., 2008) and it is still operating nowadays. It has been designed as an equity market dedicated to small and medium companies with growth potential. In the 20 years since its launch (1995-2015) it has attracted more than 3500 firms from all over the world that raised more than 90 billion of pounds (White Page Ltd & London Stock Exchange, 2015). Based on the successful experience of AIM, after the merger of Borsa Italiana with LSE, AIM Italia was launched in Italy. This Italian second market replicates most of the regulation and principles of its homologous British market. A detailed explanation of the functioning of AIM Italia is presented in section 3.1 and the main data regarding the market are reported in section 3.2.

### 3.1. The Regulation of AIM Italia.

Borsa Italiana and LSE merged in 2007. At that time, the LSE got more than ten years of experience in managing its second market dedicated to smaller firms. Given the large presence of SMEs and the limited number of listed firms in Italy, after the merger the AIM concept was extended to the Italian reality.

The rules for the AIM Italia were approved at the end of 2008 and the first listing occurred in May 2009 (Vismara et al., 2012). However, AIM Italia is considered to be born on March 1, 2012 (Borsa Italiana, n.d.) when it was merged with ‘Mercato Alternativo del Capitale’ (MAC)<sup>27</sup>. AIM Italia is a Multilateral Trading Facility (MTF). MTFs are regulated by MIFID directives and are Alternative Trading Systems. In brief, MTFs are trading venues that are mostly regulated by the company who manages them and only minimally subject to laws and regulations of the jurisdiction where they operate (Ferragina et al., 2008). In practice, AIM Italia is an exchange-regulated market subject to the rules approved by Borsa Italiana. These rules are intentionally simplified in order to meet the needs of small and medium firms that may find it difficult to comply with the norms of the main market. Even though it is a simplified market, AIM Italia offers the opportunity to small and medium companies to go public and to experience life as a listed firm. In this way, AIM Italia companies can enjoy the opportunities to access capital markets, becoming known to the financial community, improving their

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<sup>27</sup> AIM Italia is not the first second market launched by Borsa Italiana (Vismara et al., 2012). ‘Mercato Ristretto’ was the market dedicated to SMEs and it was replaced in 2003 by ‘Expandi’. Instead, ‘Nuovo Mercato’ was the market launched in 1999 for high-tech firms. In 2005, it was labelled ‘MTax’. In 2007 the exchange-regulated market ‘Mercato Alternativo del Capitale’ was launched and then it was merged with AIM Italia in 2012.

organizational structure to meet the market informational needs and increasing their reputation as well as funding internal and external growth. On the other side, they can also experience the disadvantages of listing such as the separation of ownership and control, the initial costs of listing and the costs of a more complex organizational structure. It should be highlighted that Borsa Italiana allows not only ‘operating firms’ to list. Also investing companies are admitted to list on AIM Italia.

The regulation of AIM Italia is based on that of the AIM of London and as argued by Espenlaub et al. (2012) it is one of the least stringent in the world. In particular, the regulation of AIM markets is principle-based. This means that the rules imposed by the stock exchange involve a comply-or-explain option that gives listed firms significant flexibility in interpreting principles and customizing compliance (Esenlaub et al., 2012). Central to this approach is the role of the Nominated Adviser, also called Nomad. The Nomad is an agent that acts not only as IPO advisor, but it is retained by the listed firm during all the period in which the company remains listed. The Nomad acts as a decentralized regulator and it also has the role of certifying and controlling the quality of listing firms and their compliance with the rules after the IPO (Esenlaub et al., 2012).

The regulatory framework of AIM Italia is based on two main documents establishing the rules for companies and Nomads and several annexes (Ferragina et al., 2008). A detailed analysis of the regulation of AIM Italia is provided in the following sections.

### 3.1.1. The Rules for Companies.

When a company decides to list on AIM Italia, it is generally assisted by a financial advisor (Mancaruso, Ferragina, & La Ferla, 2009). The advisor is a trustworthy agent that has the role to support both the entrepreneur and the firm in the process of listing. The advisor prepares the firm to face at its best the listing process and it provides help in selecting the proper advisors and in communicating with the actors involved in the listing process.

Once the will of a firm to list on AIM Italia is ascertained, the rules for companies (Borsa Italiana, 2016a) set by Borsa Italiana require the listing firm to appoint a Nominated Adviser. The Nomad should be chosen from the AIM Italia register of approved Nominated Advisers. The role of the Nomad is that to evaluate the appropriateness of the listing firm to be admitted on AIM Italia and to assist and support the listed firm after the admission to the market. By accepting to assist a listing firm, a Nomad puts at stake its own reputational capital (Esenlaub et al., 2012). This happens because Nominated Advisers act as regulatory agents since they are outsourced a substantial part of regulation. Hence, their credibility in certifying that a company

is appropriate to be admitted to the market strictly depends on their reputation. Every time that a listed firm fails to perform correctly in the listing process or in the aftermarket, they lose part of their reputation. Therefore, the real challenge for firms in the initial phase of the listing process is to find and convince a Nomad that they are appropriate to be admitted to AIM Italia (Ferragina et al., 2008). Once a Nomad has been appointed, it has to evaluate the appropriateness of its listing firm by conducting a financial, tax and legal due diligence. The Nomad should also evaluate whether it is necessary to conduct a commercial, specialist and/or technical due diligence on the listing firm. The due diligence highlights possible issues but it also allows to perform an initial valuation of the firm and to write down a draft of the admission document. After performing marketing activities such as the analyst presentation or the roadshow – possibly involving other advisors as brokers and public relations firms (Mancaruso et al., 2009) – the firm should provide to Borsa Italiana some specific information (pre-admission announcements). This information should be sent to Borsa Italiana at least ten business days before the admission date. Afterwards, at least three business days before the admission date, the issuing firm should send to Borsa Italiana the application form, the admission document and the Nomad's declaration as well as other attached documents. The admission document prepared by the issuing firm and its advisors is similar to a prospectus but it is created following different rules and it does not require the approval by CONSOB. Together with the admission document, the issuer should provide, if existing, the last audited annual report. The admission to AIM Italia is subordinated to the decisions and evaluations of the appointed Nomad. The Nominated Adviser is the only subject that decides whether a firm can go public on AIM Italia or not. Anyhow under particular circumstances, Borsa Italiana can make the admission of a firm subject to special conditions or it can refuse the admission to AIM Italia. Admission is denied if the application for admission of the firm is irregular or incomplete or if the admission of the firm may be detrimental to the orderly operation or reputation of the market. In any case, for the admission it is necessary that the free float is at least 10% of the capital. Under particular circumstances, a waiver from the 10% standard may be granted by Borsa Italiana. In addition, the start of trading is subject to the successful outcome of the offering. An offering is considered successful if it has been subscribed by at least five professional investors or by twelve investors of which at least two are professionals. The provisions regarding the minimum level of free float and the number of investors are aimed at ensuring sufficient liquidity for AIM Italia securities. The rules of the market also require each listing firm to appoint a specialist. On admission, AIM Italia companies should decide whether they will use Italian or English for their communication to the public and they are also required to maintain a website where required information should be available free of charge.

Once the firm is admitted to AIM Italia it has to retain its Nomad for as long as it remains listed. The Nominated Adviser provides guidance to the listed firm on how to comply with the regulatory principles of AIM Italia, it ensures the adequacy and timeliness of disclosures to the market (Eспенlaub et al., 2012) and it makes sure that the company is appropriate to be listed on AIM Italia by regularly communicating with the listed firm. In any case, the Nomad of a listed firm may be changed. By providing to Borsa Italiana the appropriate information, a listed firm could appoint a different Nominated Adviser. The key point is that each AIM Italia company should always have a Nomad. If a listed firm ceases to have a Nominated Adviser, Borsa Italiana suspend trading in its AIM Italia securities. If within two months a new Nomad has not been appointed, the admission of the securities to the market is cancelled.

The rules for companies of AIM Italia contain provisions regarding also the financial information of companies. Listed firms are required to prepare a half-year report of the six months after the end of the financial period for which financial information has been disclosed in the admission document. Afterwards, an intermediate financial report should be prepared at least every six months and made available to the public within three months from the end of the period considered in the report. AIM Italia firms should also prepare annual reports that should be audited. Annual reports should be published no later than six months after the end of the financial year. Both the intermediate and annual reports should be prepared and presented in accordance with the Italian accounting standards or the International accounting standards or the US GAAPs.

*Table 2. Summary of the main requirements for AIM Italia companies.*

*Source: information obtained from the rules for companies for AIM Italia updated on July 4, 2016 (Borsa Italiana, 2016a). The rules are freely available on the Borsa Italiana website.*

	
Floating Capital	At least 10%
Audited annual reports	1 (if existing)
Minimum market capitalization	Not required
Intermediate financial reports	At least every 6 months (to be published within 3 months from the end of the period).
Annual report	To be published within 6 month from the end of the financial year. It should be audited.
Accounting standards	<ul style="list-style-type: none"> <li>– Italian GAAPs or</li> <li>– International Accounting Standards or</li> <li>– US GAAPs.</li> </ul>
Nomad	Required
Specialist	Required
SDIR	Required
Language	Italian or English
Website	Required

### 3.1.2. The Nominated Adviser.

The Nominated Adviser has a determinant role in AIM Italia. It is the subject who decides whether a company can be admitted to the market and once admitted, it is fundamental to determine whether a firm can continue to be traded on AIM Italia. It also has the role to help the firm to comply with the principles of the market and to verify whether rules are respected. In practice, in the principle-based regulatory environment of AIM Italia – where ample scope is left for the interpretation of the rules – the Nomad acts as a decentralized regulator (Espenlaub et al., 2012). Therefore, considering the activities and the responsibilities of the Nominated Advisers, it is clear that the smooth functioning and the reputation of AIM Italia strictly depend on the ability of Nomads to perform their role appropriately. Hence, given the ample scope for abuse and negligence and the possible damages for the whole market of a bad conduct of Nomads, the rules for Nominated Advisers (Borsa Italiana, 2016b) are a key component of the regulatory framework of AIM Italia.

The rules for Nomads established by Borsa Italiana refer to the criteria and the process to become a Nominated Adviser, the obligations and the review of Nomads.

An entity is eligible to become a Nominated Adviser if it is a bank, an EU investment company or a firm belonging to a statutory audit network. In the latter case, the entity should respect additional conditions regarding the controls and the procedures in place to comply with AIM Italia rules. In any case, the entity should have its annual accounts audited and it should have adequate staff to perform the required activities. The entity is also required to have practiced corporate finance for at least two years and to employ adequate key executives with appropriate experience and expertise. However, the mere fact that an entity satisfies all these requirements does not mean that it could become a Nomad. Borsa Italiana can decline an application or impose additional conditions on approval with the objective to preserve the reputation and the integrity of the market. In order to verify the appropriateness of an entity to become a Nomad, Borsa Italiana can also interview some or all the proposed key executives and other relevant employees at the entity.

Once an entity has become a Nomad, it has to satisfy the criteria previously discussed on a continuing basis. Compliance with the criteria is checked both by the Nomad itself and by Borsa Italiana, who can require information and conduct interviews and tests on Nomads and their key executives. To facilitate the review, a Nomad must allow Borsa Italiana to access its records and its business premises. If Borsa Italiana concludes that a Nomad does not respect the



requirements set in the rules, it may remove the Nominated Adviser status to the entity or it can impose conditions on the ability of the entity to act as a Nomad.

The rules require the Nominated Advisers to nominate a person who acts as the principal contact of Borsa Italiana on compliance matters. Nomads are also required to allocate an adequate number of qualified staff to be responsible for each AIM Italia company and to include in the team at least one key executive. When a Nomad starts to assist an issuing firm, it must submit to Borsa Italiana the Nominated Adviser declaration. When the firm is listed, the Nomad is required to maintain regular contacts with the firm and to keep track of the key discussions, the advices and the decisions taken.

### 3.2. A Picture of AIM Italia.

The size of AIM Italia is far smaller than that of its British homologous. At the end of June 2017, on the AIM of London were listed 963 firms – the 17% were foreign firms – and the overall market capitalization exceeded 93 billion of pounds (London Stock Exchange, 2017). On the same date, the companies listed on AIM Italia were 83 and the capitalization of the market was of Euro 4 billion (Incorvati, 2017b). Despite the enormous difference in numerical terms between the two markets, it may not be appropriate to conclude that the experiment to extend the successful concept of AIM to the Italian market has failed. Instead, the comparison between the poor numbers of AIM Italia with those of its bigger homologous somehow resemble the relation between the main equity markets of Italy and UK. The advent of AIM Italia has expanded the opportunities for firms to get listed in a country where the reliance on the banking sector to obtain financial resources and the reluctance of firms to become public are larger than in other comparable European countries<sup>28</sup> (Ferragina et al., 2008; Vismara et al., 2012). As evidence of the interest of firms on AIM Italia, it should be highlighted that the number of firms listed on this market has grown year after year and that the yearly volume of IPOs has increased from the founding year of the market till nowadays. In detail, 90 IPOs have occurred on AIM Italia from 2009 to July 2017 and most of the offerings took place after the merger of AIM Italia with MAC (78 out of 90 IPOs). In addition, in the last two years it has

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<sup>28</sup> The number of companies that get listed on the Italian Stock Exchange is significantly lower than in other EU countries. According to Čornanič and Novák (2015) the number of IPOs occurred on the main market of Italy between 2005 and 2009 was 72. This IPO volume is much lower than that observed in the same years on the main markets of U.K (284 IPOs) and even Poland (195 IPOs). Considering a longer timespan this phenomenon is even more pronounced. In the period 1995-2009 the number of firms that went public on all the equity markets of Borsa Italiana were 229. In the same period, 603 IPOs took place on the stock exchange of Frankfurt, 838 IPOs occurred in France and 2085 IPOs took place in London (Vismara et al., 2012). Hence, in that period on the London Stock Exchange occurred approximately 9 times more IPOs than on the Milan stock exchange.

been observed an increase in the number of investing companies listed on AIM Italia. Most of these companies are Special Purpose Acquisition Companies (SPACs)<sup>29</sup> and just one is a ‘Società di investimento a capitale fisso’ (SICAF)<sup>30</sup>.

As argued before, the opportunities offered by AIM Italia have been noticed in particular by small and medium firms.

According to the report of the Observatory on AIM Italia of IR Top<sup>31</sup> (IR Top, 2016), in 2016 the average market capitalization of AIM Italia firms was of Euro 34 million. Moreover, the market cap of half of the listed firms was lower than 20 million Euros and just 8% of the firms had a capitalization over 100 million Euros. The average proceeds raised at the IPO by AIM Italia firms were of Euro 10 million and the overall proceeds raised in initial offerings in the first 6 months of 2016 were of 90 million Euros (278 million raised in 2015). Consistently with the assumption that SMEs list on second markets to raise financial resources to finance growth (Vismara et al., 2012) rather than to provide an exit opportunity to shareholders (Eспенlaub et al., 2012), the 91% of AIM Italia IPOs consisted of primary shares and only 9% of issuers offered secondary shares at the initial offering (IR Top, 2016).

The average floating capital of listed firms in 2016 was of 22%, even though it varied widely from firm to firm: more than half of the firms had less than 20% of their capital floating and just 11% of firms had a free float over the 50% threshold.

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<sup>29</sup> A SPAC is a blank check or shell company, that is a company without operating business and only minimal assets (Hale, 2007). A SPAC goes public in order to raise funds for an unidentified business to be acquired within a specified period of time, generally two years. SPACs are generally established and managed by individuals or organizations with a successful track record of returns generation for investors (Berger, 2008). Once the SPAC completes the IPO and receives the money it starts looking for possible target companies. When it finds the target, the SPAC should announce the deal to the market and it has to receive the approval by shareholders to close the transaction. If the transaction fails to close and the shareholders exercise their conversion rights or if two years passed without closing a deal, the SPAC is liquidated and shareholders are refunded of the money originally invested (Berger, 2008). The refund of shareholders is possible because money raised at the IPO could not be used by the managers of the SPAC, instead they should be placed in a specific account.

One of the advantages of a SPAC is that its securities are listed in a market, therefore shareholders can freely trade SPAC's shares and warrants.

<sup>30</sup> A SICAF is an investment vehicle, part of the category of the Alternative Investment Funds (Assogestioni, n.d.). It is regulated by the Italian law and it should receive the approval of the Bank of Italy to operate. In sum, a SICAF is a corporation similar to a mutual fund that could be listed in a market or not. A SICAF can issue different categories of shares but it could not issue bonds. Thus, in this type of funds, investors are also shareholders, so they can participate to the investment decisions of the SICAF if the type of shares they own provides them this right.

<sup>31</sup> The observatory on AIM Italia is run by IR Top, an Italian consulting firm active on AIM Italia and that is equity market partner of Borsa Italiana. The report of the observatory is presented to the financial community in July and its data are reported by the main Italian business newspapers. To the best of my knowledge, the document produced by the IR Top observatory is the only complete report freely available on AIM Italia. The report I make reference to here is the one presented in July 2016, whose data refer to July 1, 2016.

Contrarily to the AIM of the LSE, AIM Italia attracts almost exclusively Italian firms. In 2016, only 4 companies had their legal seat abroad. Of the Italian firms, more than 40% came from Lombardy, the 17% from Lazio and the 13% from Emilia-Romagna.

As evidence of the attractiveness of AIM Italia for SMEs with growth opportunities, the average revenues of listed firms in 2015 was of Euro 38 million (IR Top, 2016). In particular, 20% of the listed firms reported net sales lower than Euro 5 million and 13% of firms reported revenues higher than 100 million Euros. One exception is Gala S.p.A. whose sales in 2015 were greater than Euro 1.5 billion. The average revenue growth in 2015 was 19%. In detail, more than a quarter of firms experienced growth at a rate higher than 50% and approximately half of these firms (11% of the total) reported growth rates higher than 100%. On the other hand, another quarter of firms reported declining revenues. Looking at profitability, average EBITDA in 2015 was 13% and more than a half of AIM Italia firms reported an increase in EBITDA in comparison to the previous year. In this subset, EBITDA more than doubled from 2014 to 2015 for a quarter of firms.

The companies listed on AIM Italia have been rather active in performing extraordinary transactions. Between 2015 and the first six months of 2016, 57% of companies carried out at least one extraordinary transaction, mainly mergers and acquisitions.

Considering the governance of listed companies, in 2016 the Board of Directors of AIM Italia firms consisted on average of 6 members (IR Top, 2016). Only in the 62% of firms, at least one of the directors in the board was independent. The remaining 38% of firms did not have independent members in the board. In addition, only a bit more than 40% of companies adopted a code of ethics.

After this overview on the characteristics of firms listed on AIM Italia, it is useful to analyse who invests in AIM Italia companies and which are the conditions of the market.

In 2016, AIM Italia companies had 74 institutional investors in their shareholder base (IR Top, 2016). These investors brought to the market Euro 274 million even though they allocated their investments unevenly across firms. 21% of firms did not have any institutional investor among their shareholders, while 79% had at least one and just one firm had 16 institutional investors in its shareholder base. In any case, the average investment of institutionals in a company was Euro 0.8 million, even though the median was 0.35 million meaning that most of investments were of low amount while few large investments raised the average figure. This is consistent with the presence of a few larger firms in the market and with the existence of investing companies.

Looking at the country of origin of institutional investors in 2016, 54% of them was Italian and the remaining 46% was foreign. The presence of foreign institutional investors is an encouraging fact for AIM Italia, because it means that this market is able to attract foreign flows of capital that are used to finance growth of Italian small and medium companies. However, in 2016 half of foreign investors was based in Switzerland and Luxembourg. In the list of top foreign investors, many Swiss institutional investors were based in the Lugano area and one of the Luxembourgian investors was a branch of an Italian asset management firm. This evidence could cast some doubts about the real nationality of some investors and on the true size of the foreign funds invested in AIM Italia (Cellino, 2017). Anyhow, the presence of foreign investors may have been limited by the small size of the firms listed on AIM, the limited analyst coverage and the scarce use of English by listed firms to communicate to the public.

Another important characteristic of AIM Italia to be analysed is liquidity. The report of the observatory on AIM Italia highlights that the daily average trading value in the first six months of 2016 has been just of fifteen thousand Euros, a steep decline from the 2015 average that was above one hundred thousand Euros. The low level of liquidity has been largely claimed by the business press as the main problem of AIM Italia (Cellino, 2017). Low liquidity and investments are considered to be caused by the thin presence in Italy of institutional investors focused on small and medium enterprises. However, things have started to change in the first semester of 2017, when liquidity increased fivefold (Assosim, 2017) in comparison with the first six months of 2016. According to Assosim (2017), this marked increase in liquidity should be attributable to the effects of the “Piani Individuali di Risparmio”<sup>32</sup>, the so called “PIR”. The launch of PIR-compliant funds benefited also the investment flow directed toward AIM Italia companies. In the first semester of 2017 – the period in which PIR regulation has been introduced in the Italian legal framework – 27 new PIR-compliant funds have been launched and more than 5 billion of Euros have been raised, of which 4 billion were raised in the second quarter of the year (Assogestioni, 2017). The effect of PIR on AIM Italia has not been precisely

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<sup>32</sup> The regulation regarding the so called “Piani Individuali di Risparmio” (PIR) was introduced in the Italian legislation with the 2017 Budget Law. The objective of PIR is to boost the flow of national savings invested in Italian firms, in particular the smaller ones. To achieve this goal, investors are stimulated by tax incentives to invest their savings in PIR-compliant products.

PIR regulation is addressed only to retail investors and it provides to them a tax exemption for the income they earn on PIR investments. This tax exemption is granted to investors who invest less than 30 thousand Euros per year and no more than 150 thousand Euros overall in PIR. In addition, investors are required to maintain their investment in PIR for at least 5 years to benefit of the tax exemption.

To be classified as PIR, the funds allocated to the savings plan should be invested for at least the 70% in financial instruments issued by EU or EEA firms that are based or that have a permanent establishment in Italy. In addition, at least the 30% of the 70% (21% overall) of the funds should be invested in financial instruments of firms not part of the FTSE MIB or of an equivalent index referred to other regulated markets.

estimated till now. It could only be observed that the overall market capitalization increased from Euro 2.6 billion at the end of June 2016 to more than 4 billion Euros one year later (Incorvati, 2017b). In the future, an estimate forecasts that the impact of PIR on AIM Italia will be of more than 3 billion of Euros in 5 years (Incorvati , 2017a). In sum, the advent of PIR may help to solve the scarceness of liquidity that affects AIM Italia and it may also increase the interest of institutional investors on the firms listed in this market.



## 4. EMPIRICAL ANALYSIS: UNDERPRICING ON AIM ITALIA.

In the extant literature there are several empirical researches focusing on IPO underpricing. These studies prove the existence of abnormal initial returns and each of them provides empirical support to some of the underpricing determinants proposed in the literature. However, most of these studies have built their analyses on samples of IPOs occurred in the United States or in the United Kingdom, as it is observable in the literature review reported in this thesis. This results in an empirical literature that – despite being quite broad – is more weighted toward the Anglo-Saxon reality. Hence, the evidence obtained from other countries is more limited. As it has been observed in chapter two, underpricing tend to vary across countries due to differences in culture, institutions and legal systems. Therefore, there could be some institutional or cultural factors that may make specific causes more or less fundamental to explain underpricing moving from US and UK markets to other countries' markets.

