Underpricing, ownership structure and liquidity of Initial public offering

by

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Abstract:

The aftermarket performance of Initial Public Offering is a subject which has been largely covered in the literature. This paper presents an empirical study that has been carried out on a sample of 277 IPOs in the Euro NM market and 277 equivalent operations in the Nasdaq .Our study is particularly concerned with analysing the relationship between the level of underpricing of an initial public offering, its property structure after the process of allocating the capital and its ex-post level of liquidity.
We have shown that the underpricing level is positively correlated to the part of the capital retained by the original shareholders. If the company IPO is underpriced, it is very likely because the founder shareholders have proffered to retain an important part of the capital in order to maintain the control on the company. The property structure can explain the variation in the level of the liquidity. The liquidity of a company with an undervalued offer is higher than that of an underpriced company. In fact the companies with underpriced issues are characterised by a low average of price variants and a higher transaction turnover than that of the overpriced IPO.

Key words: *Initial Public Offerings (IPO)*; *Underpricing*; *Liquidity*; *Ownership structure and Money left on the table.*

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Introduction

Several empirical studies on initial public offerings (IPO) show the presence of abnormal returns favouring the investors who have subscribed to them. During flotation operation the reason for opening up the capital to the public, the liquidity of the securities that is hoped for, the level of underpricing and the expected changes in the structure of the property are particularly dependent. Let us take this first example; if the flotation is part of a exit strategy and is concerned with transferring a large amount of shares to large number of investors. The property structure after the operation will consequently be relatively dispersed. The timing of the operation and the choice of the method of flotation are consequently essential in order to minimize the costs of the operation. In fact, the underpricing will reflect the asymmetry costs of the information and will be considered as a necessary part of the costs connected with the transfer of capital.

However, if, as in a second example, the original shareholders prefer to keep control of their company and only envisage stock market flotation for raising capital in order to finance acquisition operations within the frame work of a strategy for the company's external growth, the original shareholders will only give up a small part of their company. The property structure after flotation will remain very concentrated and the liquidity of the securities will be lower and above all the new shareholders will be deprived of the possibility of subscription. Thus, the underpricing for these companies will be higher and could be considered as the necessary cost to maintain the control and to finance the company's growth.

Beyond these two examples, we can also put forward the argument according to which, the underpricing is weaker for the companies where the original shareholders wish to disinvest from their company in order to diversify their portfolios and benefit from the liquidity of their securities.

Normally, companies try to maximize the liquidity of their actions after flotation at the official quotation According to Amihud and Mendelson (1986) and Ibbotson and Ritter (1995) a high liquidity enables these companies to raise supplementary funds on beneficial conditions thanks to low transactions costs. Subrahmanyam and Titman (1999) point out that liquidity is a crucial element for it leads to the realisation of other offerings in the future which, in turn, improve the size and the efficiency of the share market. Moreover, Shleifer and Vishny (1986) explain that if the original shareholders prefer to keep the control of their company, they can promote the liquidity by the dispersion of the property structure of the float and prevent the creation of new control blocks. This strategy makes it possible to create a mechanism foreseeing any attempt of hostile takeover.

But, attaining a high level of liquidity can generate additional costs. We can confirm moreover, all things being equal, that a concentration of the property structure provides more advantages than property dispersion. For the major shareholder has the right to actively monitor the company and can participate in company activities in order to reduce agency costs. It is also possible that in business practice, some companies favour the advantages of property concentration. These policies cause them to lose liquidity[1]. Alternatively, there is a cost to reach the level of liquidity required for the issuer in the case of IPO, for this leads to the participation of other investors. This paper considers that this cost is reflected by the level of underpricing of each Stock market offering.

The objective of this paper is to elucidate on the one hand, the relationship between property structure and liquidity and on the other hand, the level of underpricing and property structure. In particular, we will test the hypothesis of a negative relationship between property concentration and the level of underpricing. This study will enable us to analyse two systems of corporate management (Insider system / outsider system). The investors in the first system are more orientated towards control, the frequent use of shares with double voting rights and pyramid structures, which will lead to property concentration. In continental Europe, even after the opening of their capital to the public, quoted companies often remain strongly controlled. On the other hand, according to Brennan and Franks (1997), even if the Stock market floatation offers in the United States and in the United Kingdom are characterised by an orientation towards control, the property structure a few years after the floatation becomes typically dispersed with a separation between property and control.