Hence, I decide to concentrate my empirical analysis on underpricing of Italian IPOs, in particular those occurred on AIM Italia. Other studies have focused on Italy but to the best of my knowledge they refer to initial offerings occurred until 2013 and they concentrate especially on the main market. Therefore, the aim of this analysis is to verify whether some of the factors that are considered key to explain underpricing on international markets – and most of them are useful to justify initial returns also on the main Italian equity market – are still useful to explain underpricing on AIM Italia.

It is interesting to analyse underpricing on this market because of the role that AIM Italia could have in the Italian economy if it will succeed as its British homologous did. As it has been discussed in the previous chapter, AIM Italia is an equity market dedicated to small and medium companies with growth potential. This market gives to SMEs the possibility to go public and to enjoy the benefits – but also the disadvantages – of being listed. Among the advantages, one of the most relevant is the possibility to raise financial resources to rebalance the firm capital structure and to finance growth. This is a good opportunity offered to SMEs in a country where other forms of financing – whether debt or equity – are experiencing troubles or are underdeveloped. For instance, in Italy bank lending has contracted considerably during the recent financial crisis and it was still diminishing in 2016 for small companies (Banca d'Italia, 2017). In addition, during the period 2012-2016 the overall investment level of private equity firms in the equity capital of Italian companies has been lower than the European average and of many western European countries (Invest Europe, 2017). Therefore, small and medium firms may positively consider the opportunity to get listed on AIM Italia as a way to raise financial resources and to increase their reputation. However, going public is not a costless process.

When firms decide to go public, they should consider that they have to bear direct costs such as fees to be paid to banks and consultants but also the indirect cost of underpricing (Ritter, 1987). Thus, given the importance of underpricing in determining the costs of an IPO – and therefore its convenience with respect to other strategies – it is key to identify which are the main drivers of underpricing on AIM Italia and whether these drivers differ from those that lead the first day price performance of initial offerings in larger international markets.

To do so, the empirical analysis that I conducted is summarized in the following of this chapter. In particular, section 4.1 describes the sources used to collect data and it provides information on the way in which the sample of IPOs is built. Then, all the variables used in the analysis – based on variables used in the international literature – are described in detail in section 4.2. Section 4.3 provides some summary statistics referred to the sample and it also provides a first intuition about the relations between the variables and underpricing. Then, in section 4.4 the main hypotheses to be verified in the analysis are developed. The same section also explains all the steps of the process conducted to obtain the model on which the analysis is based and the results of the main regression analyses are reported. Finally, section 4.5 explains the results and concludes on the underpricing on AIM Italia.

#### 4.1. Data Sources.

The empirical analysis presented in this chapter is based on a sample of IPOs occurred on AIM Italia/MAC between March 1, 2012 and July 31, 2017. The initial date of the sample is the day in which AIM Italia is considered to be born. In practice, it is the day in which AIM Italia and ‘Mercato Alternativo del Capitale’ were merged together.

Data on initial offerings are collected from several sources. The list of IPOs that took place in the period considered and their IPO dates are retrieved on the Borsa Italiana website. Issuers press releases are used to obtain data on offer prices and on the number of shares issued. If press releases are not available, business press news are used. Historical stock prices, market index quotes and Nomads credit ratings are retrieved on Thomson Reuters Eikon<sup>33</sup>. The founding date of Nomads, their ROA in the reference period and the ATECO classification of issuers and Nomads are retrieved from the ‘Aida’ database of Bureau van Dijk. The description of 2007

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<sup>33</sup> For 4 out of 58 observations, the closing price on the first day of trading of IPO shares reported by Thomson Reuters Eikon does not coincide with the price reported by the issuer press release on the first trading day. For this reason, prices for these observations are retrieved on Yahoo Finance. This information provider reports the same prices reported in the issuers press releases.



ATECO codes is retrieved on ISTAT website. All the remaining information is collected from the admission documents of the issuing firms that are available in each issuer's website.

In the considered period, the number of IPOs occurred on AIM Italia is 78. However, not all these IPOs are included in the sample. The IPOs of investing companies – 9 SPACs and 1 SICAF – have been excluded<sup>34</sup>. Another IPO is excluded because issued shares were only allocated for free to the shareholders of the parent company and they were not offered to other investors. For this firm, the price setting process and the first-day of trading returns are likely driven by different factors than those of issuing firms that offer shares to external investors at the IPO. Two IPOs are excluded because they lack information about the number of shares issued. Other 6 firms have been delisted and their admission documents are no more available. For this reason, the IPOs of these firms are excluded from the sample. Another IPO has been excluded from the sample because it is an outlier<sup>35</sup>. This firm presents characteristics that are very far from those of the other companies. In the regression analyses this observation would have significantly influenced the results. Therefore, the final sample consists of 58 IPOs.

## 4.2. Variables Construction.

The analysis of the determinants of underpricing of AIM Italia IPOs conducted in this chapter has required the use of several variables. The following of this section provides a description of these variables, grouping them on the basis of the factors they represent. The description includes the way in which variables are built and it also includes references to the main studies in which these variables are employed.

### *Initial Returns.*

The most important element of this analysis are initial returns since they are the dependent variables of this analysis. As anticipated in chapter 2, initial returns can be computed in two different ways. Raw initial returns (RIR) are defined as  $(P_1 - OP)/OP$  where  $P_1$  is the closing price of the IPO shares at the end of the first trading day and OP is the offer price (Beatty &

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<sup>34</sup> As discussed in the previous chapter, investing companies are different from 'operating' companies. SPACs are blank-check companies that are used to raise money to merge with an operating company and take it public. Instead, the activity of SICAF is much more similar to that of a mutual fund than to the activity of an operating company. For these reasons, the IPOs of non-operating firms are generally not included in the samples used by most of the empirical studies on underpricing (Aggarwal & Rivoli, 1990; Reber & Vencappa, 2016).

<sup>35</sup> A better explanation about the removal of this IPO is provided in the appendix at the end of this chapter.

Ritter, 1986). Instead, market-adjusted initial returns (MIR) are defined as  $(P_1 - OP)/OP - (I_1 - I_0)/I_0$ , where the last term represents the reference market index return in the first trading day of the IPO (Aggarwal & Rivoli, 1990). However, the literature is not unanimous on the way to compute this last term. Some studies (Cassia et al., 2004; Dell'Acqua et al., 2015) define  $(I_1 - I_0)/I_0$  as the return of the reference index between the date in which the offer price is set and the end of the first trading day. Market-adjusted initial returns are defined in this way by the variable MAIR. In this analysis, MAIR is preferred to MIR. The motivation is that MAIR adjusts initial returns for the market performance considering the whole period in which the offer price is fixed. Adjusting market performance only in the first day of trading does not properly consider all the market changes that could have occurred in the time period between the date in which the offer price is set and the IPO date. In any case, it is worth remembering that whatever the way in which market returns are computed, they assume that the systematic risk of the IPO is equal to that of the market. In reality, the beta of IPOs is higher than one (Aggarwal & Rivoli, 1990).

The reference market index used in this chapter is the FTSE Italia All-Share. This index is probably the best proxy of the Italian equity market since it comprises all the companies listed on the main market. FTSE AIM Italia has not been used in this analysis because it started to be computed in 2013, thus after the initial date of the sample.

### *Market conditions.*

The condition of the market before the IPO is considered to affect initial returns. In the literature, market conditions are proxied with several metrics. One of them is the standard deviation of the daily returns of the reference market index in the 100 days before the IPO (MCVOL\_100). This metric is used in Dell'Acqua et al. (2015). Market conditions are also proxied with the standard deviation of the reference index in the 60 days before the initial offering (MC\_INDVOL60) (Cassia et al., 2004).

MCVOL\_100 and MC\_INDVOL60 are quite similar because they both express the uncertainty that characterize the market before the IPO by computing a volatility measure related to the market index. Even though these two variables provide similar information, they are not interchangeable. MC\_INDVOL60 is characterized by a specific weakness. Opposed to MCVOL\_100, it does not compute volatility of daily returns. It computes the standard deviation of the index itself in the 60 days before the IPO. Given that the index level varies – sometimes widely – over time, its standard deviation varies in magnitude accordingly. Therefore, two time periods characterized by the same degree of volatility show two different standard deviations

of the market index if the index level in these two periods is different. For this reason, MCVOL\_100 could be considered a better proxy of market volatility.

A third metric employed to proxy market conditions is the return of the reference index in the 100 days before the IPO (MC\_PER100) (Cassia et al., 2004). Other studies compute returns on smaller timespans. For instance, Lowry and Schwert (2002) compute the index return on the 15 days before the offer. The difference of this metric with the previous ones is that it provides information both on the sign and on the magnitude of the performance of the reference index before the IPO. However, it does not provide information on market volatility.

All the three variables described use as reference market index the FTSE Italia All-share.

### *IPO market activity.*

The level of IPO activity around the initial offering is another market-related issue that is used to explain underpricing. As highlighted in chapter 2, initial returns are affected by the fact that an IPO occurs in a hot or in a cold market period.

In the literature, several variables are employed to express IPO market activity. Some studies (Habib & Ljungqvist, 2001; Reber & Vencappa, 2016) rely on dummy variables to summarize the IPO activity in the market. These dummies are used to identify whether an offering has occurred in a hot or in a cold period. Instead, other studies (Booth & Chua, 1996; Butler, O'Connor Keefe, & Kieschnick, 2014; Espenlaub et al., 2012) use continuous variables to express the IPO market activity. Anyhow, both categories of variables rely on two measures to capture the activity of the IPO market. These measures are the number of IPOs occurred and the average underpricing in a given period.

In this chapter, three alternative variables are used to proxy the IPO market activity. Based on Booth & Chua (1996), IPO3M is defined as the number of IPOs occurred on AIM Italia in the three months before the issue. Similarly, IPOQ represents the number of IPOs that took place on AIM Italia in the same calendar quarter of the initial offer (Dell'Acqua et al., 2015). Instead, UP3M is defined as the average underpricing of initial offerings occurred on AIM Italia in the three months preceding the IPO (Espenlaub et al., 2012).

The values assumed by these three variables are computed considering all the 78 IPOs occurred on AIM Italia between March 2012<sup>36</sup> and July 2017. However, in this calculation even the IPOs of investing companies are included. In order to control whether the inclusion of investing companies compromises the ability of these measures to explain underpricing, the same set of

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<sup>36</sup> The first IPO part of the sample occurred in June 2012.

variables is computed considering the 68 IPOs of operating companies occurred in the same period. These variables are called IPOQS, IPO3MS and UP3MS. In this case, the calculation includes all the IPOs of the operating firms since they can all provide valuable information on the market at the time of their IPO, even though they are not included in the reference sample.

### *Issuer characteristics.*

In the literature, two important issuer attributes are considered to affect underpricing. They are the issuer size and age. These attributes signal how established a company is and they also indicate the uncertainty about an IPO.

In this chapter, issuer size is expressed with two alternative variables. The first is SALES (Reber & Vencappa, 2016). It represents the consolidated revenues of the issuing firm referred to the latest financial year for which audited financial statements have been presented. Information on consolidated revenues are retrieved from the admission document in which key financial statements information are summarized. In this analysis, the sales variable is subject to logarithmic transformation. The resulting variable is called LN(SALES). This transformation is frequently observed in the literature (Butler et al., 2014; Čornanič & Novák, 2015; Habib & Ljungqvist, 2001) in order to linearize the relationship between issuer's sales and underpricing. The other variable used to proxy the issuing firm size is the firm capitalization at the offer price. This variable is used in Filatotchev and Bishop (2002) and in this chapter it is referred to as MCAP.

The age of the issuer is represented by the variable YEARS. As in Filatotchev and Bishop (2002), Keasey and Short (1997) and Reber and Vencappa (2016), it is defined as the difference between the IPO date and the issuer's date of foundation expressed in years.

### *Consultants reputation.*

The reputation of the Nominated Adviser and of the audit firm hired by the issuer is another element that is considered to affect underpricing.

The literature offers several alternatives to measure the reputation of the Nomads<sup>37</sup>. Probably the most used measure of reputation is the one explained by Carter and Manaster (1990). Their

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<sup>37</sup> In practice, a large part of these measures is used to assess the reputation of underwriters. This happens because most of the studies analyse markets that are different from AIM. However, the measures used to evaluate underwriter's reputation could be extended to assess also Nomad's reputation. This has been done by Migliorati and Vismara (2014). In their study, they rank European underwriters - operating both in main and

measure is based on the position of underwriters in ‘tombstone announcements’<sup>38</sup>. However, as highlighted by Migliorati and Vismara (2014) and Espenlaub et al. (2012), ‘tombstone announcements’ are rarely used in Europe. Therefore, alternative reputation measures have been developed. Migliorati and Vismara (2014) propose two alternative ways to assess reputation. The first is the equally weighted market share of the Nomad. It is measured as the number of IPOs handled by the Nomad as a proportion of all the IPOs handled in the market. The second is the proceeds-weighted market share of the Nomad (Megginson & Weiss, 1991). It is computed as the proceeds raised in the initial offerings of the Nomad’s clients as a proportion of the overall proceeds raised in all the IPOs occurred in the market. Market shares – whether equally-weighted or proceeds-weighted – should be computed separately for each of the markets considered. Migliorati and Vismara (2014) observe that the underwriting industry in Europe is fragmented at national level. In addition, the fragmentation is evident in the same country between main and second markets. Therefore, market shares of underwriters in the main market can be used as a proxy of reputation in that market. In the secondary market, those measures may lose their ability to proxy underwriters reputation. Hence, market shares could be used as reputation measures only if they are computed at market level.

Another approach in assessing Nomads reputation is adopted by Espenlaub et al. (2012). In their study, the reputation of a Nomad at the time of the IPO of its client company is defined by a composite measure based on the average of the Nomad percentile ranks in five separate measures in the year prior to the IPO. These five measures are:

1. the equally-weighted market share of the Nomad in the year before the IPO;
2. the proceeds-weighted market share of the Nomad in the year prior to the IPO year;
3. the credit score of the Nomad in the year before the IPO of its client firm;
4. the Nomad’s Return on Assets in the year before the IPO of the advised firm;
5. the age of the Nomad at the IPO of its client firm.

A variable for each of the reputation metrics presented till now – except for Carter and Manaster tombstone measure – has been created. Therefore, the variables defined are the followings:

- NMS is the equally weighted market-share of the Nomad;
- NPR represents the proceeds-weighted market share of the Nomad;

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second markets - according to their reputation. In doing so, they use the same metrics for underwriters and Nomads.

<sup>38</sup> IPO tombstone announcements are deal-specific lists of underwriters based on the number of shares underwritten. An example of tombstone announcement is reported by Carter and Manaster (1990).

- NMSN is the Nomad equally weighted market-share adjusted on a scale that goes from 0 to 1, where 0 corresponds to the market-share of the Nomad with the lowest market share and 1 coincides with the share of the Nomad with the highest market share.
- NPRN is the proceeds-weighted market share of the Nomad, adjusted as before on a scale from 0 to 1;
- NROA is the average ROA of the Nomad in the period 2012-2017, as reported in the Aida database. It is adjusted on a scale from 0 to 1<sup>39</sup>;
- NAGE is the age of the Nomad at the beginning of 2012 (the initial date of the sample) adjusted on a scale from 0 to 1;
- NRAT is the average long-term credit rating of the Nomad between 2012 and 2017 issued by Standard & Poor's. This variable is used to proxy the credit score of the Nomad used in Espenlaub et al. (2012);
- NREP is the reputation of the Nomad resulting from the average of the previous five measures.

The previous five variables are computed slightly differently from Espenlaub et al. (2012). The variables presented in this section are not computed on previous year figures but on the entire time period from March 1, 2012 to July 31, 2017. This adjustment is required to adapt metrics conceived for the AIM of LSE to the characteristics of AIM Italia. As argued in chapter 3, the yearly number of IPOs on AIM Italia is much smaller than that of AIM. Therefore, computing measures on the basis of only one year would alter the effectiveness of that measure in representing Nomads reputation (Migliorati & Vismara, 2014).

The market shares of Nomads – represented by variables NMS and NPR<sup>40</sup> – are computed considering all the 78 IPOs occurred in between March 1, 2012 and July 31, 2017. However, it could be argued that including investing companies in this calculation may seriously affect market share results. In particular, SPACs and SICAF are companies that tend to raise significantly more proceeds at the IPOs than 'operating' firms. Therefore, their presence can significantly bias the proceeds-weighted market share of Nomads. Including these firms in market share calculations may not contribute to increase the information level on the reputation of Nomads since they are not operating companies and they may choose Nomads on different basis. Nomads market-shares computed excluding investing companies are represented by

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<sup>39</sup> On AIM Italia, Nomads are both banks and investment companies, such as 'società di intermediazione mobiliare' and consulting firms. Clearly, the ROA of banks is significantly lower than that of other companies given their high value of assets. However, a low ROA of banks does not necessarily mean that banks are less reputable as Nomads. To take into account of this bias, the return on assets of banks and of non-bank companies are computed in separated scales and NROA summarizes these results in a common scale.

<sup>40</sup> As well as the corresponding variables NMSN and NPRN, adjusted on a scale from 0 to 1.

variables NPRS (proceeds-weighted market share) and NMSS (equally-weighted market share)<sup>41</sup>. Similarly, the reputation of the Nomad based on the methodology of Espenlaub et al. (2012) computed without considering the IPOs of investing companies is measured by variable NREPS.

The reputation of the audit firm hired by the issuer is expressed by two alternative variables. Based on Beatty<sup>42</sup> (1989), BIG4 is a dummy variable which assumes value 1 if the audit firm that is hired for the listing process is part of one of the ‘big four’ auditing networks<sup>43</sup>. Otherwise, the variable assumes value 0.

An alternative variable that is used to proxy the audit firm reputation is INT\_AUDIT. It is a dummy variable that assumes value 1 if the audit firm hired for the listing process is part of an international audit network. Otherwise, the variable assumes value 0.

#### *Issue characteristics.*

Other variables considered in the analysis presented in this chapter take into account specific characteristics of the issue. The literature considers these issue attributes capable of explaining part of the underpricing phenomenon.

The first of these attributes is the ownership retained by pre-IPO shareholders. The variable that refers to this issue characteristic is RO. Following the empirical work of Keasey and Short (1997), this variable is defined as the ratio between the number of pre-IPO shares retained by pre-IPO shareholders and the number of shares immediately after the IPO<sup>44</sup>.

Another attribute is the gross proceeds raised at the IPO. Thus, the variable related to the offer size is GP. It is defined as the number of shares issued at the IPO – both primary and secondary shares – multiplied by the offer price. This calculation excludes the proceeds deriving from the exercise of the greenshoe option. However, most empirical studies employ the natural logarithm

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<sup>41</sup> The corresponding variables adjusted on a scale from 0 to 1 are called NMSNS and NPRNS.

<sup>42</sup> At the time Beatty (1989) published his study, the distinction was between ‘big eight’ and ‘non-big eight’ auditing firms. After mergers and market exits occurred over the years, the ‘big eight’ group is now reduced to four.

<sup>43</sup> Auditing firms are considered part of ‘big four’ if they are part of one of the following networks: PricewaterhouseCoopers, KPMG, Deloitte or Ernst & Young.

<sup>44</sup> In formulas,  $RO = (\text{issued shares existing before the IPO} - \text{secondary shares offered at the IPO}) / \text{issued shares after the IPO}$ . RO does not consider the shares offered with the overallotment option.

of this variable in their analysis (Cohen & Dean, 2005; Čornanič & Novák, 2015). Hence, the variable  $\text{LN}(\text{GP})$  is the natural log transformation of GP.

Following the empirical works of Cassia et al. (2004) and Butler et al. (2014), the variable SELL is defined as the ratio between the number of secondary shares sold at the IPO and the total number of offered shares.

The last variables considered in this analysis that represent an issue characteristic are GS and GSD. Similarly to Chanine (2008), GS is the number of shares in the greenshoe option agreement as a percentage of the number of shares offered at the IPO. An alternative variable to GS is GSD. GSD is defined as a dummy variable that assumes value 1 if a greenshoe option exists for the IPO, otherwise it assumes value 0.

#### *Industry classification.*

Previous studies (Park & Patel, 2015; Ritter, 1984) highlight the possibility that industry-specific factors affect underpricing. Therefore, following the works of Certo et al. (2001), Cohen and Dean (2005) and Espenlaub et al. (2012), industry dummies are used in this analysis. Industry classification of issuers is based on the first level ATECO categorization. A dummy variable is created for each ATECO section with more than two issuers belonging to it. Therefore, FIN is an industry dummy with value 1 for issuers belonging to the financial industry (ATECO section K). PROF is a dummy which assumes value 1 if issuing firms are part of the professional, scientific and technical services industry (section M of ATECO classification). Analogously, EL is an industry dummy for utilities (ATECO section D), MF refers to the manufacturing industry (ATECO section C), COM is the dummy for the commerce and trade industry (ATECO section G) and INF is the dummy for the information and communication industry (ATECO section J).

#### *PIR effects.*

As described in chapter 3, the PIR regulation introduced at the beginning of 2017 in the Italian legislation may have boosted aftermarket liquidity and possibly IPO subscription levels. These two issues are connected with underpricing (Ellul & Pagano, 2006; Koh & Walter, 1989; Rock, 1986). To observe the effects that PIR may have on the underpricing of AIM Italia IPOs, the



dummy variable IPOYEAR\_2017 is used in this analysis. It assumes value 1 for IPOs occurred in 2017 and 0 otherwise.

**Table 3. Summary of all the variables used in the analysis.** For each variable, it is reported a brief description of what it represents, it is made reference to the studies that have already used that variable and it is reported the primary source of data used to compute the variable. In the last column, 'Author calculation' is reported in case the variable is calculated starting from data obtained from calculations made to compute other variables.