[1] Bolton and Von Thadden (1998) present a model which analyses the costs and the profits obtained by property concentration.

This paper analyses the relationships which can exist between the IPO underpricing, the liquidity and the ownership structure in the 277 public offerings in the Euro NM (from the creation of this market in 1997 up to 1999) and of their equivalents in the Nasdaq. In the second section, we will present the theoretical framework and formulate the hypothesis of our research. In the third section, we will describe our methodology. In the fourth section, we will define the characteristics of our sample. Finally, in the fifth section, we will analyse the empirical results of our study.

I. Revue of the literature and formulation of the hypotheses

The phenomenon of IPO underpricing is a subject which has been largely discussed in financial economic literature. Loughran, Ritter and Rydqvist (2000) point out that the IPO underpricing offers seems to be a common characteristic in most of the financial markets. Table 1 shows a synthesis of the most known empirical works.

(Insert table 1)

Numerous explanations are provided for this anomaly which affects financial markets. According to the modern financial theories, the underpricing can be interpreted as the result of return to the equilibrium. However, other works associate the phenomenon with "fads" market, with noisy trading, with over optimism on the part of investors concerning growth perspectives or even with irrational behaviour due to speculative bubbles.[2] Up until now, the continuing existence of the phenomenon has led to the creation, by researchers, of theoretical models in which underpricing is a rational solution to information asymmetry and to agency problems as well as to institutional arrangements when companies open their capital to the public.

A. Theories concerning the underpricing of initial public offerings

Several theories concerning the pricing of IPO's have tried to provide an answer to the following question: Why are Stock market floatation offers undervalued? The main objective in this section is to establish a typology of the different theoretical currents of thought. This will enable us to distinguish four currents: (1) theories which evoke the information asymmetry existing between the insider information that is more effective than the outsiders (2) theories that evoke the information asymmetry between the investors and the lead underwriter (3) theories that evoke the information asymmetry between the issuing company and the initiating agent (4) theories that evoke agency costs. In this case, the accent is placed on the phenomenon of moral hazard and the conflicts of interests independent of the information asymmetry.

In the first theoretical current, the most recognised is the Rock (1986), p 205, where two categories of investors can be distinguished. The first is informed, whereas the second is not. According to the author, informed investors try to avoid subscribing to overprice issues and only acquire undervalued shares. On the other hand, the non-informed investors do not have the possibility to make a distinction between the issues. Consequently, they only obtain a small quantity of underpriced issues whereas they obtain the full allotment of overpriced issues. As a result, these investors are faced with the winners curse. The shares must generally be offered with a rebate in order to compensate the non-informed investors. Other authors such as Beatty and Ritter (1986) and Chowdry and Sherman (1996), adopted the same distinction between investors. For them, the IPOs must be underpriced in order to attract the participation of non-informed investors into the operation.

The second theoretical current assumes the existence of an information asymmetry concerning the flotation price and the level of demand for the shares, between the initiating agent and the investors. Benveniste and Spindt (1989) and Benveniste and Wilhelm (1990) confirm that the IPO underpricing is only a signal to lead the informed investors to reveal private information about the share demand during the subscription phase, this enabling intermediaries to increase the value of the offer. Ritter (1984) considers that the relationship between the subscription price of an IPO and the preliminary price makes it possible to foresee what will be the initial returns of the securities. The

[2] See concerning this Tinic (1988), Aggarwal and Rivoli (1990), Rajan and Servaes (1997) and Chen, Hong and Wu (1999).

shares which are valued at a higher price than the initial fixed price are characterized by a better short term performance. Moreover, the offer price is partially adjusted from the information obtained at the investors' request during the initiating agent's institutional activities. In this case, the underpricing can be used to compensate the investors for the information that they have provided to the company. Consequently, the more the information collected before the subscription is effective, the higher the level of the initial below par rating will be. Krigman, Shaw and Womack (1999) and Aggarwal and Conroy (1999) find that almost all the initial returns of IPO is made on the first day of negotiation. This confirms that the purchasers of blocks of shares are in possession of information that they update even a few minutes before the market opening. The insider information would be a determining factor in the discover price process which is more important than the actual behaviour of the investor. Loughran and Ritter (2002) suggest other explanations concerning the partial adjustment. For example the initiating agent will try to stabilise the fixed price in order to limit the excessive reactions of investors by giving in to the wave of opinion.