Variable	Variable name	Description	References	Source of data
RIR	Raw initial returns	Initial returns in the first trading day.	(Beatty & Ritter, 1986)	Thomson Reuters Eikon; issuer press release
MIR	Market-adjusted initial returns	Initial returns adjusted by market returns in the first day of trading.	(Aggarwal & Rivoli, 1990)	Thomson Reuters Eikon; issuer press release
MAIR	Market-adjusted initial returns	Initial returns adjusted by market returns in the period between the date in which offer price is set and the first day of trading.	(Cassia et al., 2004; Dell'Acqua et al., 2015)	Thomson Reuters Eikon; issuer press release
MCVOL_100	Market volatility	Standard deviation of daily changes of the reference index in the 100 days before the IPO.	(Dell'Acqua et al., 2015)	Thomson Reuters Eikon
MC_INDVOL60	Index volatility	Standard deviation of the reference index in the 60 days before the IPO.	(Cassia et al., 2004)	Thomson Reuters Eikon
MC_PER100	Market performance	Return of the reference index in the 100 days before the IPO.	(Cassia et al., 2004; Lowry & Schwert, 2002)	Thomson Reuters Eikon
IPO3M and IPO3MS (*)	IPOs in previous 3 months	Number of IPOs occurred on AIM Italia in the 3 months before the IPO.	(Booth & Chua, 1996)	Borsa Italiana website
IPOQ and IPOQS (*)	IPOs in the quarter	Number of IPOs occurred on AIM Italia in the same calendar quarter of the IPO.	(Dell'Acqua et al., 2015)	Borsa Italiana website
UP3M and UP3MS (*)	Underpricing in previous 3 months	Average underpricing of IPOs occurred on AIM Italia in the 3 months before the IPO.	(Espenlaub et al., 2012)	Author calculation
LN(SALES)	Issuer sales	Natural logarithm of the consolidated revenues of the issuer as reported in the latest audited annual report.	(Butler et al., 2014; Čornanič & Novák, 2015; Habib & Ljungqvist, 2001)	Admission Document
MCAP	Issuer capitalization	Capitalization of the issuer at the offer price.	(Filatotchev & Bishop, 2002)	Issuer press release
YEARS	Issuer age	Age of the issuer at the IPO expressed in years.	(Filatotchev & Bishop, 2002; Keasey & Short, 1997; Reber & Vencappa, 2016)	Admission Document
NMS and NMSS (*)	Nomad equally-weighted market share	Equally-weighted market share of the Nomad in AIM Italia.	(Migliorati & Vismara, 2014)	Author calculation
NPR and NPRS (*)	Nomad proceeds-weighted market share	Proceeds-weighted market share of the Nomad in AIM Italia.	(Megginson & Weiss, 1991; Migliorati & Vismara, 2014)	Author calculation
NMSN and NMSNS (*)	Adjusted Nomad market share	Nomad equally-weighted market share adjusted on a scale from 0 to 1.	(Espenlaub et al., 2012)	Author calculation

NPRN and NPRNS (*)	Adjusted Nomad proceeds-weighted market share	Nomad proceeds-weighted market share adjusted on a scale from 0 to 1.		Author calculation
NROA	Adjusted ROA of the Nomad	Average ROA of a Nomad in the period 2012-2017 adjusted on a scale from 0 to 1.		'Aida' database of Bureau van Dijk
NAGE	Adjusted age of the Nomad	Age of the Nomad adjusted on a scale from 0 to 1.		'Aida' database of Bureau van Dijk
NRAT	Adjusted rating of the Nomad	S&P Long-term credit rating of the Nomad adjusted on a scale from 0 to 1.		Thomson Reuters Eikon
NREP and NREPS (*)	Nomad reputation	Average of NMSN, NPRN, NROA, NAGE, NRAT.		Author calculation
BIG4	Big four auditing firm	Assumes value 1 if the auditing firm is part of a big 4 auditing network.	(Beatty, 1989)	Admission Document
INT_AUDIT	Auditing firm part of an international network	Assumes value 1 if the auditing firm is part of an international network.		Admission Document
RO	Retained ownership	Ownership retained by pre-IPO shareholders after the IPO.	(Keasey & Short, 1997)	Issuer press release
LN(GP)	Gross proceeds	Natural log of gross proceeds raised by the issuer at the IPO.	(Cohen & Dean, 2005; Čornanič & Novák, 2015)	Issuer press release
SELL	Sale of secondary shares	Ratio between the number of secondary shares sold and the total number of shares offered.	(Butler et al., 2014; Cassia et al., 2004)	Issuer press release
GS	Greenshoe	Number of shares offered in the greenshoe option as a percentage of the total number of shares offered.	(Chanine, 2008)	Admission Document
GSD	Greenshoe option	Assumes value 1 if a greenshoe option exists.		Admission Document
FIN	Financial industry	ATECO section K.		
PROF	Professional services industry	ATECO section M.		
EL	Utilities industry	ATECO section D.	(Certo et al., 2001; Cohen & Dean, 2005; Espenlaub et al., 2012)	'Aida' database of Bureau van Dijk
MF	Manufacturing industry	ATECO section C.		
COM	Trade industry	ATECO section G.		
INF	Information and communication industry	ATECO section J.		
IPOYEAR_2017	IPO occurred in 2017	Assumes value 1 if the IPO occurred in 2017.		Borsa Italiana website

(\*) Variables ending with an 'S' and marked with an asterisk are computed in the same way of the corresponding variables without the 'S', except for excluding investing companies from the calculation.

### 4.3. The Sample.

As highlighted before, the final sample used to perform the analysis described in this chapter is made of 58 IPOs. The average underpricing – measured as average of raw initial returns - observed for this sample is 5.09%. This value decreases to 4.29% computing average underpricing using market-adjusted initial returns<sup>45</sup>. These data are summarized in table 4. Quite surprisingly, average underpricing on AIM Italia is low if compared with both international evidence and previous empirical works on Italian IPOs. For instance, in the period 2010-2013 average underpricing of US IPOs was 14.58% (Park et al., 2016) while in the UK Chambers and Dimson (2009) report average underpricing of 19% between 1987 and 2007. In Italy, average underpricing on the main market was 21.87% (average market-adjusted initial returns were 19.25%) for IPOs occurred between 1985 and 2001 (Cassia et al., 2004). In the following years, average underpricing declined to 12.17% for IPOs occurred on Italian regulated markets in the period 1999-2013 (Lanzavecchia & Mazzonetto, 2014).

The difference between the average underpricing of the sample and underpricing observed by previous studies in Italy's second markets is even more pronounced. Vismara et al. (2012) report an average underpricing of 20.8% for the 9 IPOs occurred on MAC in the period 2007-2009 and Dell'Acqua et al. (2015) observe an average underpricing of 16.32% on AIM Italia until 2012. Smaller initial returns are reported by Lanzavecchia and Mazzonetto (2014) who observe an average underpricing of 8.53% considering IPOs occurred on AIM Italia until July 2013.

Consistently with previous studies (Dell'Acqua et al., 2015; Habib & Ljungqvist, 2001), the observed underpricing varies significantly across issues. In the sample considered, raw initial returns vary from -21.08% to 40.63%. As highlighted in table 5, approximately one third of IPOs is overpriced<sup>46</sup>. However, most of these IPOs is only slightly overpriced, given that they are concentrated in the [-5%,0%) interval of raw initial returns. It is also worth noting that by adjusting initial returns for market returns, IPOs tend to be less underpriced. In particular, negative returns intervals tend to be more populated.

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<sup>45</sup> Average underpricing considering all the IPOs occurred on AIM Italia between March 1, 2012 and July 31, 2017 excluding the IPOs of investing companies is 5.56% if measured using raw initial returns and it is 4.74% if computed using market-adjusted initial returns.

<sup>46</sup> An IPO is overpriced if the closing price in the first day of trading is lower than the offer price.

**Table 4. RIR and MAIR.** Summary statistics of the raw initial returns (variable RIR) and of the market-adjusted initial returns (variable MAIR) of the IPOs part of the sample.

	RIR	MAIR
Observations	58	58
Mean (%)	5.09%	4.29%
Standard deviation	0.1208	0.1189
1 <sup>st</sup> quartile (%)	-1.92%	-2.42%
Median (%)	2.44%	1.70%
3 <sup>rd</sup> quartile (%)	11.25%	10.31%
Minimum (%)	-21.08%	-18.41%
Maximum (%)	40.63%	38.48%

**Table 5. RIR and MAIR intervals.** Breakdown of IPOs in intervals of raw initial returns (RIR) and market-adjusted initial returns (MAIR).

Returns intervals		RIR		MAIR	
		No. IPOs	% IPOs	No. IPOs	% IPOs
less than -20%		1	1.72%	0	0.00%
-20%	-10%	4	6.90%	4	6.90%
-10%	-5%	2	3.45%	9	15.52%
-5%	0%	12	20.69%	9	15.52%
0%	5%	17	29.31%	18	31.03%
5%	10%	5	8.62%	3	5.17%
10%	20%	9	15.52%	7	12.07%
20%	30%	6	10.34%	6	10.34%
30%	40%	1	1.72%	2	3.45%
more than 40%		1	1.72%	0	0.00%
Total		58	100%	58	100%

Consistently with international evidence (Ibbotson & Jaffe, 1975; Lowry & Schwert, 2002; Ritter, 1984), both the underpricing and the volume of AIM Italia IPOs vary over time. Table 6 summarizes this variations for the IPOs of the sample. It could be observed that the IPO volume varies considerably across years. Almost half of the IPOs of the sample occurred in 2014 and 2015. Instead, the sample contains only three IPOs occurred in 2012. The first seven months of 2017 registered 8 IPOs of ‘operating firms’, equating the IPO volume of all the twelve months of 2016. From table 6, it is also observable the underpricing variation over time. Patterns of underpricing variation are similar for raw initial returns and market-adjusted initial

returns. Underpricing is high in 2012 – consistently with Dell'Acqua et al. (2015) – and it decreases in the following years<sup>47</sup>, before it returns over 10% in 2017.

Another interesting evidence presented in table 6 is money left on the table<sup>48</sup> by issuers. Clearly, the pattern followed by the total yearly amount of money left on the table does not follow that of initial returns. This happens because ‘money left on the table’ depend on the number and on the size of the IPOs occurred in a given year and on the degree of underpricing. However, a pattern similar to that of initial returns is that of average money left on the table by IPOs per year. As a proof of the small size of AIM Italia IPOs, it could be observed that the average issuer of the sample has left on the table 0.3 millions of Euros at the IPO. In comparison, the average issuer on MTA left 22.2 millions of Euros in the period 1985-2001 (Cassia et al., 2004) while the average issuer in the UK left 6.4 millions of pounds on the table at the IPO between 2000 and 2007 (Chambers & Dimson, 2009).

**Table 6. IPO volume, underpricing and money left of the table per year.** The table reports the number and the relative frequencies of IPOs part of the sample per year. In columns RIR and MAIR, the yearly averages of raw initial returns and market-adjusted initial returns are reported. The sixth column shows the amount of money left on the table per year by the IPO firms part of the sample. The final column shows the average money left on the table by the issuing firms of the sample per year of IPO.

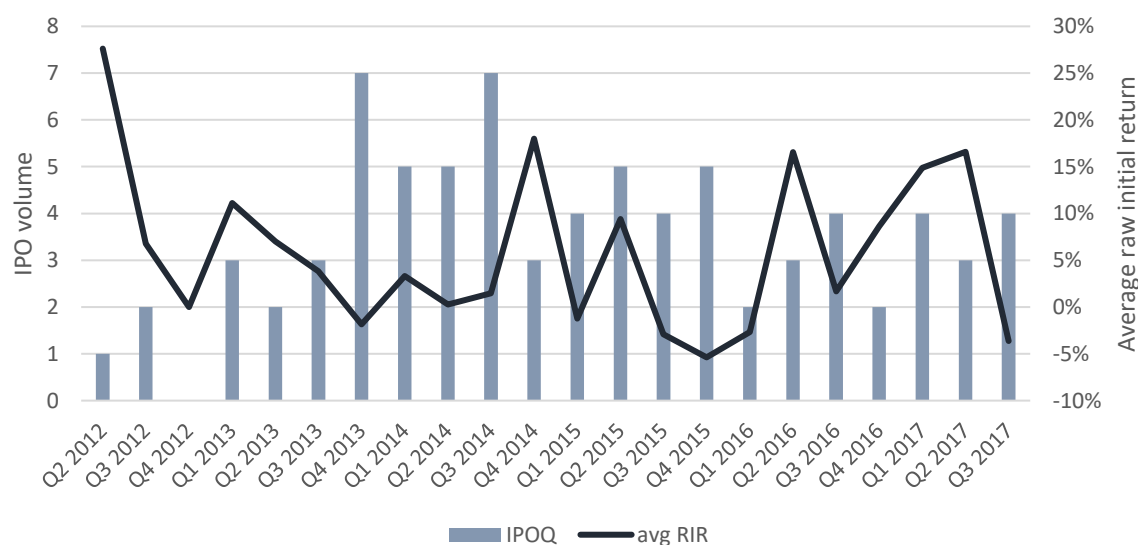
YEAR	IPO volume	IPO volume (%)	RIR	MAIR	Money left on the table	Avg. money left on the table
2012	3	5.2%	13.7%	9.7%	€ 1,230,210	€ 410,070
2013	10	17.2%	2.3%	1.6%	€ 2,058,696	€ 205,870
2014	17	29.3%	4.5%	4.4%	€ 5,270,689	€ 310,041
2015	12	20.7%	2.1%	1.6%	€ 988,568	€ 82,381
2016	8	13.8%	5.2%	3.8%	€ 1,564,737	€ 195,592
2017	8	13.8%	10.9%	10.0%	€ 6,435,271	€ 804,409
Total	58	100.0%	5.09%	4.29%	€ 17,548,171	€ 302,555

Evidence of underpricing and IPO volume variations over time is presented also in figure 3. The bars of the graph represent the number of IPOs per quarter, including both investing companies and offerings excluded from the sample. In practice, they represent the values assumed by the variable IPOQ. All the IPOs are included because they provide better information on IPO market activity than considering only the IPOs part of the sample. The line shows the average raw initial returns per quarter of the IPOs included in the sample. At first

<sup>47</sup> This pattern is consistent with previous studies. Dell'Acqua et al. (2015) report an average raw initial return of 16.32% for the 17 IPOs occurred on AIM Italia and MAC until 2012. Expanding the analysis to the first 7 months of 2013 makes average underpricing to decrease to 8.53% (Lanzavecchia & Mazzonetto, 2014).

<sup>48</sup> To recall, money left on the table is underpricing measured in monetary terms.

sight, this graph provides evidence of volume and underpricing variations over time even at intra-year level. A closer look may also reveal that quarters with larger IPO volumes tend to follow quarters of higher average initial returns. This is particularly evident for the high-volume periods between the fourth quarter of 2013 and the third quarter of 2014 or for the third quarter of 2016. All these quarters follow periods of higher initial returns. The pattern is less visible in other quarters probably because of the small IPO volume that characterize AIM Italia. Anyhow, this pattern is consistent with Ibbotson and Jaffe (1975) and Lowry and Schwert (2002).



**Figure 3. Initial returns and IPO volume.** The bars of the graph represent the volume of IPOs on AIM Italia per quarter as measured by variable IPOQ. The line represents the average raw initial returns of the IPOs part of the sample per quarter.

Descriptive statistics on the size of the issuing firms part of the sample are presented in table 7. As anticipated in the previous chapter, AIM Italia companies are quite small. The issuers part of the sample report average revenues of 35.7 million euros in the financial year before their IPO. In comparison, the average revenues of IPO firms on MTA were of 722 million euros in the period 1985-2001 (Cassia et al., 2004) and they were of 298 million of dollars for US IPOs between 1980 and 2012 (Reber & Vencappa, 2016). However, the average sales figure for AIM Italia IPOs is quite in line with the values observed in other European exchange-regulated markets (Vismara et al., 2012). It is worth noting that the standard deviation of sales is considerably high. This happens because the distribution of sales of the IPOs part of the sample is quite dispersed. In particular, there are a few IPO firms with high sales levels that raise the average figure. This is another reason to adopt the natural log transformation of variable SALES in this analysis. It is interesting to observe that the sales of approximately a quarter of issuing

firms are below the 5 million euros threshold and that the median firm reports sales of 12.5 million euros in the financial year before the IPO.

The other measure of firm size used in this study is the capitalization of the issuing firm at the offer price, expressed by variable MCAP. In this case, the distribution is less dispersed than that of sales. It is interesting to observe that half of the firms part of the sample do not have a capitalization at the offer price higher than 31 million euros. This means that more than half of the firms part of the sample would have not met the minimum foreseeable market capitalization requirement of 40 million euros if they decided to list on MTA (Borsa Italiana, 2017) instead of AIM Italia. Therefore, for many of the firms that decide to go public, AIM Italia is the only available choice in Italy (Vismara et al., 2012).

**Table 7. Sales and capitalization of issuers.** The table reports the main summary statistics referred to variable SALES, that represents the sales reported by issuing firms at consolidated level in the last audited annual reports available before the IPO. The table also provides summary statistics about variable MCAP, that represents firms capitalization at the offer price.

	SALES	MCAP
Observations	58	58
Mean (€m)	35,655	42,393
Standard deviation (€m)	125,061	37,510
1 <sup>st</sup> quartile (€m)	5,326	18,875
Median (€m)	12,511	30,136
3 <sup>rd</sup> quartile (€m)	27,582	57,460
Minimum (€m)	51	4,485
Maximum (€m)	952,732	199,872

Table 8 reports the breakdown of IPOs based on sales intervals (Panel A) and capitalization intervals at the offer price (Panel B). It could be observed that initial returns do not seem to follow specific patterns in relation to sales and capitalization.

**Table 8. Sample IPOs breakdown based on sales and capitalization intervals.** Panel A provides information on the number of IPOs and initial returns for each interval of issuer sales. Panel B provides the same information per capitalization at the offer price intervals.

Panel A					
Sales intervals (€m)		No. IPOs	No. IPOs (%)	RIR	MAIR
€ 0	€ 2,500	8	13.8%	8.1%	6.7%
€ 2,500	€ 5,000	6	10.3%	-4.1%	-5.0%
€ 5,000	€ 7,500	5	8.6%	10.1%	10.1%
€ 7,500	€ 10,000	4	6.9%	9.2%	9.8%
€ 10,000	€ 15,000	11	19.0%	5.2%	3.6%

€ 15,000	€ 20,000	5	8.6%	10.7%	11.0%
€ 20,000	€ 30,000	5	8.6%	3.6%	2.5%
€ 30,000	€ 40,000	7	12.1%	6.3%	6.0%
€ 40,000	€ 50,000	1	1.7%	-16.4%	-18.4%
€ 50,000	€ 100,000	4	6.9%	3.0%	1.4%
More than € 100,000		2	3.4%	-1.0%	-0.2%
Total		58	100%		

Panel B					
Capitalization at the offer price (€m)		No. IPOs	No. IPOs (%)	RIR	MAIR
€ 0	€ 10,000	5	8.6%	5.7%	4.5%
€ 10,000	€ 20,000	10	17.2%	10.0%	8.8%
€ 20,000	€ 30,000	14	24.1%	2.8%	2.6%
€ 30,000	€ 40,000	10	17.2%	3.5%	1.1%
€ 40,000	€ 50,000	2	3.4%	8.3%	6.8%
€ 50,000	€ 75,000	10	17.2%	5.9%	5.6%
€ 75,000	€ 100,000	2	3.4%	2.2%	2.6%
More than € 100,000		5	8.6%	2.3%	3.1%
Total		58	100%		

The average age at the IPO of the issuing firms included in the sample is of 12.6 years, as it is observable in table 9. This value is much lower than the average age of 49 years reported by Cassia et al. (2004) for a sample of IPOs on the Italian main market. However, looking at comparable foreign markets, the age of issuers on AIM Italia is significantly higher than that of firms that go public in other European exchange-regulated markets (Vismara et al., 2012). For instance, on the AIM of London the average age of a sample of firms that went public between 1995 and 2004 is of 3.7 years.

**Table 9. Summary statistics of variable YEARS, representing the age of issuers at the IPO.**

Variable	Observations	Mean	Standard Deviation	1 <sup>st</sup> quartile	Median	3 <sup>rd</sup> quartile	Min	Max
YEARS	58	12.55	10.86	4	11	16	0	53

Table 10 reports the breakdown of the IPOs based on age intervals. In addition, for each interval are reported the average initial returns for the IPOs part of that age bracket. It is difficult to identify a clear pattern of underpricing in relation to age. However, it is worth noting that older



issuers are on average more underpriced than younger ones. Anyway, this evidence may be driven by the lower volume of older issuers in the sample.

*Table 10. IPO breakdown based on intervals of issuers age.*

Age intervals (years)		No. IPOs	No. IPOs (%)	RIR	MAIR
0	5	16	27.59%	3.2%	1.5%
5	10	12	20.69%	6.2%	5.9%
10	15	13	22.41%	3.0%	2.8%
15	20	5	8.62%	5.8%	5.5%
20	25	5	8.62%	1.6%	1.8%
25	30	3	5.17%	14.9%	14.4%
More than 30 years		4	6.90%	12.3%	9.2%
		58	100%		

Table 11 provides some descriptive statistics on the main characteristics of the IPOs of the sample. Pre-IPO shareholders use to retain a large share of equity of their firms after the IPO. On average, they maintain the 79% of the equity of their firms after the initial offering. As highlighted in panel 1 of table 12, only in one IPO, shareholders keep less than 50% of ownership of their firm after the offering.

The average gross proceeds raised at the IPO by the firms of the sample are of 8.3 million euros. However, the distribution of gross proceeds is quite dispersed. This is not strange considering the great variation of firm capitalization at the offer price of the firms of the sample previously described.

Panels A and B of table 12 propose a breakdown of IPO volume and underpricing based on intervals of retained ownership and gross proceeds. Based only on these simple categorisations, there not seems to be a relationship of underpricing with retained ownership and gross proceeds. Table 11 also provides statistics on the percentage of secondary shares offered on the total shares issued at the IPO. As highlighted in panel C of table 12, only in the 29.3% of cases, secondary shares have been issued at the IPO by the issuers part of the sample. However, in these IPOs, secondary shares have always been issued together with primary shares<sup>49</sup>. The fact that all the IPOs offer primary shares provides additional evidence to the hypothesis that second markets are frequently used by firms to finance growth instead of simply providing an exit strategy to current shareholders (Espenlaub et al., 2012; Vismara et al., 2012).

<sup>49</sup> This assertion is derived from evidence reported in table 11. The maximum value of variable SELL that represents the number of secondary shares sold in percentage to the total number of shares issued at the IPO is 61.54%. Therefore, even in this case the IPO comprised newly issued shares.

Greenshoe option agreements have been negotiated only by 25.9% of firms part of the sample. The maximum amount of shares offered in the greenshoe option in percentage to the total amount of shares issued at the IPO is positively correlated with the gross proceeds raised at the initial offering<sup>50</sup>. This may suggest that greenshoe options are granted to or that are required by the banks part of the issuing process only in case of larger firms that could possibly develop a more liquid market after the IPO.

As shown in panels C and D of table 12, average underpricing do not vary significantly for IPOs that offer secondary shares or for those issuers that provide a greenshoe option.

**Table 11. Summary statistics** for variables *RO* (retained ownership), *GP* (gross proceeds), *SELL* (% secondary shares part of the offer), *GS* (% of shares granted in the greenshoe option on the total amount of shares offered at the IPO).

	RO	GP (m€)	SELL	GS
Observations	58	58	58	58
Mean	79.00%	€ 8,271	7.35%	3.14%
Standard deviation	9.66%	€ 7,400	13.89%	5.68%
1 <sup>st</sup> quartile	74.07%	€ 3,488	0.00%	0.00%
Median	82.33%	€ 5,314	0.00%	0.00%
3 <sup>rd</sup> quartile	86.98%	€ 9,999	10.00%	5.06%
Minimum	48.47%	€ 1,365	0.00%	0.00%
Maximum	90.47% <sup>51</sup>	€ 29,606	61.54%	15.00%
Total		€ 479,724		

**Table 12. IPO breakdown** based on intervals of retained ownership (*RO*), gross proceeds (*GP*), *SELL* and *GS*.

Panel A					
RO		No. IPOs	No. IPOs (%)	RIR	MAIR
40%	50%	1	1.7%	0.0%	-4.6%
50%	60%	2	3.4%	5.9%	1.0%
60%	70%	8	13.8%	-4.1%	-4.0%
70%	80%	17	29.3%	4.8%	4.4%
80%	90%	29	50.0%	8.0%	7.2%
90%	100%	1	1.7%	3.5%	0.7%
Total		58	100%		

<sup>50</sup> The correlation between variables *GS* and *GP* is 0.6477. It is interesting to observe that also firms that raise more proceeds at the IPO are generally larger. The correlation between *GP* and *MCAP* is 0.8231.

<sup>51</sup> The minimum floating capital required by AIM Italia rules is 10%. In this case, this requirement seems not respected. However, the pre-IPO shareholder base of this firm includes 14 shareholders owning less than 5% of the firm's equity. Of these, 5 shareholders are below the 1% threshold. Therefore, it may be that these shareholders are included in the free-floating capital calculation.

Panel B					
GP (m€)		No. IPOs	No. IPOs (%)	RIR	MAIR
0	5,000	25	43.1%	9.8%	8.7%
5,000	10,000	19	32.8%	-0.3%	-0.9%
10,000	15,000	4	6.9%	6.5%	4.5%
15,000	20,000	3	5.2%	3.5%	1.3%
20,000	25,000	5	8.6%	1.9%	2.3%
25,000	30,000	2	3.4%	4.9%	7.6%
Total		58	100%		

Panel C				
GS	No. IPOs	No. IPOs (%)	RIR	MAIR
0%	43	74.1%	5.3%	4.2%
More than 0%	15	25.9%	4.4%	4.4%
Total	58	100%		

Panel D				
SELL	No. IPOs	No. IPOs (%)	RIR	MAIR
0%	41	70.7%	4.97%	4.08%
More than 0%	17	29.3%	5.39%	4.80%
Total	58	100%		

The sectorial segmentation of the issuers part of the sample based on the ATECO classification is presented in table 13. However, not all the industries are represented in the sample. In particular, there are 4 industries with just one or two firms in the sample and only 6 industries out of 21 have more than 2 issuers. As discussed, the analysis conducted in this chapter employs industry dummies only for the latter 6 industries. The initial returns reported in industries represented with two issuers or less may be significantly affected by observations with extreme values.

**Table 13. IPO firms breakdown on the basis of the first level of ATECO industry classification.** Not all the industries are represented in the sample. English translation from Italian of the descriptions of ATECO sections is retrieved from the Regulation No. 1893/2006 of the European Parliament and of the Council of 20 December 2006.

Section	Description	No. of issuers	No. Of issuers (%)
A	Agriculture, forestry and fishing	0	0.0%
B	Mining and quarrying	0	0.0%
C	Manufacturing	12	20.7%
D	Electricity, gas, steam and air conditioning supply	5	8.6%
E	Water supply; sewerage, waste management and remediation activities	0	0.0%

F	Construction	0	0.0%
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	5	8.6%
H	Transportation and storage	2	3.4%
I	Accommodation and food service activities	1	1.7%
J	Information and communication	15	25.9%
K	Financial and insurance activities	4	6.9%
L	Real estate activities	0	0.0%
M	Professional, scientific and technical activities	12	20.7%
N	Administrative and support service activities	0	0.0%
O	Public administration and defence; compulsory social security	0	0.0%
P	Education	1	1.7%
Q	Human health and social works activities	0	0.0%
R	Arts, entertainment and recreation	1	1.7%
S	Other service activities	0	0.0%
T	Activities of households as employers; undifferentiated goods- and service-producing activities of households for own use	0	0.0%
U	Activities of extraterritorial organisations and bodies	0	0.0%
Total		58	100%

In table 14, the average initial returns of the IPOs of the issuers belonging to the most represented sectors are reported. It could be observed that both average raw initial returns and average market-adjusted initial returns vary across industries. Quite surprisingly, IPOs part of the information and communication industry (sector J) experienced quite low underpricing on average. These IPOs are generally affected by higher levels of initial returns (Filatotchev & Bishop, 2002) because the IT sector is one of those with the most promising growth opportunities but it is also characterized by higher uncertainty than more mature industries. Anyhow, average initial returns of the information and communication industry may be affected by the composition of this industry according to ATECO. The ATECO section of information and communication comprises activities ranging from telecommunications, software development and IT services to publishing, film-making and television broadcasting. Therefore, the wide range of activities comprised in this section may affect the average underpricing of this industry. It may be appropriate to analyse the IPOs at a more detailed level. However, splitting the IPO firms part of the sample on the basis of two-digit ATECO industries would reduce dramatically the number of firms part of each category. In this situation, the average underpricing figure computed for each two-digit code industry may be seriously affected by individual observations.

**Table 14. Number of IPOs and initial returns per industry.** Only the industries with more than 2 IPOs are reported.

Industry dummy	ATECO section	ATECO description	No. IPOs	RIR	MAIR
MF	C	Manufacturing	12	8.60%	8.26%
EL	D	Electricity, gas, steam and air conditioning supply	5	6.08%	5.67%
COM	G	Wholesale and retail trade; repair of motor vehicles and motorcycles	5	0.24%	-0.29%
INF	J	Information and communication	15	3.39%	3.05%
FIN	K	Financial and insurance activities	4	0.19%	-1.46%
PROF	M	Professional, scientific and technical activities	12	9.94%	8.57%

The following tables describe the Nomads involved in AIM Italia IPOs and their relationship with underpricing. Tables 15 and 16 provide the same type of information. The only difference is in the type of IPOs considered to produce those data. As discussed earlier in this chapter, Nomads reputation is computed in several ways in the literature. Two of them are the proceeds-weighted and the equally-weighted market shares of Nomads. In this analysis, these two market-shares can be computed considering either all the IPOs occurred between March 2012 and July 2017 or considering the IPOs occurred in the reference period except those of investing companies. In the first case, results are presented in table 15. In the case excluding investing companies, results are shown in table 16. It could be observed that two Nomads – Banca Aletti and Intermonte SIM - have only advised investing companies, therefore they are missing in table 16. The exclusion of investing companies has also impacted significantly on the market shares of Banca IMI and UBI Banca. Both Nomads have predominantly advised investing companies in the reference period, so they are both left with only one IPO advised in table 16 after excluding SPACs and SICAF. Anyhow, the most evident difference between the two tables is about the proceeds-weighted market shares of Nomads. The amount of proceeds raised are significantly affected by the presence of investing companies. Overall proceeds raised in the reference period considering SPACs and SICAF are over 1.2 billion euros. After removing all ten investing companies, overall proceeds raised are more than halved at 0.5 billion euros. This means that in the reference period, each of the investing companies raised on average more than 75 million euros. This amount is much higher than the 8.3 million euros raised on average by operating companies. This evidence justifies why in this analysis it has been preferred to rely on Nomads reputation measures that do not consider investing companies. As discussed before, the selection of the Nomad by investing companies may be driven by factors that are different from those of operating companies. To compute the Nomad reputation, all the IPOs

of operating companies are considered because even if they are not part of the sample they can still provide useful information on Nomads.

Another interesting fact that could be observed in tables 15 and 16 is that the IPO market of AIM Italia is not dominated by the same investment banks that dominate the new issues market of MTA. Small Nomads such as EnVent and Integrae have advised more than 60% of operating companies in their listing process while a large Italian investment bank such as Banca IMI has only advised one operating firm. This fact has already been discovered by Migliorati and Vismara (2014), who observe that the IPO market of main and second markets in the same country tend to be served by different underwriters.

**Table 15. List of Nomads that advised issuing firms in the period March 1, 2012 – July 31, 2017.** Data comprise the IPOs of investing companies. For each Nomad, it is reported the number of issuers advised in the reference period, the market-share, the overall amount of proceeds raised by the Nomad's clients, the proceeds-weighted market share and the average reputation of the Nomad using the methodology based on Espenlaub et al. (2012).

Nomad	No. IPOs	NMS - market share	Proceeds raised (m€)	NPR – proceeds weighted mkt share	NREP
Advance SIM S.p.A.	2	2.6%	€ 31,974	2.5%	0.22
Aletti & C. Banca di Investimento Mobiliare S.p.A.	1	1.3%	€ 80,000	6.3%	0.33
Baldi & Partners	2	2.6%	€ 7,487	0.6%	0.06
Banca Akros S.p.A.	1	1.3%	€ 6,900	0.5%	0.34
Banca Finnat Euramerica S.p.A.	5	6.4%	€ 15,345	1.2%	0.28
Banca IMI S.p.A.	4	5.1%	€ 404,000	31.8%	0.58
Banca Intermobiliare di Investimenti e Gestioni S.p.A.	1	1.3%	€ 19,344	1.5%	0.06
Banca Popolare di Vicenza S.p.A. <sup>52</sup>	7	9.0%	€ 87,245	6.9%	0.56
CFO SIM S.p.A.	2	2.6%	€ 102,123	8.0%	0.17
EnVent Capital Markets Ltd. <sup>53</sup>	19	24.4%	€ 133,097	10.5%	0.24
Equita SIM S.p.A.	3	3.8%	€ 63,416	5.0%	0.13
Integrae SIM S.p.A.	24	30.8%	€ 108,116	8.5%	0.46
Intermonte SIM S.p.A.	1	1.3%	€ 35,000	2.8%	0.05
UBI Banca S.C.p.A.	4	5.1%	€ 156,513	12.3%	0.42
Unipol Banca S.p.A. <sup>54</sup>	2	2.6%	€ 19,637	1.5%	0.36
Total	78	100.0%	€ 1,270,196	100.0%	

<sup>52</sup> Also referred to in the sample as 'Banca Popolare di Vicenza S.C.p.A.'.

<sup>53</sup> In the sample, it is also referred to as 'EnVent – Independent Investment Banking S.p.A.'.

<sup>54</sup> Comprises data referred to 'Unipol Merchant S.p.A.'.

**Table 16. List of Nomads that advised issuing firms in the period March 1, 2012 – July 31, 2017, excluding investing companies.** For each Nomad, it is reported the number of issuers advised in the reference period, the market-share, the overall amount of proceeds raised by the Nomad's clients, the proceeds-weighted market share and the average reputation of the Nomad using the methodology based on Espenlaub et al. (2012).

Nomad	No. IPOs	NMSS - market share	Proceeds raised (m€)	NPRS – proceeds weighted mkt share	NREPS
Advance SIM S.p.A.	2	2.9%	€ 31,974	6.2%	0.26
Baldi & Partners	2	2.9%	€ 7,487	1.4%	0.07
Banca Akros S.p.A.	1	1.5%	€ 6,900	1.3%	0.37
Banca Finnat Euramerica S.p.A.	5	7.4%	€ 15,345	3.0%	0.31
Banca IMI S.p.A.	1	1.5%	€ 24,000	4.6%	0.40
Banca Intermobiliare di Investimenti e Gestioni S.p.A.	1	1.5%	€ 19,344	3.7%	0.09
Banca Popolare di Vicenza S.p.A.	7	10.3%	€ 87,245	16.8%	0.65
CFO SIM S.p.A.	1	1.5%	€ 4,123	0.8%	0.12
EnVent Capital Markets Ltd.	18	26.5%	€ 127,097	24.5%	0.36
Equita SIM S.p.A.	3	4.4%	€ 63,416	12.2%	0.20
Integrae SIM S.p.A.	24	35.3%	€ 108,116	20.8%	0.58
UBI Banca S.C.p.A.	1	1.5%	€ 5,013	1.0%	0.33
Unipol Banca S.p.A.	2	2.9%	€ 19,637	3.8%	0.39
Total	68	100.0%	€ 519,696	100.0%	

Table 17 provides a breakdown of the IPOs included in the sample on the basis of intervals of reputation of their Nomads. In panel A, reputation is measured as the proceeds-weighted market share of the Nomad. From this basic analysis, it could be noted that IPOs assisted by Nomads with a proceeds-share in the top bracket are on average less underpriced than IPOs whose Nomad is in the worst proceeds-share interval. The Nomads market-share interval breakdown of IPOs do not provide any preliminary evidence of a linear relation between Nomads market shares and the underpricing of their client issuing firms. The results presented in panel C provide a hint similar to that of panel A in the sense that issuing firms assisted by Nomads in the top reputation intervals are on average less underpriced than the IPOs of issuers who hired Nomads in lower reputation intervals.

**Table 17. IPO breakdown on the basis of Nomad reputation.** Panel A categorizes IPOs on the basis of the proceeds-weighted market share of their Nomads in the reference period. Panel B provides a breakdown of IPOs based on the market-shares of their Nomads. Finally, Panel C uses intervals of Nomads reputation measured in the same way as variable NREPS to categorise IPOs.

Panel A					
Proceeds share intervals (NPRS)		No. IPOs	No. IPOs (%)	RIR	MAIR
0%	5%	12	20.7%	9.31%	8.63%
5%	10%	2	3.4%	6.22%	3.32%
10%	15%	3	5.2%	4.52%	6.61%
15%	20%	7	12.1%	-3.52%	-4.01%
20%	25%	34	58.6%	5.36%	4.32%
Total		58	100%		
Panel B					
Mkt-share intervals (NMSS)		No. IPOs	No. IPOs (%)	RIR	MAIR
0%	10%	17	29.3%	8.10%	7.65%
10%	20%	7	12.1%	-3.52%	-4.01%
20%	30%	15	25.9%	1.39%	0.14%
30%	40%	19	32.8%	8.50%	7.62%
Total		58	100%		
Panel C					
Reputation intervals (NREPS)		No. IPOs	No. IPOs (%)	RIR	MAIR
0	0.1	3	5.2%	17.49%	16.48%
0.1	0.2	1	1.7%	6.42%	2.45%
0.2	0.3	5	8.6%	-3.69%	-4.55%
0.3	0.4	22	37.9%	4.23%	3.09%
0.4	0.5	1	1.7%	7.75%	5.83%
0.5	0.6	19	32.8%	4.56%	3.62%
0.6	0.7	7	12.1%	-3.52%	-4.01%
Total		58	100%		



#### 4.4. The Model.

The information presented in the previous section are aimed at providing a better understanding of the characteristics of the IPOs of the sample used in this analysis. Data have been disaggregated to provide an intuition of possible relations between the values assumed by specific variables and underpricing. However, evidence obtained from data breakdown can just give a feeling of which could be the relations between data. A more thorough analysis on the determinants of underpricing is carried out in the following part of the chapter.

In this section, a multiple linear regression model based on the study of Dell'Acqua et al. (2015) is developed. The results of the multiple linear regression analyses and their interpretation are then presented. These findings are used to conclude on the underpricing of AIM Italia IPOs.

Anyhow, before starting the analysis, it is necessary to identify which are the hypotheses on the underpricing of AIM Italia IPOs that this study wants to test.

##### 4.4.1. Hypotheses Development.

In order to verify which are the determinants of underpricing on AIM Italia, some of the main causes of underpricing that are identified in the literature and that are reported in the first two chapters of this thesis are tested empirically on the sample of AIM Italia IPOs previously described. The results of this analysis may indicate whether the first-day price performance of initial offerings on AIM Italia is driven by the same factors that drive underpricing in larger international markets or if there are peculiar characteristics that make the underpricing explanation to differ on this smaller market.

In particular, the characteristics of AIM Italia that are presented in the previous chapter may suggest that information asymmetries may play a key role to explain underpricing on this market. AIM Italia companies are smaller and generally younger than the firms listed on the main market. As argued in section 1.2.2, the size and the age of a company signal how established a firm is. Younger companies have a short operating history, so their observable past operating and financial performances are quite limited (Reber & Vencappa, 2016). For this reason, investors are more uncertain in valuing the firm and they tend to discount this uncertainty in their valuation. Smaller firms are generally characterized by a less structured organization and simpler control systems. These firms may also depend on the founder or on key employees and executives. If key people leave, the company may lose a significant part of its know-how or of its network of relationships. The management team in small and medium firms is smaller and less specialized. Although this enhances the firm flexibility, it is also a

source of uncertainty given that decisions on different matters are taken by a limited number of people. In addition, the probability of default of small companies is higher than that of large companies (Park & Patel, 2015). The limited press and analyst coverage on smaller companies means that fewer information is available on these firms. This determines a lack of legitimacy and reputation in the financial community. All these facts explain why small and medium firms are perceived as more risky than large firms. Given the risk associated to these firms and the uncertainty about their future prospects, investors require price protection in the form of higher underpricing to participate to their IPOs.

*Hypothesis 1: Issuer size and IPO underpricing are negatively related.*

*Hypothesis 2: The age of the issuer and IPO underpricing are negatively related.*

In order to reduce the uncertainty of investors in valuing issuing firms, the issuer may adopt a signalling strategy. As discussed in the literature review of this thesis, signals could be used by issuers in order to reduce the information asymmetries with investors. A signal has the role to communicate to the potential investor base additional information about issuers, over and above those formally communicated through compulsory documents and press releases. An investor who receives a signal – and that is able to interpret it – is able to improve his valuation of the issuing firm thanks to the greater amount of information he possesses. Therefore, by lowering investors' uncertainty about firms value and by reducing information asymmetries, signals contribute to reducing underpricing.

Two of the most important signals that an issuer could employ are related to the reputation of the underwriter and of the auditor that he hires. These agents have the role to certify an issue with their own reputation (Beatty, 1989; Carter & Manaster, 1990). In particular, a reputable underwriter certifies that an issue is well priced and a reputable auditor certifies the dependability of the financial statements of the issuer. The certification role of these agents is deeply connected with their reputation. If they fail to meet their certification role, their reputational capital is eroded and this could reduce their profitability or it could push them out of the market<sup>55</sup> (Beatty & Ritter, 1986). In AIM Italia, I expect the certification role of the agents involved in the IPO process to be very important. In this context, instead of the underwriter it is better to consider the Nomad. Nomads fulfil one of the most important roles. They have to evaluate the appropriateness of a firm to be admitted to the market and they have

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<sup>55</sup> For a more detailed explanation see section 1.2.2.

to help the firm to comply with the rules of Borsa Italiana. As argued by Espenlaub et al. (2012), they act as gatekeepers and decentralized regulators. In addition, the authors define AIM<sup>56</sup> as “a reputational market where the quality of a listed company is certified and controlled by [Nominated Advisers] staking their reputational capital rather than by explicit rules and oversight of the regulatory authorities” (Espenlaub et al., 2012, p. 430). Therefore, in an exchange-regulated market where there is few information about listed firms and where investors feel uncomfortable with their valuation, it is reasonable to expect that the reputational capital of Nomads and auditors is key to certify the real quality of an issuing firm.

*Hypothesis 3: The greater the reputation of the Nomad hired by an issuer, the lower is the underpricing at the IPO, keeping all else equal.*

*Hypothesis 4: The greater the reputation of the Audit firm hired by an issuer for the listing process, the lower is the underpricing at the IPO, keeping all else equal.*

The owners of an issuing firm can signal the quality of their company with the share of equity they retain after the IPO (Leland & Pyle, 1977). A reasonable pre-IPO shareholder who knows more about the firm than external investors would maintain his investment in the firm if that investment can generate satisfactory returns. It follows that the higher the level of investment maintained by pre-IPO owners in their firm, the higher are their expectations of future returns from that investment. Therefore, the choice of pre-issue shareholders on the amount of equity to retain gives an indication of the firm’s quality to IPO investors. The reduction in investors uncertainty about the firm value generated by the amount of retained ownership is expected to reduce underpricing<sup>57</sup>.

*Hypothesis 5: The share of equity retained by pre-IPO shareholders is negatively related with IPO underpricing.*

In the specific context of AIM Italia, another factor that could possibly affect underpricing is worth to be tested. As discussed in the previous chapter, the introduction of the so called ‘Piani Individuali di Risparmio’ in the Italian legislation has significantly increased the flow of

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<sup>56</sup> The definition is referred to the Alternative Investment Market of the London Stock Exchange. However, it could be extended to AIM Italia since most of its regulation replicates that of AIM (see the previous chapter for a more detailed explanation).

<sup>57</sup> A literature review on the effects of retained ownership on underpricing is presented in section 1.2.2.

investments directed toward small- and mid-cap companies in Italy. This is probably the cause of the increase in aftermarket liquidity (Assosim, 2017) experienced by AIM Italia firms in the first six months of 2017. In addition, PIR regulation is expected to substantially increase the amount of money invested in AIM Italia firms (Incorvati, 2017a) and to enlarge the investor base interested in participating to new IPOs.

An increase in the expected aftermarket liquidity and a possible reduction in liquidity risk<sup>58</sup> are associated to lower levels of underpricing (Ellul & Pagano, 2006). On the other hand, the literature associates higher levels of underpricing to IPOs who experienced a stronger demand (Koh & Walter, 1989; Levis, 1990). Therefore, the combined effect of these two factors on underpricing is difficult to be determined a priori.

Considering the possibility that the underpricing level of the IPOs occurred in 2017 is affected by the introduction of PIR, a variable is used to test the effects of this regulation and to possibly obtain some preliminary evidence on the effects of PIR in the Italian IPO market.

#### 4.4.2. Methodology.

In order to verify the hypotheses developed in the previous subsection, a set of multiple linear regression models is developed. As anticipated, these models are based on that used in the study of Dell'Acqua et al. (2015). Dell'Acqua et al. (2015) employ their regression model to test the effects of much of the determinants of underpricing that are verified in this thesis on a sample of 129 IPOs occurred on the Italian Stock Exchange<sup>59</sup> during the period 2001-2012. However, the analysis conducted in this chapter does not confine itself to replicate the analysis of Dell'Acqua et al. (2015). First of all, some adjustments to the original model are needed in order to make it adapt to analyse IPOs in the AIM Italia context<sup>60</sup>. Then, the adjusted model is

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<sup>58</sup> Ellul and Pagano (2006) define liquidity risk as the uncertainty of investors about the liquidity of the IPO shares in the aftermarket.

<sup>59</sup> The study of Dell'Acqua et al. (2015) focuses on IPOs occurred on all the market segments of the Italian stock exchange between 2001 and 2012. Therefore, they consider IPOs occurred on MTA, Mercato Expandi, Nuovo Mercato and AIM Italia.

<sup>60</sup> The first adjustment to the model of Dell'Acqua et al. (2015) is to drop the independent variables that could not be used in this analysis.