The third theoretical current takes in to consideration another form of information asymmetry. Mandelker and Raviv (1977) and Baron (1979) demonstrate the relationship between the company directors and the intermediaries. Consequently, they associate the underpricing to the initiating agent's aversion to risks. Mauer and Senbet (1992) propose an explanation more based on the pricing of securities in the segmented financial market. They confirm, in particular, that the existence of problems in these markets, such as incomplete access and constraints, lead to a considerable risk for investors. Baron and Holmström (1980) also confirmed that the underpricing is a consequence of the information asymmetry, given that the intermediary has insider information about the level of demand and that the seller is not able to verify the intermediary's efforts for the sponsoring the offer. This hypothesis was rejected by Muscarella and Vetsuypens (1989) who found a significant level of underpricing in a sample of IPOs where the intermediary transferred his own shares (with the absence of information asymmetry). Grinblatt and Hwang (1989), Allen and Faulhaber (1989), Welch (1989) and Chemmanur (1993), with a different view, have identified the company directors as being the informed party. For them, the IPO underpricing is explained by a signal about the quality of the company and as a means of balancing the costs born by the investors when collecting information. Jegadeesh, Weinstein and Welch (1993), Garfinkel (1993), Michaely and Shaw (1994) and Spiess and Pettway (1997) empirically validated the strength of this hypothesis.

Finally, the fourth theoretical current, takes into consideration the agency problems with a moral hazard. Ibbotson (1975) confirms that the lead underwriter can be encouraged to underprice the IPOs in order to convince buyers to subscribe in future operations. Allen and Faulhaber (1989) put forward the hypothesis according to which the lead underwriter also wishes to win the good will of potential clients by allocating underpriced shares to them. Baron and Holmström (1980) point out that the marketing expenditure has a decreasing marginal return; consequently it is less costly to convince investors to subscribe to underpriced IPOs. Leland and Pyle (1977) maintain the hypothesis according to which the new shareholders demand undervalued shares in order to compensate for the fringe benefits taken out of the company by the founder shareholder, who prefers to maintain the control of the company. Thus, the underpriced IPO would be strictly linked with the motivations behind the opening up of capital to the public and the expected evolution of the property structure. On the one hand, according to Brennan and Franks (1997), the IPO would be dependent on the willingness of directors to stimulate the demand of small investors and to prevent controlling shareholders from acquiring blocks of shares. On the other hand Stoughton and Zechner (1998) confirm that the controlling shareholders prefer to acquire large participations in order to reassure the other investors and to reassure themselves.

Baron (1982) associated agency costs, asymmetric information and control costs in a model, which enables him to predict that the lead underwriter have a tendency to underprice IPO in order to reduce their sales effort to a minimum and to maximize the probability of success of the operation.

B. Current tendencies in empirical works

Among the proceeding explanations concerning the IPO underpricing, the dominant theoretic currents of thought are those based on information asymmetry between the company and the investors. In order to find empirical evidence concerning these theories, Beatty and Ritter (1986), empirically

tested the key concept of ex-ante risk based on the expected relationship between the underpricing level and the lack of information. The authors use ex-ante risk approximations. Those most often used in literature are the age of the firm, and the size of the assets. They also use ex-post approximations such as the price volatility the bid-ask spread and the part of the capital retained by the controlling shareholders. Moreover, the ex-ante risk can be reduced with a good placement strategy by the selection of adequate intermediaries and the most competent auditors by the presence of risk capital companies or even by supplying an adequate commitment, for example by fixing lock-up provisions.[3]

Currently, the debate is turning towards optimal sales procedures. That is to say, a firm price offer versus an open price offer versus a guaranteed placement. Jenkinson (1990) made a comparative study of the IPO underpricing in Great Britain, Japan and the United States and put forward the theory according to which the regulation which governs the placement of the new flotation makes it possible to explain the way the price is determined in these different countries. Benveniste and Spindt (1989) prove that the procedure of guaranteed placement is the most effective, since it leads the investors, unlike in the open price offer, to reveal their beliefs and enables the initiating agent to discriminate during the share allotment procedure. Sherman and Titman (1999) constructed a model that suggests that in the case of companies where the gathering of information is costly, the number of investors participating in the operation is very high and the level of the below par rating will be high. In fact if the information is costly, several investors will be invited to participate in the book building phase, but the increase in the number of participants increases rationality and the level of underpricing.

Benveniste and Busaba (1997) point out that the guaranteed placement IPO generates a higher gross product than that obtained with a fixed price offer. Leite (1999) proposes a model which shows that the use of the guaranteed placement procedure makes it possible to determine the pricing of the offer with much more precision. This improves the problem of adverse selection that the less informed investors have to face and that consequently reduces the need for underpricing. Biais, Bossaerts and Rochet (1998) confirm that the open price offer is the best, given that this can include information concerning recent market movements concerning the pricing of the offer. This is confirmed by the results obtained by Kandel, Sarig and Wohl (1999) for the open price IPO in Israel. They prove that, in the offers made according to this process, each time the investors get more information concerning the elasticity of the share demand, these latter revise their prices. In this case, it is necessary to underprice because of the uncertainty connected with the elasticity of the demand, although this is important for determining the value of the security.

Other characteristics affecting the mechanism of flotation offers have been analysed. Benveniste, Busaba and Guo (2001) tried to make a model of the option to withdraw an offer as an integral part of the placement process. They remark than the level of underpricing is low each time that the investor thinks that it is highly probable that an offer will be withdrawn. Fernando, Krishnamurthy and Spindt (1999) found that a non linear relationship (in the form of U; quadratic) between the choice of the fixing procedure for the IPO price and the level of underpricing. The low prices of the offers discourage institutional interest. Moreover, the low price flotation offers seem to be aimed at a retail clientele that suffers from adverse selection problems provoked by the underpricing. High prices for the offer encourage institutional interest and provoke a very high underpricing which can be understood as a compensation for the institution for their gathering of the information.

However, Habib and Ljungqvist (2001) emphasise that underpricing is not the entrepreneur's primordial preoccupation. According to the definition of Ritter (1984), we cannot expect that the entrepreneurs will reduce to a minimum the money left on the table provoked by the underpricing of the issue. This value destruction increases in relation to the underpricing on the one hand, and in relation to the number of former shares sold to the public during the operation. All studies that analyse this and foresee the level of underpricing of the flotation offers must take into consideration the different factors causing the loss of wealth rather than just being intrinsically limited to the

[3] When a company makes an IPO, the share issue generally represents 15% to 25% of the company's shares. The great majority of the shares remain in the possession of the insiders, either the company's directors either the capital risk investors. Often these insiders are obliged by the company that handled the floatation to retain their securities a certain period of time in order to prevent them from a making large sale as soon as the securities are floated on the stock market. See in this respect Brav, Geczy and Gompers (2000).

underpricing. Loughran and Ritter (2002) observed that the money left on the table is, in general, a larger amount sum than for the stock market flotation costs that is to say an average of 9.1 million dollars in the nineties. Nevertheless, the authors point out that the issuers are rarely interested in this subject. By developing the prospect theory, the authors confirm that flotation offers where the loss of wealth is considerable are always those with a higher offer and market price than that which had initially been anticipated. Thus the controlling issuers discover that they are much richer than they expected to be and the underpricing can be considered as an indirect form of compensation for the initiating agent.