The first variable dropped is the 'demand multiple'. In Dell'Acqua et al. (2015), this variable reflects the level of IPO subscription measured as the number of shares demanded by investors divided by the number of shares offered at the IPO. Unfortunately, data on the demand for AIM Italia IPOs are generally not available. Another dropped variable is 'listing board'. It identifies the market segment in which an IPO has occurred. The analysis of this chapter is conducted only on IPOs occurred on AIM Italia, thus it is not necessary to distinguish different listing boards. A third variable not considered in this analysis is the 'crisis' dummy. It discerns IPOs occurred before 2007 from IPOs occurred later. Issuers considered in this analysis went all public after March 2012, therefore a dummy for the crisis cannot be used. The variable related to the aftermarket risk is dropped as well. Measuring the aftermarket risk is a way to estimate the ex-ante uncertainty surrounding an IPO. Ex-ante uncertainty is positively related to underpricing (Beatty & Ritter, 1986) and it is captured also by other measures

improved by adding variables that are already used in the literature in order to test the effects of other factors on underpricing.

After the adjustments to the model of Dell'Acqua et al. (2015), the first multiple linear regression model used in this analysis emerges.

The dependent variable of this model is RIR, that represents the raw initial returns of the 58 IPOs included in the sample. To explain raw initial returns, four explanatory variables are used. The first two variables are aimed at proving if hypotheses 1 and 2 are correct. In order to account for the size of the issuing firm, the natural log transformation of variable SALES is chosen among the alternatives presented in the variables construction section. Thus, the first explanatory variable is LN(SALES). Hypothesis 2 is tested by including variable YEARS in the regression model. As in Dell'Acqua et al. (2015), variables referring to issuer size and age are frequently used in past studies as control variables (Certo et al., 2001; Cohen & Dean, 2005; Reber & Vencappa, 2016). In these studies, their role is to control for the ex-ante uncertainty about the IPO. However, in AIM Italia the small size and the low age of issuers are two peculiar characteristics. Therefore, given the objective of this analysis to highlight differences between the underpricing determinants of AIM Italia IPOs and the determinants reported by the international evidence, it seems appropriate to carefully analyse the roles of issuer size and age to explain underpricing since they are two characteristic that differentiate AIM Italia from most of the markets analysed in the literature. The aim is to find whether these two issuers dimensions

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such as the size and the age of the issuing firm or by the size of the offer (Ljungqvist, 2007). Aftermarket risk could be measured either as the beta of the offering – as in Dell'Acqua et al. (2015) – or as the standard deviation of returns in the aftermarket (Ritter, 1984, 1987). However, both methods are affected by a problem that specifically affects AIM Italia: the low trading volume in the aftermarket. The volume of trades in the days after the first trading day tends to collapse for most of issuing firms and it tends to remain low afterwards. For the shares of a few issuing firms, the trading volume is equal to zero in some of the days immediately after the IPO. Hence, market prices may not change from day to day just because there are no trades in the market. In practice, for many AIM Italia companies it could be supposed that a liquid market does not develop in the days after the IPO. Therefore, the betas and the standard deviation of daily returns computed for listed firms with scarcely traded stocks may not provide good proxies of aftermarket risk. For this reason, a variable representing the aftermarket risk of AIM Italia IPOs is not included in this analysis. The last variable dropped is the time length of the offering. Information on offering periods are provided in the admission documents of only a few issuers while in the Borsa Italiana website this information is provided only for IPOs that take place in the main market.

The second adjustment to the model of Dell'Acqua et al. (2015) concerns the independent variables classification as explanatory variables and control variables. This adjustment is aimed at adapting the model to the specific hypotheses that this analysis wants to test. Thus, three of the control variables in Dell'Acqua et al. (2015) are treated in this analysis as explanatory variables. On the other hand, two explanatory variables in the original model are considered control variables in this study. The variables used in this analysis are presented in detail in the following of this section.

A partial adjustment made to the model of Dell'Acqua et al. (2015) is about the dependent variable. Dell'Acqua et al. (2015) define initial returns both as raw initial returns and market-adjusted initial returns. However, in their study they present the results of their regression model only with reference to market-adjusted initial returns. In the analysis conducted in this chapter both initial returns definitions are used.

are still useful to express ex-ante uncertainty or if the characteristics of AIM Italia assign them other explanations.

Another explanatory variable used is NPRS that represents the reputation of the Nomad that assists the issuing firm in the listing process. As presented in the variables construction section, this variable is defined as the proceeds-weighted market share of the Nomad in the reference period computed excluding investing companies. This variable is included in the model in order to test hypothesis 3. The last explanatory variable used is RO. It represents the amount of ownership retained after the offering by pre-IPO shareholders. In the model of Dell'Acqua et al. (2015) this is considered a control variable. In this study, it is used as explanatory variable since a significant part of the literature presented in chapters 1 and 2 explain underpricing with ownership measures.

In addition to these explanatory variables, five variables already used in Dell'Acqua et al. (2015) are used as control variables. The first is the one related to market conditions before the IPO. The selected variable is  $1/MCVOL\_100$  that is the inverse of the standard deviation of daily returns of the reference market index in the 100 days before the IPO. Another control variable part of the model is IPOQ. It is one of the variables that could be used to represent the IPO market activity in the period of the initial offering. To control for the size of the offering, the natural log transformation of the gross proceeds –  $LN(GP)$  – is used. Variable GS is included in the model to control for the amount of shares offered in the greenshoe option as percentage of the total number of shares offered at the IPO. Finally, a dummy variable to control for IPOs of issuers belonging to financial industry – variable FIN – is included.

The first multiple linear regression model used in this analysis, replicating the model of Dell'Acqua et al. (2015) after the adjustments is the following:

$$(1) \quad RIR_i = \beta_0 + \beta_1 LN(SALES_i) + \beta_2 YEARS_i + \beta_3 NPRS_i + \beta_4 RO_i \\ + \beta_5 (1/MCVOL\_100_i) + \beta_6 IPOQ_i + \beta_7 LN(GP_i) + \beta_8 GS_i + \beta_9 FIN_i + \varepsilon_i$$

In this chapter, it is made reference to this model as 'Model 1'.

As stated before, an improved version of Model 1 is developed by adding two additional explanatory variables and six more control variables. Variable BIG4 is included in this version of the model as an explanatory variable, following the study of Beatty (1989). It is a dummy variable used to verify the effect of the reputation of the audit firm hired by the issuer on underpricing. Hence, it is useful to test the correctness of hypothesis 4. The dummy variable IPOYEAR\_2017 is included in the improved model in order to identify the possible effects of

the introduction of PIR regulation on the underpricing of AIM Italia IPOs. As stated before, in case PIR has affected underpricing, the sign could be either positive or negative depending on whether the effect of higher IPO demand or higher expected liquidity in the aftermarket prevail. Following the study of Cassia et al. (2004), *SELL* is included in the improved model as a control variable. It represents the number of secondary shares sold at the IPO as percentage of the total number of shares offered<sup>61</sup>.

Five additional industry dummies are included in the improved model. As discussed in the variable construction section, these variables are *PROF*, *EL*, *MF*, *COM* and *INF*. Industry dummies are used, among others, in the studies of Certo et al. (2001) and Filatotchev and Bishop (2002).

The model that results after the inclusion of these additional variables is referred to as ‘Model 3’ and it is represented by the following equation:

$$\begin{aligned}
 (3) \quad RIR_i = & \beta_0 + \beta_1 LN(SALES_i) + \beta_2 YEARS_i + \beta_3 NPRS_i + \beta_4 RO_i + \beta_5 BIG4_i \\
 & + \beta_6 IPOYEAR_{2017_i} + \beta_7 (1/MCVOL_{100_i}) + \beta_8 IPOQ_i + \beta_9 LN(GP_i) \\
 & + \beta_{10} GS_i + \beta_{11} SELL_i + \beta_{12} FIN_i + \beta_{13} PROF_i + \beta_{14} EL_i + \beta_{15} MF_i \\
 & + \beta_{16} COM_i + \beta_{17} INF_i + \varepsilon_i
 \end{aligned}$$

#### 4.4.3. Results of the Regression Analyses.

The Pearson correlation matrix reporting correlations among all the variables considered in this analysis is reported in table 18. Correlation among variables that are significant at the 5 percent level or better are marked with a star. Results indicate that the correlation coefficient between the inverse of *MCVOL\_100* and *IPOYEAR\_2017* is 0.5846. The correlation coefficient between *GS* and *LNGP* is 0.6098. As stated in section 4.3, this suggests that greenshoe option is generally provided for larger issues. The remaining correlation coefficients are all below 0.5.

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<sup>61</sup> In case of underpricing, shareholders who sell their own shares at the initial offer do so at a price (the offer price) below the price the market would offer. Therefore, they immediately suffer a loss without benefitting for sold shares of the virtual wealth increase - described in the prospect theory of Loughran and Ritter (2002) – emerging from the fact that shares are revealed to be valued more than previously thought. Hence, given that shareholders who sell personal shares at the IPO suffer more from underpricing, they are more committed in limiting it. According to Habib and Ljungqvist (2001), this is the reason why IPOs involving secondary shares are less underpriced.

**Table 18. Pearson correlation matrix.** Correlations among all the variables included in 'Model 3' are reported. Correlations marked with a star (\*) are statistically significant at the 5 percent level.

Variables	RIR	LN(SALES)	YEARS	NPRS	RO	BIG4	IPOYEAR_2017	1/MCVOL_100	IPOQ	LN(GP)	GS	SELL	FIN	PROF	EL	MF	COM	INF
RIR	1																	
LN(SALES)	-0.0832	1																
YEARS	0.2408	0.2972*	1															
NPRS	-0.1688	0.0151	0.0679	1														
RO	0.2471	0.2634*	0.1596	0.0914	1													
BIG4	0.0159	0.0448	-0.0419	-0.1905	0.0392	1												
IPOYEAR_2017	0.194	-0.0049	0.1188	0.0855	0.0208	0.1148	1											
1/MCVOL_100	0.0205	0.2716*	0.1835	0.1765	0.0283	-0.0026	0.5846*	1										
IPOQ	-0.3109*	0.1209	0.0754	0.0832	-0.0088	-0.0711	-0.1761	0.3120*	1									
LN(GP)	-0.1823	0.4653*	-0.0283	-0.2102	-0.2803*	0.1096	-0.0573	0.1187	0.002	1								
GS	0.0151	0.2790*	-0.0465	-0.3820*	-0.2329	0.0553	0.0391	0.023	-0.0603	0.6098*	1							
SELL	0.0011	0.1206	0.089	-0.1993	-0.1317	0.1049	0.0913	0.1196	-0.0387	0.3797*	0.4043*	1						
FIN	-0.1113	0.0816	0.0366	0.2318	0.2874*	-0.0635	0.0885	-0.0339	0.0674	-0.0108	-0.1517	-0.1452	1					
PROF	0.2066	-0.4347*	-0.129	-0.0773	-0.3362*	-0.2077	0.0426	-0.029	-0.0817	-0.025	0.0999	-0.0407	-0.139	1				
EL	0.0254	0.1612	-0.0728	0.1496	0.1138	0.0242	-0.1229	0.0502	0.0479	0.1803	-0.0121	-0.1639	-0.0836	-0.1569	1			
MF	0.1498	0.1702	0.2664*	-0.1171	0.0408	0.2351	0.0426	-0.1028	-0.3159*	0.0773	0.0407	0.1739	-0.139	-0.2609*	-0.1569	1		
COM	-0.1245	0.0912	-0.1299	0.1769	0.0476	0.1521	0.0553	0.2556	0.0479	-0.0255	-0.0075	0.0325	-0.0836	-0.1569	-0.0943	-0.1569	1	
INF	-0.084	0.007	0.0063	-0.1519	0.0457	-0.0353	-0.1221	-0.117	0.2126	-0.053	-0.084	0.067	-0.1607	-0.3017*	-0.1814	-0.3017*	-0.1814	1



Table 19 shows the results of the regression analyses using the OLS estimation method. The first column provides the estimates of the coefficients referred to Model 1. However, this model does not respect all the assumptions that should be respected in regression analysis. In particular, the relation between RO and RIR seems not to be linear even after trying several transformations of the variable. This non-linearity impacts on the distribution of residuals, raising doubts about the presence of heteroscedasticity. For this reason, variable RO is removed. In addition, this model includes both GS and LNGP. Since the correlation between these two variables is over 0.5, GS is removed as well<sup>62</sup>. Column 2 shows the estimate of the same model presented in column 1 without variables RO and GS. This is referred to as Model 2. This model respects the assumptions of linearity, homoscedasticity, normality and of absence of multicollinearity required for OLS regression analysis<sup>63</sup>. However, given that in model 1 RO is significant at the 10 percent level, its removal has two adverse effects. The first is a drop in the R-squared. The R-squared declines from 0.323 to 0.262 moving from Model 1 to Model 2. The second effect is an increase in the p-value of the F-test on the overall significance of the model. At the 1 percent level of significance, it could not be rejected the hypothesis that all the coefficients of the model are equal to zero.

Column 3 shows the estimate of the model previously referred to as ‘Model 3’. As in the case of Model 1, this model does not respect all the assumptions required for OLS regression analysis. In detail, the relation between RO and RIR does not seem to be linear. No one of the usual transformations makes this relation to be linear. In addition, correlation is significant and above the 0.5 threshold both between variables GS and LNGP and between variables 1/MCVOL\_100 and IPOYEAR\_2017. To solve these issues, Model 4 presents the results of the estimation of the same model reported in column 3 excluding RO, GS and IPOYEAR\_2017<sup>64</sup>. Model 4 respects the usual OLS regression assumptions of homoscedasticity, linearity, normality of errors and absence of multicollinearity.

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<sup>62</sup> The relation between LNGP and RIR is much more significant in Model 1 than that between GS and RIR. In addition, the removal of LNGP instead of GS would have caused a higher drop in the adjusted R-squared and a substantial reduction in the overall significance of the model.

<sup>63</sup> Evidence that demonstrates the respect of these assumptions is provided in the appendix.

<sup>64</sup> As before, GS is excluded because its relation with RIR is less significant than that of LNGP. In addition, IPOYEAR\_2017 is removed even if it is considered an explanatory variable because the significance of its regression coefficient is much lower than that of the coefficient of 1/MCVOL\_100. Employing 1/MCVOL\_100 instead of IPOYEAR\_2017 leads to a higher R-squared and a lower p-value of the F-test on the overall significance of the model. In any case, the regression coefficients of IPOYEAR\_2017 are all not significant at any conventional level in all the following models, even after removing variable 1/MCVOL\_100.

**Table 19. Multiple linear regression results.** The dependent variable of these models is *RIR* (raw initial returns). Asterisks \*\*\*, \*\*, \* indicate that individual estimated regression coefficients are significantly different from zero at the 1%, 5% and 10% level respectively.

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
LN(SALES)	-0.0143 (0.0113)	-0.00392 (0.0103)	-0.00322 (0.0130)	0.00594 (0.0120)	
YEARS	0.00299** (0.00142)	0.00295** (0.00145)	0.00257 (0.00156)	0.00259 (0.00158)	0.00323** (0.00134)
NPRS	-0.240 (0.197)	-0.322* (0.191)	-0.257 (0.215)	-0.356* (0.206)	-0.367** (0.181)
RO	0.364* (0.184)		0.342* (0.199)		
BIG4			0.00136 (0.0341)	0.00384 (0.0336)	
IPOYEAR_2017			0.0164 (0.0666)		
1/MCVOL_100	0.00120 (0.00100)	0.00121 (0.00102)	0.00104 (0.00161)	0.00129 (0.00109)	0.00113 (0.000962)
IPOQ	-0.0237** (0.00926)	-0.0258*** (0.00942)	-0.0209* (0.0117)	-0.0245** (0.0102)	-0.0255*** (0.00900)
LN(GP)	-0.0191 (0.0265)	-0.0314 (0.0213)	-0.0387 (0.0312)	-0.0526** (0.0247)	-0.0399** (0.0182)
GS	0.278 (0.342)		0.317 (0.384)		
SELL			0.00164 (0.127)	0.0419 (0.124)	
FIN	-0.0491 (0.0615)	-0.0181 (0.0597)	0.0271 (0.0869)	0.0680 (0.0785)	
PROF			0.136** (0.0644)	0.138** (0.0647)	0.0655* (0.0353)
EL			0.119 (0.0791)	0.141* (0.0755)	0.0755 (0.0523)
MF			0.0768 (0.0665)	0.0780 (0.0651)	
COM			0.0371 (0.0751)	0.0457 (0.0740)	
INF			0.0683 (0.0615)	0.0737 (0.0593)	
Constant	0.0672 (0.277)	0.395** (0.176)	0.0760 (0.311)	0.396* (0.198)	0.420** (0.172)
Observations	58	58	58	58	58
R-squared	0.323	0.262	0.411	0.356	0.323
Prob>F	0.0178	0.0259	0.0989	0.0927	0.0046
Adj R-squared	0.1961	0.1587	0.1603	0.1457	0.2288

However, Model 4 still includes 14 independent variables. This reduces the applicability of this model, considering that the sample used in this analysis is made of only 58 observations. For this reason, following the procedure used by Dell'Acqua et al. (2015), a smaller model is derived from Model 4 using a stepwise procedure. Variables are gradually removed from Model 4 on the basis of the contribution of their elimination to the increase of the adjusted R-squared and to the reduction of the p-value of the F-test on the significance of the model. The elimination

procedure stops when no one of the remaining variables could be eliminated without generating a reduction in the adjusted R-squared or an increase of the p-value of the F-test. At this point, the variables previously eliminated are added back one by one to the model and they are kept only if they provide a positive contribution to the adjusted R-squared or to the significance of the entire model. The model generated by this procedure is called ‘Model 5’ and it is reported in column 5. It comprises 7 variables, of which 5 are significant to explain the level of raw initial returns.

Model 5 is the final model of this analysis. The process to obtain it started from the model proposed by Dell’Acqua et al. (2015). From this model some variables are removed to adapt it to the AIM Italia context and the resulting model is model 1. Then following previous studies, other variables are included to test additional underpricing determinants and the model obtained is model 3. Finally, from model 3 some variables are dropped to respect the OLS regression assumptions while others are removed during a stepwise procedure. Hence, the result of this refinement process is Model 5. This model exhibits a quite good R-squared of 0.323 and the highest level of adjusted R-squared within the models reported in table 19. In addition, it is the only regression model that is significant at all the conventional levels.

The regression model seems to respect the common linear regression assumptions<sup>65</sup> of linearity<sup>66</sup>, normality of errors<sup>67</sup>, homoscedasticity<sup>68</sup> of residuals and absence of multicollinearity<sup>69</sup>.

In table 20, Models 2, 4 and 5 are replicated changing the dependent variable from RIR to MAIR (market-adjusted initial returns). This change in the explained variable is useful to identify whether the determinants that are found to explain first day initial returns in the models considered can still explain underpricing after initial returns are cleaned from the market

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<sup>65</sup> More detailed evidence about the respect of the regression assumptions for model 5 is provided in the appendix.

<sup>66</sup> Linearity has been checked graphically using the augmented component-plus-residual plot for each variable (excluding dummies). Graphs reveal that the relation between variables of model 5 and RIR is linear for all the variables.

<sup>67</sup> The normality of errors is checked graphically using the kernel density graph of residuals overlaid by a normal distribution. The shape of the density distribution of residuals approximates a normal distribution. In addition, the Shapiro-Wilk test for normal data is used. This test provides evidence that residuals are normally distributed.

<sup>68</sup> Homoscedasticity of residuals is verified graphically observing the scatter plot between residuals and predicted values. In this graph, residuals are distributed around zero (the mean of residuals is exactly 2.09e-10, that is essentially zero) and they do not seem to follow specific patterns or to expand at certain levels of predicted values. Additional evidence for homoscedasticity is provided by the test of Breusch-Pagan and by the test of White.

<sup>69</sup> To test for multicollinearity, variance inflation factors are computed for each independent variable in model 5. Since all the variance inflation factors are below 10, the model is not affected by multicollinearity. In practice, no one of the regressors is a linear function of the others.

movements occurred in the period between the day in which the price is set and the IPO date. After substituting MAIR to RIR, the equivalents of models 2,4 and 5 are referred to respectively as ‘Model 6’, ‘Model 7’ and ‘Model 8’. As it is observable in tables 4 and 5 at the beginning of this chapter, the distributions of raw initial returns and market-adjusted initial returns are a bit different. This is due to the fact that the returns of the reference index in the period between the date in which the offer price is set and the IPO date may impact significantly on initial returns. For instance, this period is on average of five days for the firms part of this sample and for six of them the period is larger than ten days. Clearly, considering market returns in a timespan of a few days may impact significantly on the returns of some of the IPO firms part of the sample. The result of moving from RIR to MAIR as dependent variable is that Models 6 and 7 may be affected by heteroscedasticity<sup>70</sup>. To tackle this issue, robust regressions with Huber-White robust standard errors are run for these models. Model 8 does not present evident signs of heteroscedasticity<sup>71</sup>. Anyhow, the results of the OLS regression and of the robust regression with Huber-White standard errors are both reported in table 20.

It could be observed that moving from Model 7 to Model 8, two significant industry dummies are dropped. However, if those two dummies are added back to model 8, they are no more considered significant. For this reason, model 8 includes all and only the variables included in Model 5.

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<sup>70</sup> This is revealed by the Breusch-Pagan test. Both for models 6 and 7, the null hypothesis of constant variance of residuals is rejected at the 5 percent level of significance.

<sup>71</sup> According to the Breusch-Pagan test, the hypothesis of constant variance is rejected for significance levels above 0.08.

**Table 20. Multiple linear regressions results using MAIR (market-adjusted initial returns) as dependent variable.** Asterisks \*\*\*, \*\*, \* indicate that individual estimated regression coefficients are significantly different from zero at the 1%, 5% and 10% level respectively. Columns 1,2 and 4 present the results of the linear regressions of models 6,7 and 8 using Huber-White robust standard errors to account for possible heteroscedasticity. Column 3 presents the results of the OLS linear regression referred to Model 8.

VARIABLES	(1) Model 6 – robust S.E.	(2) Model 7 – robust S.E.	(3) Model 8	(4) Model 8 – robust S.E.
LN(SALES)	-0.00158 (0.00994)	0.00831 (0.0111)		
YEARS	0.00279 (0.00184)	0.00236 (0.00178)	0.00314** (0.00133)	0.00314* (0.00161)
NPRS	-0.334* (0.190)	-0.353* (0.207)	-0.389** (0.181)	-0.389** (0.179)
BIG4		0.0174 (0.0349)		
1/MCVOL_100	0.00111 (0.000934)	0.00124 (0.000793)	0.00110 (0.000960)	0.00110 (0.000825)
IPOQ	-0.0235** (0.0110)	-0.0217* (0.0116)	-0.0233** (0.00899)	-0.0233** (0.0107)
LN(GP)	-0.0318* (0.0182)	-0.0542** (0.0231)	-0.0384** (0.0182)	-0.0384** (0.0167)
SELL		0.0395 (0.101)		
FIN	-0.0286 (0.0404)	0.0695 (0.0558)		
PROF		0.150** (0.0582)	0.0586 (0.0352)	0.0586 (0.0387)
EL		0.152** (0.0613)	0.0776 (0.0522)	0.0776** (0.0360)
MF		0.0936* (0.0545)		
COM		0.0539 (0.0671)		
INF		0.0881** (0.0432)		
Constant	0.372** (0.149)	0.359** (0.171)	0.399** (0.172)	0.399** (0.164)
Observations	58	58	58	58
R-squared	0.248	0.358	0.304	0.304
Prob>F	0.1252	0.0252	0.0082	0.0391
Adj R-squared			0.2066	

#### 4.5. Findings.

The results of the regression analyses reported in the previous section together with the preliminary analysis of data presented in section 4.3 allow to conclude on the hypotheses formulated in section 4.4.1. It is worth noting that the models that are more appropriate to conclude on the underpricing of AIM Italia IPOs are Model 5 and its analogous model with the use of MAIR as dependent variable, Model 8.

Regarding the first hypothesis, there not seems to be an effect of the size of the issuer on underpricing. The sign of the estimated regression coefficient of variable LN(SALES) is negative – as expected – in model 2 and model 6, while it turns positive in models 4 and 7. However, in whatever model the relation of sales with underpricing is not statistically significant. In addition, in order to test further the effects of issuer size on underpricing, variable MCAP has been substituted to LN(SALES) in the regression analyses. The regression coefficient of MCAP is statistically significant only in a model built as Model 6 with the exclusion of LN(SALES). Surprisingly, the sign of the effect of MCAP on MAIR in this model is positive, hence it is opposed to the sign predicted by the literature. However, variables MCAP and LNGP are positively and significantly correlated. The correlation between these two variables is of 0.7758. Therefore, it is necessary to drop from the model one of these two variables. If variable LNGP is removed, the relation between MCAP and MAIR becomes statistically not significant. Instead, LNGP remains significant both with and without MCAP. In sum, it could be concluded that the size of the issuer – either expressed as issuer sales before the IPO or as capitalization at the offer price – does not seem to affect underpricing. This conclusion is also reached, among others, by Certo et al. (2001) and Reber and Vencappa (2016). In the literature, issuer size is considered as a proxy of ex-ante uncertainty of investors about the IPO. In AIM Italia, this may not be true possibly because all the issuers are part of the category of small and medium companies. In this situation, issuer size may not be key to explain how established a company is and it may not be appropriate to approximate the uncertainty surrounding the IPO. Instead in the markets generally considered in the literature, the size of issuers tends to vary widely, from small and medium companies to multinational firms. In these contexts, it could be hypothesized that the size of issuers is much more relevant to approximate the uncertainty surrounding the IPO.

Ex-ante uncertainty is also approximated by the gross proceeds raised by an issuer at the IPO (Beatty & Ritter, 1986). In this analysis, gross proceeds are represented by the variable LN(GP). The estimated regression coefficient of LN(GP) is negative and significant at least at the five percent level in all the relevant models of this analysis, that is in models 5 and 8. Therefore,

gross proceeds are negatively related with underpricing both when it is measured as raw initial return and when it is expressed as market-adjusted initial return. The sign of this relation is consistent with the explanation that smaller offerings are more underpriced because they are more speculative, on average, than larger offerings (Beatty & Ritter, 1986). However, the risk-based explanation of the negative relation between gross proceeds and initial returns is not the only one offered by the literature. Habib and Ljungqvist (2001, p.434) argue that “some IPOs are more underpriced than others because their owners have less reasons to care about underpricing. ...[The] extent to which owners care about underpricing depends on how much they sell at the IPO”. In practice, selling primary shares at a discount increases the dilution suffered by pre-IPO shareholders. The extent of dilution depends on the level of underpricing and on the size of the offer. Therefore, the larger the offer size – in this analysis proxied by gross proceeds – the larger the incentive for pre-IPO owners to limit underpricing. The result is that in larger offerings, pre-IPO owners closely monitor the marketing effort and the pricing behaviour of the Nomad and of the other advisors, leading to lower levels of underpricing.

The second hypothesis of this analysis is tested with the use of the variable YEARS. The estimated regression coefficient of YEARS is positive and significant at the 5 percent level in models 2 and 5. It is also positive and significant in model 8, even though only at the 10 percent level in the regression with Huber-White robust standard errors. The sign of the regression coefficient is unexpected since the international literature assumes a negative relation between the age of the issuer and underpricing (Ljungqvist, 2007; Reber & Vencappa, 2016). This because issuer age is generally considered a company-based proxy for the ex-ante uncertainty about an IPO (Ljungqvist, 2007). However, there are three studies that report a positive and significant relation between the age of the issuer and underpricing (Chan, Wang, & Wei, 2004; Islam, Ali, & Ahmad, 2010; Sahoo & Rajib, 2011). The results of the regression analyses of Chan et al. (2004) report a positive and significant relation between the issuer age and underpricing for a sample of 39 B-share IPOs issued in the period 1993-1998 in the Chinese equity markets of Shanghai and Shenzhen. A positive and significant effect of age on underpricing is also observed by Islam et al. (2010) using a sample of 191 IPOs occurred between 1995 and 2005 on the Bangladeshi stock exchange of Chittagong. Finally, a positive and significant regression coefficient of issuer age with underpricing is reported by Sahoo and Rajib (2011) for a sample of 95 IPOs of manufacturing firms occurred on the stock exchange of Mumbai, India in the period 2002-2007. Unfortunately, no one of these three studies provides an explanation for the sign of the relation between age and initial returns. However, it could be observed that all the three studies base their empirical analysis on IPO markets of emerging countries. It could be hypothesised that the unexpected sign of the effect of issuer age on

underpricing reported in their studies emerges from characteristics of IPO markets in emerging countries that differ from those of IPO markets in developed countries, on which international evidence is based. For instance in the study of Francis et al. (2010), the markets of China and India are considered ‘segmented markets’. This means that firms in these markets face difficulties in raising capital because of direct and indirect barriers – such as information asymmetries and low liquidity – that limit the possibility to raise external financial resources. Similarly, Su and Fleisher (1999) argue that for B-shares<sup>72</sup> in China, information asymmetry is a great hindrance to raising funds and that access to international capital markets is enhanced for those firms with a well-established history that can be considered as evidence of strong future prospects.

To a certain extent, AIM Italia can be considered as affected by problems that are similar to those that affect the equity markets of emerging countries. The first problem is the weaker institutional environment. AIM Italia is an exchange-regulated market, hence it is not supervised by CONSOB, the Italian market authority. It is also considered a reputational market since the quality of listed firms is certified by Nomads. Nomads are responsible for admitting firms to the market, interpreting AIM Italia principles for their listed firms and monitoring the compliance with the rules of their client firms. In sum, part of the responsibilities of Nomads is to perform the functions generally executed by an independent market authority. The great difference is that the relationship between listed firms and Nomads is a commercial one. If a Nomad refuses to admit a firm to AIM Italia or if it decides to exclude one of its client-firms from the market, it renounces to a source of revenues. This may raise some doubts on the diligence of Nomads in monitoring their client-firms. From the point of view of investors, this may increase the perceived risk in investing in AIM Italia securities. The second problem that affects AIM Italia is the thin presence of investors specialised in investing in small and medium companies (Cellino, 2017). This is visible observing the information reported by the observatory of IR Top (2016). In 2016, of all the investments of institutional investors in AIM Italia firms, just the 19 percent was directed toward firms with a market capitalization below 15 million euros, even though these firms represented the 42 percent of the firms listed on AIM Italia. This means that most of AIM Italia investors may lack the competences or the right risk-propensity to invest in small companies. The third problem that affects AIM Italia is about the size of listing firms. At the IPO, AIM Italia issuers are small and medium companies. As argued before, these firms are on average perceived as more risky by investors. The management team is

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<sup>72</sup> According to Chan et al. (2004), B-shares are a special type of shares that could be traded only by non-PRC nationals in the markets of Mainland China, that is in the stock exchanges of Shanghai and Shenzhen. Instead, PRC nationals can only trade A-shares in the markets of Mainland China.



generally made of few people. In addition, less information is available – even because the rules require less information to be made available to the public – on average for these firms with respect to larger firms that list on the main market.

A weaker institutional environment, together with the smaller size of firms may lead to higher information asymmetries. In this situation, the age of the issuer may still represent a proxy of the uncertainty about the IPO, with older firms perceived as more established and more mature in conducting their business. For this reason, age can still be supposed as being negatively related to underpricing. However, if the level of information asymmetries on AIM Italia is very high and the institutional environment is weak – hence the conditions become similar to those of emerging markets – it could be hypothesized that investors prefer to invest in older companies rather than in younger firms because of their scepticism about firms with a shorter operating history. Older firms have demonstrated over time their ability to operate in the market, the capabilities of their management team and their resistance to external shocks. Instead, younger firms have a very short operating history to present to investors, the capabilities of their management team have not been demonstrated and their ability to remain in the market and to grow have not been proved. An investor who invest in these companies may discover the potentiality of these firms and the ability of their management teams only after the IPO. In case the performance of the firm is poor, if the investor decides to sell his shares he may have to do so in a market characterized by low liquidity. Therefore, in this situation investors who lack competences, experience and the risk-propensity to invest in SMEs may be very reluctant to invest in young companies. For this reason, investors may prefer to invest in older companies and they may avoid investing in companies with an unobservable operating history<sup>73</sup>. Hence if this happens in reality, the IPO demand for younger IPOs should be weaker. A weaker demand results in lower levels of underpricing (Koh & Walter, 1989; Levis, 1990; Rock, 1986).

If this reasoning is correct, the positive relation between the age of the issuer and underpricing would be a spurious one, since it would be in fact driven by the level of IPO demand. In case YEARS is a spurious variable, its regression coefficient would become negative or at least not significant after controlling for IPO demand. Unfortunately, no data are available on the demand of investors for the IPOs included in the sample. In future research on underpricing on

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<sup>73</sup> This reasoning is similar to that of Su and Fleisher (1999). They argue that B-share IPOs are characterized by large information asymmetries since international investors have poor information about Chinese issuers. If information asymmetries are very high, international investors would prefer to consider other investment opportunities. Therefore, they conclude that “access to international capital markets is enhanced for firms that have well-established domestic histories which can be viewed by international investors as evidence of strong future prospects” (Su & Fleisher, 1999, p. 198). For the IPOs of this shares, Chan et al. (2004) observe a positive relation of age with underpricing.

AIM Italia, it would be appropriate to control for the strength of the demand at the IPO in regression analysis by including a control variable.

Hypothesis three claims that IPOs of firms assisted by a reputable Nomad are less underpriced, keeping all else equal. This hypothesis seems to be confirmed by the empirical analysis conducted in this chapter. In particular, the estimated regression coefficient associated to variable NPRS is negative and significant at the ten percent level in Model 2. It is also significant at the five percent level in Model 5 and in Model 8, hence it is significant both with the use of raw initial returns and market-adjusted initial returns as dependent variables. This evidence seems to confirm the certification role played by Nomads for their client firms. Trying to identify additional confirmation of the role of Nomad in certifying new issues, I tried to substitute variable NPRS with the other variables for Nomad reputation described in section 4.2 at the beginning of this chapter. The equally-weighted market share of the Nomad – both including and excluding investing companies – is not significantly related with underpricing. Similarly, the regression coefficients of individual variables based on the study of Espenlaub et al. (2012) – NMSN, NPRN, NROA, NAGE, NRAT – and their average NREP<sup>74</sup> are not significant at any conventional level. It is interesting to observe that while the proceeds-weighted market share excluding investing companies is significant to explain underpricing, after including investing companies in the calculation of the proceeds-weighted market share this relation becomes not significant. Therefore, in this analysis the best measure of Nomads reputation is the proceeds-weighted market share, contrarily to the evidence of Vismara et al. (2012) who observe that equally-weighted market shares behave better in proxying underwriters reputation in Europe. The analysis also provides evidence that useful reputation measures can be computed using market shares calculated on a market basis. This is consistent with Vismara et al. (2012) who argue that the underwriting industry in Europe is segmented and that for second markets it is better to evaluate reputation on a market basis rather than on a country basis.

In addition, this analysis confirms the hypothesis that a reputational metric based on market shares is better to be computed on groups of similar firms. Investing companies may decide which Nomad to hire considering aspects that are different from those taken into account by operating companies. Hence, only the proceeds-weighted market shares of Nomads computed including only operating companies are significant to represent the reputation of Nomads for operating companies. Instead, there not seems to be a relation between the reputation of the

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<sup>74</sup> Even the estimated regression coefficient of variable NREPS – average reputation based on the definition provided by Espenlaub et al. (2012) excluding the IPOs of investing companies - is not significant at any conventional level.

audit firm hired for the listing process and underpricing, as stated by hypothesis four. The estimated regression coefficient of variable BIG4 is largely not significant. To obtain an additional confirmation for this result, variable AINT is substituted to BIG4 in Models 3 and 4 and it is added in Model 5. The regression coefficients of this variable in this new regression analyses are still not significant. This suggests that the certification role played by audit firms is not connected with their reputation, measured by the firm membership to a ‘big 4’ audit network or more generally to an international network. In addition, I’ve tried to substitute in the final regression models variables BIG4 and AINT to NPRS. Even in this case, the regression coefficients of both variables are not significant at any conventional level. This means that in AIM Italia, only the Nomad certifies with its own reputation the quality of issuing firms.

It is also worth to observe that the estimated regression coefficient of variable IPOYEAR\_2017 is not statistically significant at any conventional level. IPOYEAR\_2017 is a dummy variable that assumes value 1 if the IPO occurred in 2017. It is included in the regression model to observe the possible effects of the introduction of PIR legislation – occurred at the beginning of 2017 – on the IPOs on AIM Italia. The simple fact that the estimated coefficient of this variable is not significant to explain underpricing does not necessarily mean that PIR has not impacted on the underpricing of AIM Italia IPOs. First of all, the sample is limited to IPOs occurred until July 31, 2017. PIR compliant products reasonably started to attract a significant amount of resources a few months after the introduction of the legislation. Therefore, it could be that part of IPOs occurred on AIM Italia in the first few months of 2017 have not completely benefitted of the possible effects of PIR. An alternative motivation is that the effects of PIR have been immediately predicted by the advisors operating in the IPO market. In this situation, PIR have not impacted on underpricing because their effects have been anticipated and incorporated in the offer price. However, according to Lowry and Schwert (2002), advisors take some time to incorporate in their pricing decisions upward changes in market valuation of issuing firms. The third motivation is that, as argued before, the likely effects of PIR on underpricing go in opposite directions. If PIR are the cause of the increase in the aftermarket liquidity observed by Assosim (2017) in the first semester of 2017 on AIM Italia and if IPO investors expect this increase in aftermarket liquidity, then following Ellul and Pagano (2006), the effect of PIR is to reduce underpricing, keeping all else equal. However, if the increase in the flow of investments generated by PIR and directed toward AIM Italia also increases the demand for IPOs, PIR has the effect to increase underpricing, keeping all else equal. Anyhow in order to verify these effects, data on expected liquidity as well as data on IPO demand for AIM Italia IPOs are required. Unfortunately, these data are not always available for all the firms considered in the sample. Future research, using data on the additional IPOs occurred after the

introduction of PIR may verify whether the increase in liquidity of AIM Italia stocks is caused by PIR. If this is true, a proxy of expected liquidity could be included as a variable in the analysis<sup>75</sup>. If its estimated regression coefficient turns out to be negative and significant the results observed by Ellul and Pagano (2006) are confirmed and evidence on the effects of PIR on first-day returns of IPOs could be identified. If data on IPO demand are available, future research may also test whether investors demand for IPOs has increased after the introduction of PIR and whether this demand is positively related to underpricing, as predicted by the literature (Koh & Walter, 1989; Levis, 1990).

Market conditions do not seem to affect underpricing. The estimated regression coefficient of variable 1/MCVOL\_100 is positive in all the regressions, meaning that lower volatility of the reference index is associated with higher underpricing. However, the estimated regression coefficient is not significant in all the regressions at all the conventional significance levels. To test the effect of market conditions on underpricing, other variables have been considered. Variables MC\_INDVOL60 and MC\_PER100 have been substituted to 1/MCVOL\_100 in models 2, 5 and 8 but their estimated regression coefficients are even less significant than those of 1/MCVOL\_100.

Particularly important to explain underpricing is variable IPOQ, that represents the IPO market activity. It measures the number of IPOs – both of operating and investing companies – occurred on AIM Italia in the calendar quarter in which the IPO took place. The estimated regression coefficient of this variable is negative and significant at least at the 10 percent level in all the regression models considered. In particular, it is significant at the 1 percent level in Models 2 and 5 and at the 5 percent level in Models 6 and 8. This result is consistent with the international literature. In particular, both the studies of Ibbotson and Jaffe (1975) and Lowry and Schwert (2002) note that periods in which IPO volume is high tend to follow periods in which average underpricing is high. According to Lowry and Schwert (2002), this regularity could be explained by the fact that during the registration period, underwriters glean information about issuing firms valuation from informed investors. If the valuation of informed investors is higher than expected, this information is only partially incorporated in the offer price of issuing firms. However, this positive information is incorporated in the offer price of the following IPOs, as bankers learn about investors valuation in the period. The result is that the IPOs that occurred in the initial phase of the bankers learning process about increasing investors valuation are priced significantly below the market valuation. This results in high average initial returns in that period. Observing high initial returns, firms understand that the market offers high

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<sup>75</sup> To identify which variables could be used to proxy investors expectations for aftermarket liquidity see Ellul and Pagano (2006). Their measures of liquidity are based on trading data of the first four weeks after the IPO.

valuations and they decide to file to go public. Hence, they are attracted to the IPO market by the possibility to raise more money than previously thought. Information on market valuation is now incorporated in the offer price of these issuing firms. This makes initial returns to decrease – as new IPOs are priced more in line with the market – and it makes IPO volume to increase as more firms are attracted to the new issues market. The results of this analysis reflect this regularity since, keeping all else equal, an issuer that goes public in an high IPO volume period experiences lower levels of underpricing. Therefore, the negative relation between IPO volume in a calendar quarter and underpricing may probably be justified by the Lowry and Schwert (2002) explanation. In order to conduct further tests on the effects of IPO market activity on underpricing, other two variables are included in the final models of this analysis instead of IPOQ. As stated in section 4.2, the other variables used in this analysis to proxy IPO market activity are IPO3M and UP3M. No one of the estimated coefficients of these variables is significant at the conventional levels. Furthermore, the same variables computed excluding the IPOs of investing companies are substituted in the linear regression models to IPOQ. The results are that the estimated coefficients of variables IPO3MS and UP3MS are not significant at any conventional level. However, the estimated coefficients of variable IPOQS are negative and significant at the 10 percent level in Model 2 and at the 5 percent level in Model 5. Instead, IPOQS is not significantly related to underpricing in the models where the dependent variable is MAIR. The effect on underpricing of IPOQS is similar to that of IPOQ. However, evidence suggests that IPOQ is better at explaining initial returns since it is significant in all the models considered. This means that the IPO market activity is better explained by all the IPOs occurred on AIM Italia, hence including investing companies.

The results of this analysis show that granting a greenshoe option to the banks hired for the listing process seems not to impact on underpricing. The estimated coefficient of variable GS – that measures the maximum number of shares offered in the greenshoe option as percentage of all the shares offered at the IPO – is positive, consistently with Dell'Acqua et al. (2015), but it is not significant at any conventional level. The estimated coefficient remains insignificant even excluding from the final regression model variable LNGP, that is positively and significantly correlated with GS. In addition, even the dummy variable GSD used instead of GS is not useful to explain underpricing on AIM Italia.

The number of secondary shares sold as a percentage of all the shares offered at the IPO is expected to be negatively related to underpricing. This is explained by the fact that the more a pre-IPO shareholder sells at the IPO, the higher are his incentives to reduce underpricing (Habib & Ljungqvist, 2001; Ljungqvist & Wilhelm, 2003). This happens because the higher is the underpricing, the higher is the money this pre-IPO shareholder leaves on the table at the IPO

and the higher is the loss he perceives according to the prospect theory of Loughran and Ritter (2002). The percentage of secondary shares sold at the IPO is included in the regression analyses starting from Model 3 with the use of variable SELL. However, the estimated regression coefficient of this variable is largely not significant, hence the variable has been removed in the stepwise procedure and it is not included in the final model.

The regression analyses also highlight that, keeping all else equal, the IPOs of firms belonging to certain industries are more underpriced. The estimated regression coefficient of industry dummy PROF is positive and significant at the 10 percent level in model 5 and at the 5 percent level in model 4. This suggests that firms performing professional, scientific and technical activities (ATECO section M) have peculiar characteristics that may positively influence their initial returns at the IPO. Even the estimated regression coefficient of industry dummy EL referred to the electricity, gas, steam and air conditioning supply industry (ATECO section D) is positive and significant in model 4 and also in models 7 and 8 that use MAIR as dependent variable. The estimated regression coefficients of the other industry dummies are not significant. These results are quite surprising since most studies tend to control for the effects of the financial and hi-tech industries when they analyse underpricing (Certo et al., 2001; Filatotchev & Bishop, 2002). However, an in-depth look at the industries affecting underpricing reveals that the effect of PROF is led by certain subindustries identified by two-digits ATECO codes. In particular, the positive influence of PROF on raw initial returns is mainly driven by industries identified by codes 71 and 72. ATECO code 71 represents the architectural and engineering activities. In the sample, two IPO firms are part of this category: one provides engineering services for the aeronautical industry and the other projects and installs wind farms for the production of electricity. Just one issuer in the sample belongs to the scientific research and development industry, identified by ATECO code 72. Hence, these three firms can't be considered as operating in low- or mid-tech industries. This reconciles with the international literature that controls for the effects of promising hi-tech industries in the regression models. Anyway, as argued before, using two-digits industry classification to build industry dummies is not feasible in this analysis given the small size of the sample and the thin presence of issuers in more detailed industry categories. Regarding industry dummy EL, all the five firms part of category D are included in the electricity, gas, steam and air conditioning supply industry identified by the two-digit code 35, since section D is made of only one division<sup>76</sup>. The positive impact on underpricing of this sector is probably driven by the fact that to a certain extent, all these firms produce and trade electricity from renewable energy plants. Therefore, if this sector

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<sup>76</sup> In the ATECO classification, 'Sections' are the first level classes identified by an alphabetical code. 'Divisions' are the second level classes identified by a two-digit numerical code.

is considered risky, it follows that underpricing is higher (Beatty & Ritter, 1986; Ritter, 1984). It is worth noting that the estimated regression coefficients for the financial industry and for the information and communication industry are all positive but not significant at any conventional level. As stated in the industry-analysis of the sample in section 4.3, the fact that the information and communication industry does not impact on underpricing may be possibly driven by the heterogeneous composition of this industry according to the ATECO classification. However, even trying to re-run the final regression model substituting industry variables with dummy variables built on two-digit ATECO codes, the IT industry seems not to be able to explain part of underpricing.

Hypothesis five is tested with the use of variable RO. The results of the regressions of Model 1 and 3 provide evidence of a positive and significant relation of retained ownership with underpricing. However, this variable has been removed because its relation both with RIR and MAIR is not linear. This non-linearity may be caused by the limited size of the sample and by the influence that some observations – even after the removal of the outliers – may still exert on regression results. Anyway, a graphical examination reveals that the relation between RO and RIR tend to be positive for levels of retained ownership approximately higher than 60 or 70 percent. This positive relation does not support the hypothesis previously developed. Based just on this preliminary evidence, it could be supposed that the level of retained ownership by pre-IPO shareholders is not useful to signal the quality of their firms to IPO investors. This may be caused by the fact that on AIM Italia, selling secondary shares is not so frequent. Instead, all the IPOs offer newly issued shares. Hence in this situation, the quality of an issuing firm can't be inferred by the willingness of pre-IPO owners to remain in the shareholders base after the IPO and not to cash-in their investments, since very few secondary shares are sold. A possible explanation for the positive relation between retained ownership and underpricing is the following. If we assume that investors fear the possibility to invest in a firm where pre-IPO shareholders are interested in controlling the firm even after the IPO to conduct activities that are in their own interest but not in the interest of the firm (Brennan & Franks, 1997; Engelen & Van Essen, 2010); if we also assume that the possibility to manage the firm in an opportunistic way increases the larger is the share of equity owned by pre-IPO shareholders, then it may be concluded that the higher is the retained ownership, the higher is the fear of investors to suffer from the effects of the possible bad conduct of pre-IPO shareholders. This fear causes higher underpricing, similarly to Engelen and Van Essen (2010) and Banerjee et al. (2011). Anyhow, to conclude on the effects of retained ownership on underpricing a more thorough analysis should be performed in future research when more IPOs on AIM Italia can be observed.

To conclude, the value added by this thesis to the literature on underpricing is that it sheds light on the determinants of underpricing on AIM Italia. Few researches have been conducted on underpricing on the Italian equity markets compared to the number of researches conducted in other countries. Of the researches on Italian markets, no one specifically focuses on AIM Italia. The analysis conducted in this thesis highlights that some of the determinants of underpricing considered in the international literature lose part of their ability to explain initial returns in this smaller market. This is probably due to the peculiar characteristics of AIM Italia that differ from those of the larger markets usually considered in the international literature.

In particular, it is surprising the role of issuer size and age that are generally considered two good proxies of ex-ante uncertainty about IPOs and for this reason they are widely adopted in the empirical literature. The smallness of issuers on AIM Italia has probably reduced the significance of size as a proxy of uncertainty. At the same time, the role of age is quite uncertain in this analysis. The only good proxy of ex-ante uncertainty seems to be the gross proceeds raised by issuers at the IPO. The certification role played by Nomads is similar to that of underwriters as reported in the international literature. Instead, auditors do not seem to certify the quality of IPOs with their own reputation, contrarily to what is reported in the literature. Similarly to other studies, high tech and risky industries are associated with higher levels of underpricing even in this study. However, in AIM Italia the IT and the financial industries have not a relevant influence on the underpricing of IPOs. Unfortunately, the level of ownership retained after the IPO by pre-IPO shareholders couldn't be tested in this analysis. However, the preliminary evidence obtained in this analysis is not in support of the role of retained ownership as a signal sent by issuers to potential investors, as described in the literature review of this thesis.

In any case, the analysis conducted has highlighted the need for two additional variables to be included in future analysis on the underpricing of AIM Italia IPOs. In particular, data on IPO demand are required to verify one of the possible effects of PIR on underpricing. In addition, controlling for IPO demand in future researches may reveal whether the positive relation between issuer age and underpricing is in fact spurious and whether the hypothesised explanation holds. In future researches, it would be useful to control even for investors expectations about liquidity, proxying this value with measures of aftermarket liquidity as in Ellul and Pagano (2006). Measures of liquidity are useful to test the effects of PIR, as specified before.

It is worth to observe also a limitation of this research that could be tackled in future studies. The number of IPOs that occur in AIM Italia is very low if compared to the AIM of the London



Stock Exchange or to many US and European markets considered in many empirical studies. This results in a sample of IPOs that is not as big as those usually employed in the existing literature. The results based on a sample of smaller size are more prone to be affected by individual observations. For this reason, the IPOs that could have negatively affected the analysis have been removed and the sample of 58 IPOs is obtained. In addition, several alternative variables have been used to test the same causes of underpricing in the regression analyses and several models have been developed, even changing the dependent variable. The results obtained in this thesis may be confirmed in future researches on underpricing on AIM Italia when more IPOs will be available. In addition, the results obtained on AIM Italia may provide useful hints for future studies on underpricing based on second markets that are similar to AIM Italia.



## CONCLUSIONS.

The empirical analysis conducted in this thesis provides evidence that even AIM Italia IPOs are affected by the phenomenon of underpricing. In particular, the average raw initial return in the first day of trading is of 5.09 percent. Surprisingly, this value is lower than those reported by other studies on international markets (Chambers & Dimson, 2009; Park et al., 2016). However, it is consistent with the decline of average initial returns observed in other studies on AIM Italia (Dell'Acqua et al., 2015; Lanzavecchia & Mazzonetto, 2014; Vismara et al., 2012). Due to underpricing, each of the issuers part of the sample left on the table 0.3 million euros on average. In aggregate, the 58 issuing firms of the sample left on the table more than 17 million euros and raised approximately 480 million euros at the IPO. The analysis also provides evidence that average initial returns and IPO volumes fluctuate over time. Consistently with the literature (Ibbotson & Jaffe, 1975; Lowry & Schwert, 2002), periods of high volume seem to follow periods of high average initial returns.

To explain these abnormal returns, a set of regression models is developed. The starting point of the models used is the model adopted in Dell'Acqua et al. (2015). This model is adjusted to make it adapt to analyse the AIM Italia context. Hence, two models are developed from this adjustment. Then, several explanatory variables – reflecting the main underpricing determinants identified in the literature and reviewed in chapter 1 and 2 – are added. The model obtained after adding variables is quite large considering the size of the sample, hence the final model of this analysis is obtained by running a stepwise procedure. Then, the main models of the analysis are replicated changing the dependent variable. Following the empirical literature, underpricing can be computed either as raw initial return (Beatty & Ritter, 1986) or as market-adjusted initial return (Aggarwal & Rivoli, 1990; Cassia et al., 2004; Dell'Acqua et al., 2015). Hence, the main models used in the analysis with raw-initial returns as dependent variable are replicated with the use of market-adjusted initial returns as dependent variable. In any case, it is worth noting that the definition of underpricing as raw initial return is much more frequent in the empirical literature than the definition of underpricing as market-adjusted initial return. Anyhow, the results presented by the two sets of models with different dependent variables are quite similar.

The findings obtained from the analyses conducted highlight that much of the determinants that explain underpricing in international markets is useful to explain underpricing even on AIM Italia. However, some particular characteristics of AIM Italia lead to unexpected results. The size of the issuer, that is generally recognized as a proxy on ex-ante uncertainty (Ritter, 1984; Chambers & Dimson, 2009) is not related to underpricing in this study. In AIM Italia, issuers

are generally small. The median issuer in the sample reported sales of 12.5 million euros. This figure is significantly lower than the revenues generally observed for the issuers in international main markets (Cassia et al., 2004; Reber & Vencappa, 2016). Similarly, even the capitalization of AIM Italia issuers at the offer price is much lower than that reported in international evidence. Given that the issuers on AIM Italia tend not to differentiate significantly in size – opposed to what happens in international markets – it could be possible that size is not able to provide useful information to investors. This could be the reason why issuer size is not found to be related to underpricing.

Instead, issuer age – that is another proxy of ex-ante uncertainty (Ljungqvist, 2007; Reber & Vencappa, 2016) – is found to be positively related to underpricing. However, the sign of this relation is unexpected. The international literature expects issuer age and underpricing to be negatively related since older firms are associated with lower uncertainty and this in turns leads to lower initial returns. A positive relation between issuer age and underpricing is observed only in some emerging markets (Chan et al., 2004; Islam et al., 2010; Sahoo & Rajib, 2011). It could be hypothesised that the weaker institutional environment, the thin presence of investors specialised in small and medium companies and the smallness of issuing firms make AIM Italia to approximate some of the conditions that characterise the IPO markets of emerging countries. Following Su and Fleisher (1999), these conditions boost information asymmetries between issuers and investors. Hence, investors may prefer to concentrate their investments in less risky firms that are the older firms for which the past track-record can be observed rather than investing in young firms with unobservable past performance and unknown management. If this happens, it could be hypothesised that the demand for the IPOs of younger firms is weak and this in turns determines lower underpricing for these firms (Koh & Walter, 1989; Levis, 1990; Rock, 1986). According to this hypothesis, older firms would obtain a stronger demand at the IPO that results in higher underpricing. Thus, I suspect that the relation between issuer age and underpricing is a spurious one. Unfortunately, no data on IPO demand are available for the IPOs considered in the sample. Future research on underpricing on AIM Italia – if data on IPO demand will be available – may include a variable to control for the strength of IPO demand. If the proposed hypothesis is true, IPO demand should be positively related to underpricing and the relation between issuer age and underpricing should turn negative or at least it should become not significant.

The only proxy of ex-ante uncertainty that behaves as reported in the literature are the gross-proceeds raised at the IPO by the issuer. The amount of gross proceeds is inversely related to underpricing, supporting the hypothesis that smaller offerings are more speculative and thus more underpriced (Beatty & Ritter, 1986). An alternative explanation for this relation is

proposed by Habib and Ljungqvist (2001), who argue that larger offerings are less underpriced because pre-IPO owners are more incentivised to care about the pricing and the marketing behaviour of Nomads and advisors since the larger is the offering, the larger is the extent of the loss they suffer because of the dilution caused by mispricing.

Related to the function of gross proceeds, it is worth to observe that they are mainly collected by issuing primary shares. Offerings including even secondary shares are not so common on AIM Italia. Hence, issuing firms going public in AIM Italia are probably motivated by the possibility to raise funds to finance growth and to rebalance their capital structure rather than to provide an exit strategy for their current shareholders, consistently with Vismara et al. (2012). The analysis also highlights the certification role played by Nomads (Carter & Manaster, 1990; Espenlaub et al., 2012; Megginson & Weiss, 1991; Migliorati & Vismara, 2014). In practice, the reputation of the Nomad hired for the IPO is negatively related to underpricing. This happens because the Nomad certifies with its own reputation the quality of the initial issue, thereby sending a signal to IPO investors. In this analysis, it emerges that among several alternatives, the best proxy of Nomad reputation is the proceeds-weighted market share of the Nomad computed on the market for IPOs of operating companies.

Still related to Nomads, it is interesting to observe that the most active Nomads on AIM Italia are not the usual investment banks that dominate the main market. Two small advisors shared more than the 60 percent of the market for Nomads for IPOs of operating companies in the reference period of this study. It is also interesting to note that there seems to be Nomads that are more inclined to assist the IPOs of investing companies while other Nomads serve almost exclusively operating firms. Hence, it could be hypothesised that the decision on which Nomad to hire is driven by different factors for operating firms and for investing companies.

Another agent that participate to the listing process and that is considered to certify an issue with its own reputation is the auditing firm hired (Beatty, 1989). In this analysis, the reputation of the auditing firm does not seem to affect underpricing.

The activity performed by the firm is found to be useful to explain part of underpricing. However, contrary to the international literature (Certo et al., 2001; Filatotchev & Bishop, 2002) the fact that an issuer belongs to the IT industry or to the financial industry seems not to impact on underpricing. The analysis highlights an increase in underpricing for firms part of the professional activities industry and for those part of the electricity supply industry. However, this evidence can still be reconciled to the international literature since a more detailed disaggregation reveals that the firms part of the professional activities industry are in fact hi-tech firms and that the firms part of the electricity supply industry are involved in the

electricity production from renewable sources, hence they work in a promising but risky business.

The analysis also reveals underpricing as being negatively related with the number of IPOs occurred in the same calendar quarter in which the IPO has occurred. As argued before, this is consistent with Ibbotson and Jaffe (1975) and Lowry and Schwert (2002). According to Lowry and Schwert (2002), this relation can be explained with fluctuations in market valuations and with the learning process of investment bankers and private firms about these fluctuations.

The level of retained equity seems not to affect underpricing in the way predicted by the signalling theory (Allen & Faulhaber, 1989; Leland & Pyle, 1977). This theory explains the level of equity retained by pre-IPO shareholders as a signal sent to potential investors about the quality of the issuing firm. The higher is the level of equity retained, the higher is the confidence of current owners about the future prospects of the firm. This explanation seems not to hold in the context of AIM Italia. Unfortunately, the level of retained ownership has not been tested in the final regression analyses since its relation with initial returns is probably not completely linear. However, from a graphical examination, the relation between retained ownership and raw initial returns seems to be positive for levels of retained ownership higher than 60 or 70 percent. This could be explained by the fear of investors to invest in a firm that is largely controlled by pre-issue owners and that these owners can exploit this situation by conducting activities that are in their own interest but not in the interest of the firm (Banerjee et al., 2011; Engelen & Van Essen, 2010). Hence, IPO investors could require higher underpricing as compensation for the risk they face. Future research having the possibility to enlarge the number of IPOs considered may still try to test the effects of retained ownership on underpricing and it could observe if linearity is respected when more IPOs can be analysed.

The introduction of PIR regulation in the Italian legislation and the subsequent proliferation of PIR compliant products has probably generated an increase in the flow of investments directed toward AIM Italia firms. This investment flow seems not to have affected the underpricing of IPOs occurred after the introduction of PIR. However, evidence on the effects of PIR is still limited given that few IPOs have been observed in 2017. Future research may provide better evidence of the effects of PIR on the IPO market of AIM Italia.

To conclude, the analysis conducted in this thesis has provided some evidence on the determinants of underpricing on AIM Italia and it has also highlighted the main discrepancies with international evidence. This is probably the value added by this thesis on the literature on underpricing, since existing studies do not specifically focus on AIM Italia and those that consider this market along with the other equity markets of Borsa Italiana do so using samples

of IPOs occurred until 2013. The results of this thesis can be verified in future research, when more IPOs can be observed. In particular, it is better in future research on underpricing on AIM Italia to include two additional variables in the analysis. The first variable that I suggest to include in future research is IPO demand, if data are available. A variable about the strength of IPO demand is useful to test whether the hypothesis formulated to explain the positive relation between underpricing and issuer age holds. If it holds, this would be an important result even at a practical level. It may suggest that investors would require a stronger institutional environment for AIM Italia to invest in young issuing firms. It may also suggest that more effort is required to attract investors specialised in small and medium companies to AIM Italia. This is also an issue that is stressed in the business news (Cellino, 2017). Finally, it could be even useful for young firms to better evaluate the opportunity to go public with respect to other possibilities. If the hypothesis holds, it would be interesting to analyse the long-term performance of young firms listed on AIM Italia to assess whether investors are right to avoid investing in those companies or if they are just missing a profitable opportunity. Data on IPO demand can be even useful to verify whether the introduction of PIR has boosted the flow of investments directed toward initial issues. An additional variable that is worth to be included in future analysis of underpricing on AIM Italia is related to the liquidity expected by investors for IPO shares. This information is generally proxied with data on aftermarket liquidity (Ellul & Pagano, 2006). The literature expects that the lower is the level of expected liquidity in the aftermarket, the higher is underpricing (Ellul & Pagano, 2006). A variable accounting for aftermarket liquidity is not included in this analysis because the international literature has rarely used measures of liquidity to analyse underpricing. This is reasonable considering that the international literature mainly focuses on large international markets in which liquidity is generally not an issue. However, the low admission requirements of AIM Italia, the smallness of firms and the high level of equity retained by pre-IPO shareholders could indicate that a liquid market for the shares of some issuers may not easily develop. For this reason, it could be possible that investors are concerned about aftermarket liquidity when they decide whether to participate to an initial offering. If this is true, expected liquidity impacts on underpricing and it is worth to be tested in future research. Liquidity is also useful to analyse the possible effects of PIR on the underpricing of AIM Italia IPOs.

To sum up, the analysis conducted in this thesis has highlighted the main determinants of underpricing on AIM Italia and the differences with the international evidence. Clearly, the literature on underpricing is very broad, hence future research may test even other causes of underpricing on AIM Italia IPOs. In addition, future research may rely on an increasing number of IPOs to be analysed, thereby providing better evidence on IPO underpricing on AIM Italia.





## APPENDIX.

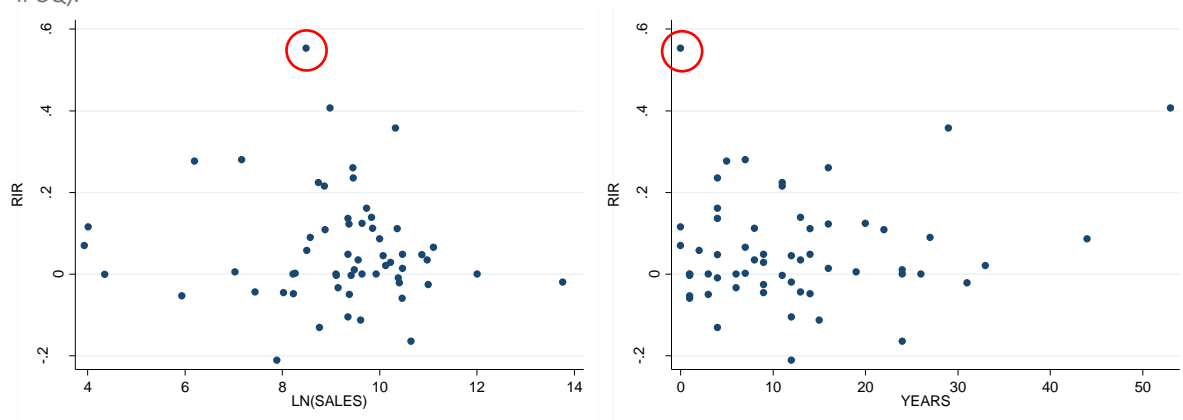
### Outlier Removal.

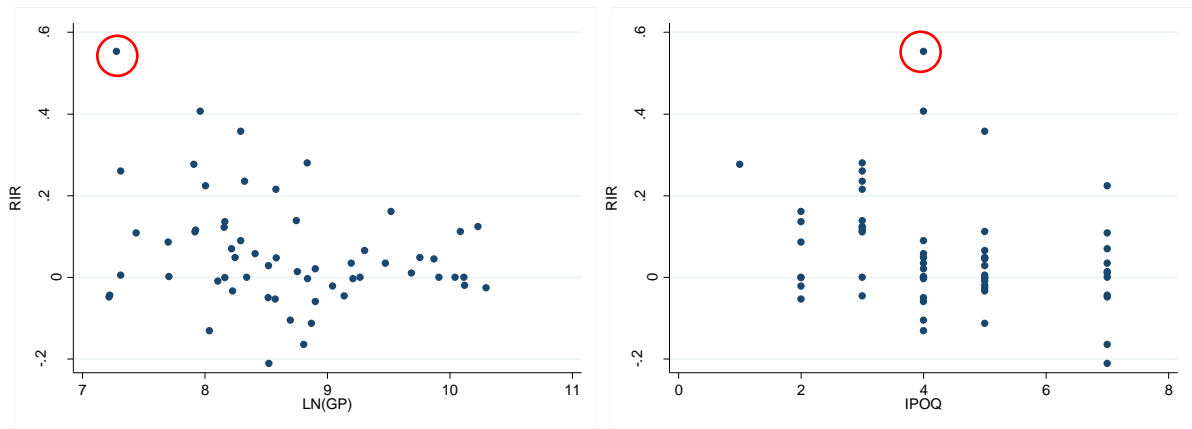
An IPO has been excluded from the sample because it is considered an outlier. This firm is Caleido Group, that went public on March 24, 2015. It is a quite small firm since it reported revenues of 4.8 million euros in the pro-forma annual report referred to the year prior the IPO. Pro-forma annual report was provided because the company went public just a few months after being established. The company is also the only AIM Italia issuer that operates in the travel agency and tour operator activities industry identified by the ATECO division 79, part of section 'N'.

The characteristic of this firm that markedly differentiate it from the remaining IPOs considered is that its shares experienced a stunning price run-up in the first trading day of 55.33 percent. This value is significantly higher than the average initial return of 5.56 percent observed for all the IPOs occurred in the reference period. This significant underpricing also differentiate Caleido from the other observations with similar characteristics. This is visible in the following figures.

The first group of figures shows scatter plots between the dependent variable RIR and some explanatory variables. In these graphs, the observation referred to Caleido is highlighted with a red circle. It could be observed that the observation referred to Caleido is always at the margin of the group of the other observations. In particular, in the scatter plot between RIR and YEARS, the observation of Caleido is very far from the remaining observations.

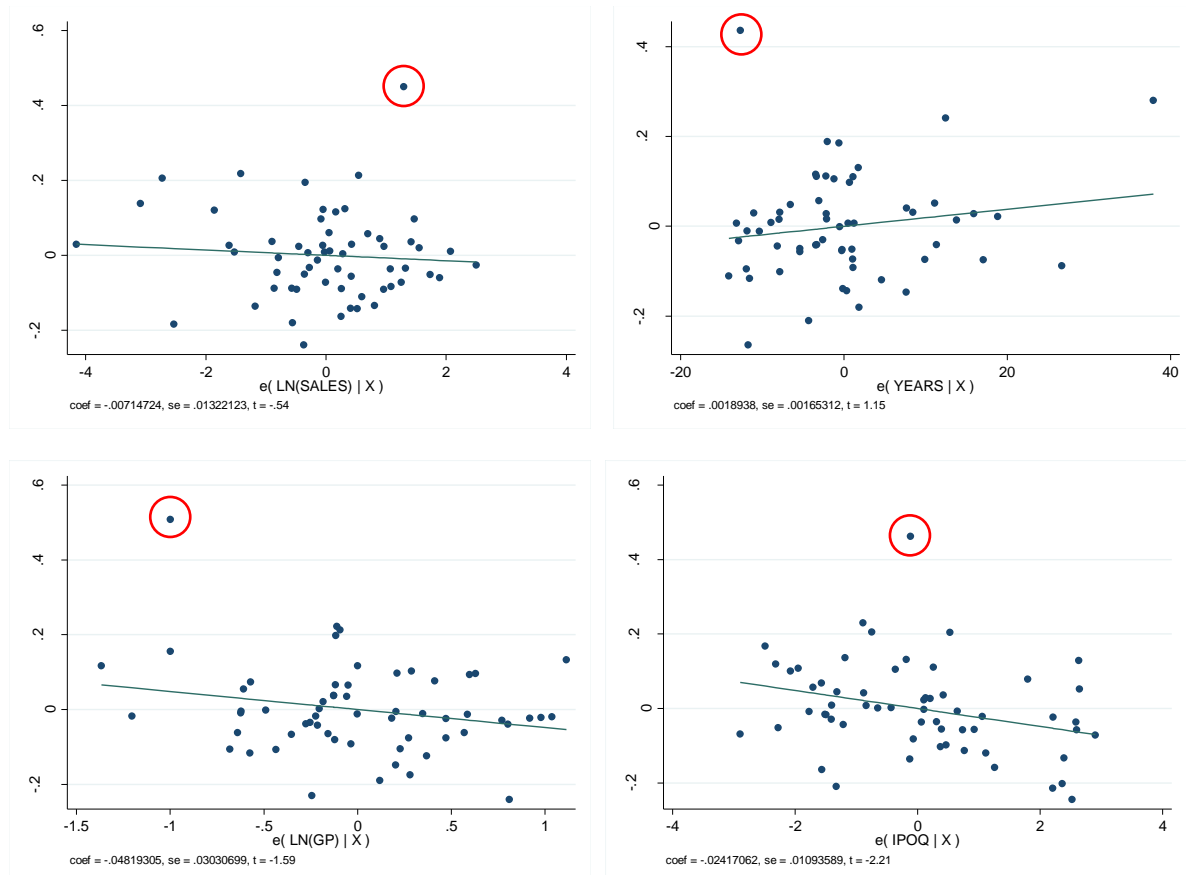
**Figure 4.** Scatter plots between variable RIR (Raw initial returns) and four explanatory variables ( LN(SALES), YEARS, LN(GP), IPOQ).





The second group of figures presents the added variable plots referred to the same variables considered in the previous group of figures. These graphs are obtained after running a regression based on Model 1 using a dataset comprising the 58 IPOs part of the sample and adding data about Caleido Group. These graphs could be used to detect outliers and they highlight better than scatter plots the fact that the observation referred to Caleido group is markedly out of the group of the remaining observations.

**Figure 5.** Added variable plots related to four explanatory variables ( LN(SALES), YEARS, LN(GP), IPOQ). The graphs are based on a dataset comprising the 58 IPOs part of the sample and data on the IPO of Caleido Group. The red circle highlights the observation referred to Caleido group.



In sum, the observation point referred to Caleido Group can significantly affect the results of the analysis. For this reason, it has been considered an outlier and it has been excluded from the sample of IPOs. In any case, it is not clear why Caleido Group has experienced such an high level of underpricing, given its own characteristics. In future research, if other IPO firms part of the same industry of Caleido will go public, it would be interesting to observe whether this industry is characterized by high average levels of underpricing or whether the underpricing of Caleido has been determined by firm- or issue-specific factors.

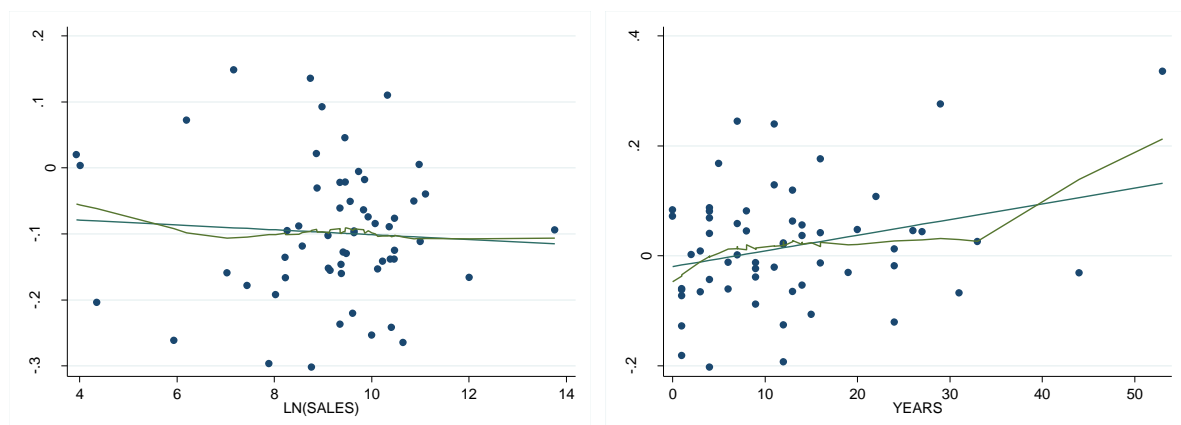
## Assumptions Check.

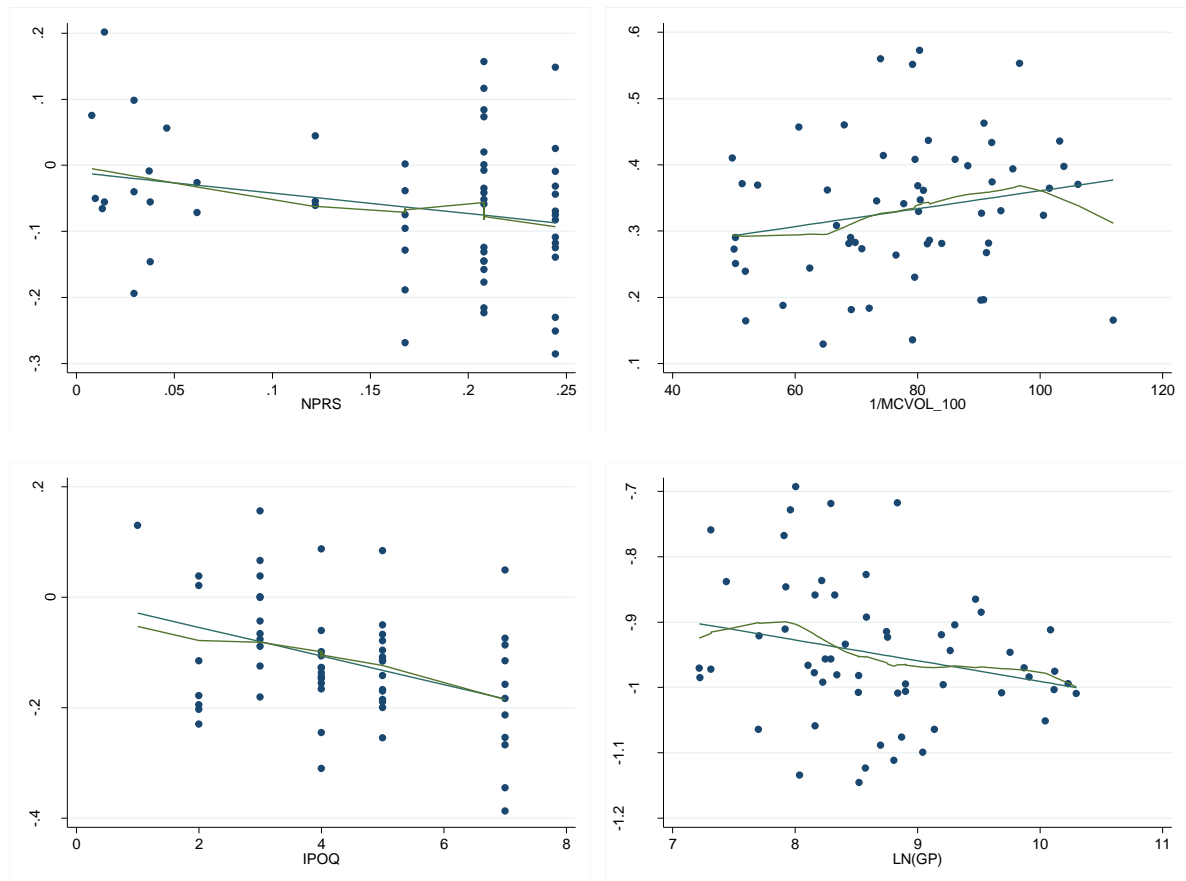
### Model 2.

#### *Check for linearity.*

The following group of graphs checks linearity between the explanatory variables used in Model 2 and the explained variable, that is RIR. The green line traced in the graph draws the observed pattern in the data, thus it helps in detecting nonlinearities. It could be observed that all the green lines tend to approximate a linear relation. The fact that in some graphs they seem to be less linear is probably caused by the fact that the number of observations considered is quite small.

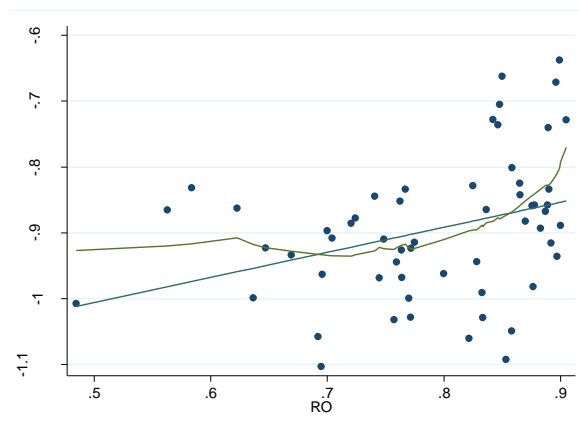
**Figure 6.** Augmented component plus residuals graphs. These graphs are used to check the linearity of the relation between the explanatory variables used in Model 2 and raw initial returns.





For the sake of completeness, below is reported the augmented component plus residual plot of RO with RIR in Model 1. It could be observed that the relation between these two variables follows a specific pattern and that it is not linear.

**Figure 7.** Augmented component plus residuals plot referred to the relation between RO and RIR in Model 1.



### Normality of Errors.

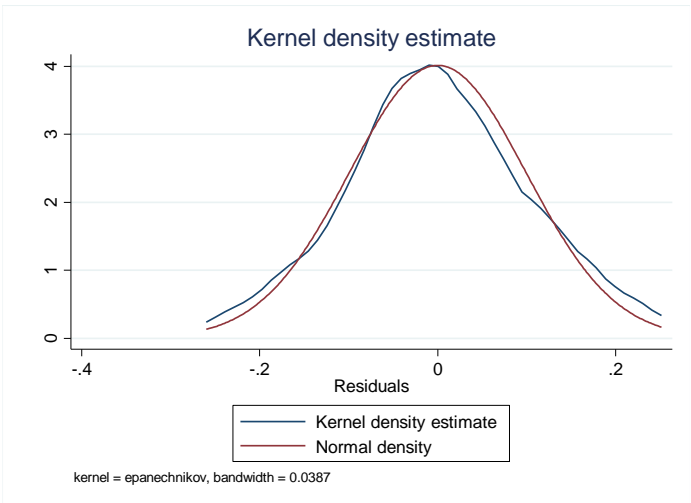
Normality is checked both graphically and with the use of a test. The Shapiro-Wilk test on the residuals of the regression shows that residuals are normally distributed. Similarly, the graph

reported in figure 8 highlights that the estimated density distribution of residuals approximates a normal distribution.

**Table 21. Shapiro-Wilk W test for Normal data.** Data highlights that residuals of the regression of Model 2 are normally distributed.

Variable	Obs	W	V	z	Prob>z
residuals	58	0.98834	0.617	-1.039	0.85058

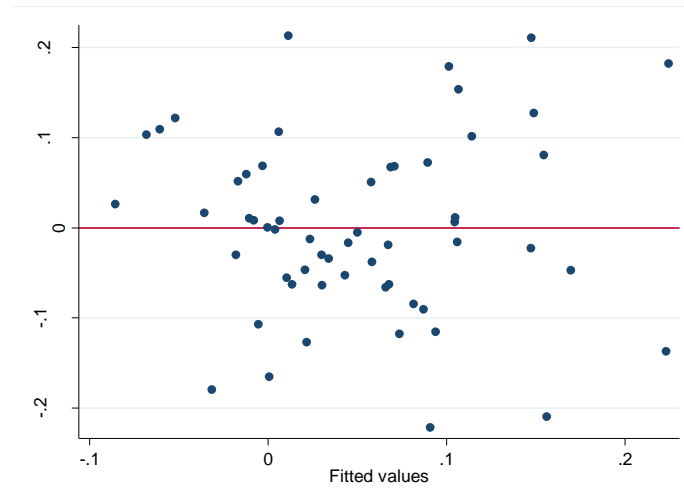
**Figure 8.** Kernel density estimate of residuals compared with a normal distribution.



*Homoscedasticity.*

Homoscedasticity of residuals is verified graphically observing the scatter plot between residuals and predicted values. In this graph, residuals do not seem to follow specific patterns or to expand at certain levels of predicted values, hence the graph does not suggest that the regression could be affected by heteroscedasticity.

**Figure 9.** Residuals versus fitted values in Model 2.



Homoscedasticity is verified also using two tests: the test of Breusch-Pagan and the test of White. The latter test provides evidence in favour of homoscedasticity. The p-value of the test is 0.62, hence the null hypothesis of homoscedasticity can not be rejected. The Breusch Pagan test provides results that may suggest possible presence of heteroscedasticity. However, both the graphical test and the White test do not present evidence of heteroscedasticity.

**Table 22.** Tests for homoscedasticity for Model 2.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho:	Constant variance
	Variables: fitted values of RIR
	chi2(1) = 4.45
	Prob > chi2 = 0.0348
White's test for Ho: homoskedasticity	
	against Ha: unrestricted heteroskedasticity
	chi2(48) = 44.48
	Prob > chi2 = 0.6179

### *Multicollinearity.*

To test for multicollinearity, variance inflation factors are computed for each independent variable in model 2. The results are summarized in table 23. It could be concluded that Model 2 is not affected by multicollinearity since all the variance inflation factors are below 10.

**Table 23.** Variance Inflation Factors computed for all the independent variables included in Model 2.

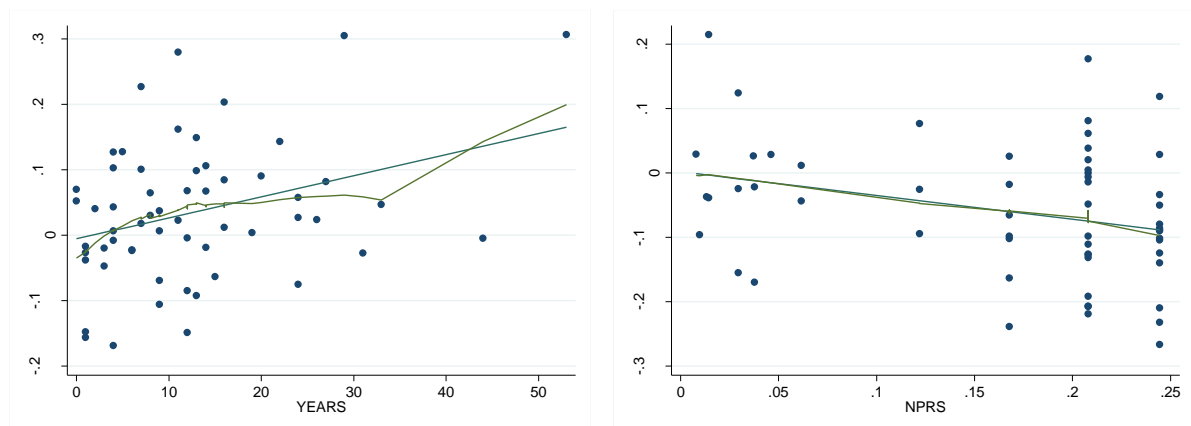
Variable	VIF	1/VIF
LN(GP)	2.29	0.437504
LN(SALES)	1.93	0.517651
GS	1.83	0.546599
RO	1.54	0.648193
NPRS	1.29	0.772253
1/MCVOL_100	1.25	0.801054
FIN	1.20	0.834102
YEARS	1.16	0.864225
IPOQ	1.13	0.881806
Mean VIF	1.51	

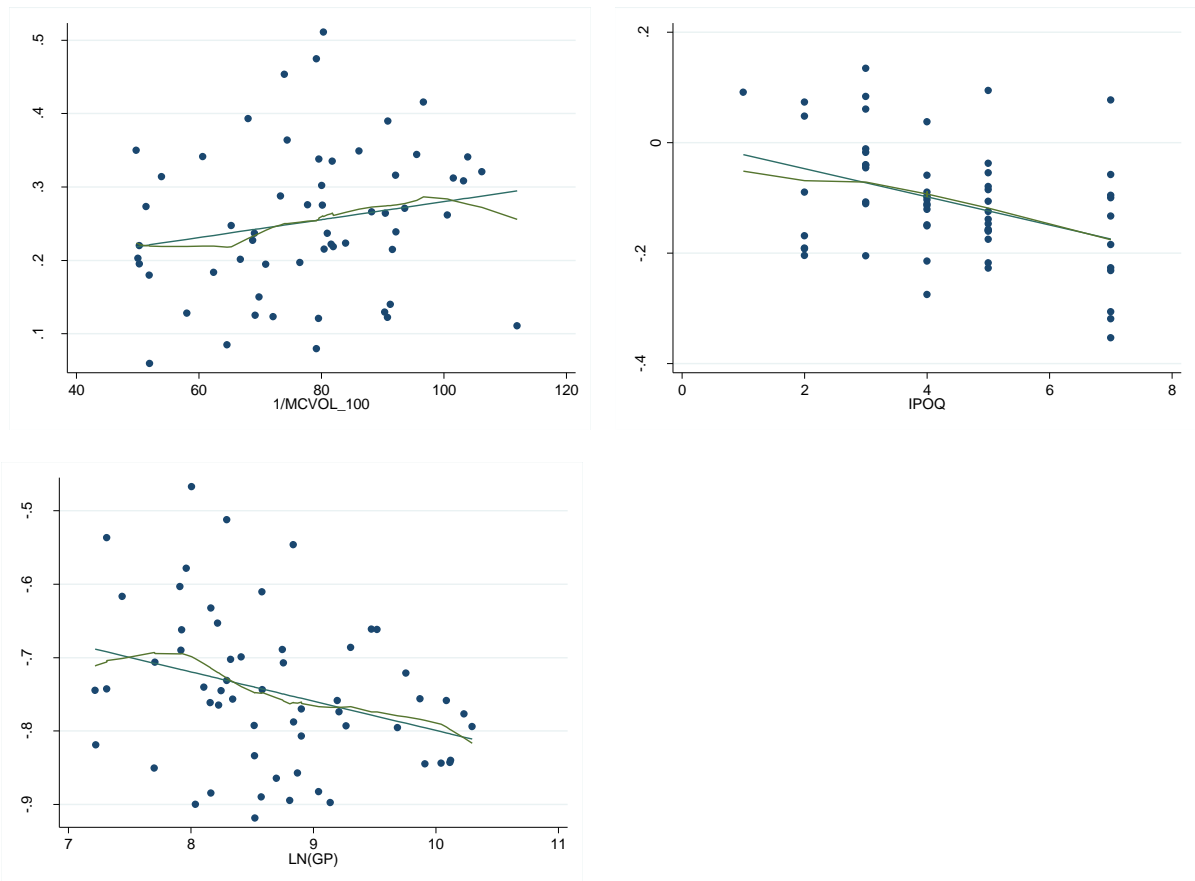
## Model 5.

### Linearity.

The following graphs have been used to detect possible non-linearities in the relations between the independent variables included in Model 5 and the dependent variable, that is RIR. The green lines that draw the observed pattern in the data seem to approximate a linear relation in all the graphs.

**Figure 10.** Augmented component plus residuals graphs. These graphs are used to test the linearity of the relation between the independent variables used in Model 5 and RIR.

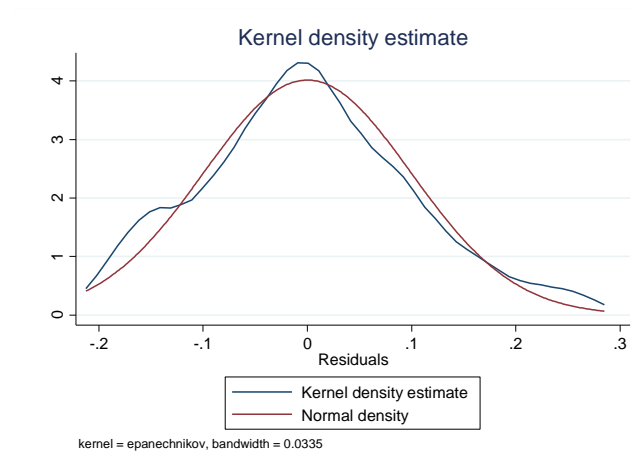




### Normality of errors.

As observable in figure 11, the distribution of residuals in Model 5 seems to approximate a normal distribution, as required by the assumption of the OLS regression. Further evidence in favour of normality of the distribution of residuals is provided in table 24, where the results of a Shapiro-Wilk test on residuals are reported.

**Figure 11.** Kernel density estimate of residuals referred to Model 5.





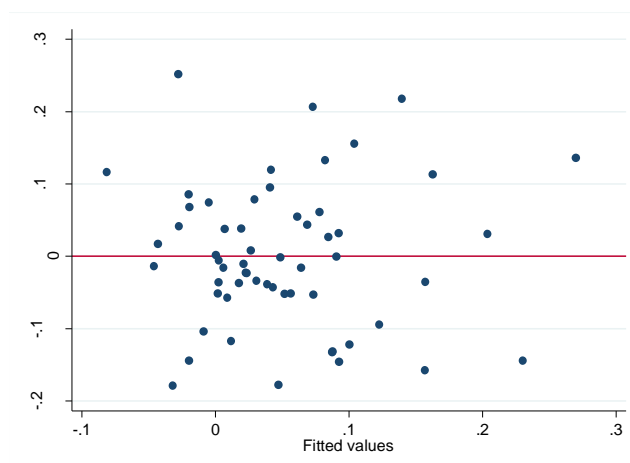
**Table 24.** Shapiro-Wilk test for normal data applied to the distribution of residuals in Model 5.

Variable	Obs	W	V	z	Prob>z
Residuals	58	0.97841	1.142	0.286	0.38753

### *Homoscedasticity.*

The assumption of homoscedasticity for Model 5 is verified both graphically and with the use of tests. The graph below reports the scatter plot of residuals against fitted values. It could be observed that residuals are distributed around zero and they do not seem to follow specific patterns. In addition, the tests of Breusch-Pagan and White both reject the possibility that residuals are affected by heteroscedasticity. The Breusch-Pagan test accepts the null hypothesis of constant variance with a p-value of 0.23, hence higher than the usual significance levels. Similarly, the White's test accepts the null hypothesis of homoscedasticity given that the p-value of the test is 0.80. In sum, the graphical examination and the tests performed do not suggest the possibility that residuals are affected by heteroscedasticity.

**Figure 12.** Residuals versus fitted values in Model 5.



**Table 25.** Results of the Breusch-Pagan and White tests on homoscedasticity for Model 5.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho:	Constant variance
	Variables: fitted values of RIR
	$\chi^2(1) = 1.43$
	Prob > $\chi^2 = 0.2310$

---

White's test for  $H_0$ : homoskedasticity

against  $H_a$ : unrestricted heteroskedasticity

$\chi^2(31) = 24.19$

Prob >  $\chi^2 = 0.8025$

---

### *Multicollinearity.*

Multicollinearity is tested by computing variance inflation factors for each independent variable used in Model 5. Since all the variance inflation factors are below the threshold of ten, there is no evidence that indicate that the regression results are affected by multicollinearity.

**Table 26.** *Variance inflation factors computed for each independent variable included in Model 5.*

Variable	VIF	1/VIF
1/MCVOL_100	1.20	0.831544
NPRS	1.14	0.876983
LN(GP)	1.13	0.884493
IPOQ	1.12	0.895015
EL	1.11	0.901685
YEARS	1.07	0.938027
PROF	1.05	0.948836
Mean VIF	1.12	

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