In fact, other explanations for the underpricing have been put forward, in the literature and which do not strictly conform to our typology in the previous section. In his work, Welch (1992), supposes that the investors do not simultaneously make contact. What is more, an offer can fail because of a waterfall effect, since the investors can be irrationally conditioned by the behaviour of other investors. Loughran, Ritter and Rydqvist (1994), explains the enormous amount of underpricing of floatation offers in emerging markets, evoking the imposed institutional regulations. Hughes and Thakor (1992) and Drake and Vetsuypens (1993), think that the initiating agent deliberately undervalues the new issues in order to avoid the risk of litigation. Su and Fleisher (1999), admit that corruption can also explain the high level of underpricing of IPOs.

A few papers in the literature are specifically concerned with floatation operations undertaken by private companies. Meggison and Netter (2001) point out that government can have large discretionary margins for the pricing of shares, this being towards economical or political ends. In fact, on the one hand, Huang and Levich (1998), maintain that public privatisation offers can be seen as having low risk cash-flows. On the other hand, several studies prove that a political effect could explain the short-term underpricing. Ibbotson, Sindelar and Ritter (1994), affirms on the one hand, that property dispersion leads to underpricing and on the other hand, that it can be the solution to encourage small investors. It is also an attempt to establish a private investment culture and to widen financial markets. However, Dewenter and Malatesta (1997) conclude that the first day returns observed for the IPO of companies to be privatised are very similar to those observed for IPO of private companies. The authors find consistent evidence in the products obtained or in the maximisation of the value of privatisation offers. Moreover, the authors confirm that the classical theory used to build a model of the behaviour of conventional public offers can also be used in privatisation offers.

After this review of the literature, we remark that most of these theories are based on the information asymmetry between the different participants in the floatation offer to explain the phenomenon of below-par rating The theories of information asymmetry generally suppose that the underpricing of offers is a linear function of the uncertainty connected with the value of the offer. This implies that the offers made by recent companies operating in the new technological sectors, must be much less undervalued than the offers of other established companies in stable industries. This review of the literature shows that several factors have been put forward to explain the underpricing of issues. Among these factors, we can distinguish the control structure. In fact, the study of the shareholding structure of a company is a determining factor in the level of underpricing. Moreover, it also affects the liquidity of the company security after its issue. We will elucidate this relationship in the next section.

C. Property structure and liquidity

Liquidity, because of its multidimensional character, is at the centre of micro-structural interdependencies. Moreover, financial literature has been interested in this concept for a long time and has proposed many definitions. For example, Demsetz (1968), defines the absence of liquidity as a lack of continuity in negotiations which is characterised by a degree of disparity between the purchasers and the sellers of the securities in a market and at a given moment. According to the author, this disparity depends on the number of shareholders. For Black (1971), a market is liquid if, at all times, there is a buying price and a selling price, for an investor wishing to sell or buy a minimum quantity imposed by the market authorities. According to Kyle (1985), the study of liquidity makes it possible to understand the speed with which an order is carried out by the market, to quantify its capacity to absorb large volumes without an impact on the price.

More recently, Hasbrouck and Schwartz (1988) pointed out that a liquid market is characterised by its depth, its width and its elasticity. Its depth is reflected by the existence of buying and selling orders very close to the price of the security at that moment. The width signifies the existence of new orders in the volume and the elasticity signifies the sensitivity of the new orders to the changes in price provoked by the flux of short-term unbalanced orders. Other authors such as Amihud and Mendelson (1986), have defined the liquidity by the bid-ask spread observed. Despite the plurality of the definitions, liquidity remains a complex concept that is difficult to quantify. Its multidimensional character explains the difficulties in understanding it and its complexity. Thus, we must not only use a single measure to define it.

In a conventional way, financial theory allows for the existence of a positive relationship between the liquidity of a company's securities and the presence of a shareholder or a category of shareholder in its capital. Demsetz (1968), confirms that the number of shareholders is a determining factor for the liquidity. The more the number of people who hold a particular share increases, the more the number of participants interested in the market negotiation increases by the same proportion. Consequently the number of transactions by time unit also increases. In these works, the author observes that the number of transactions is strongly correlated with the negotiated volume. The second consequence, connected with the increase in the number of shareholders, is a reduction in the bid-ask spread.

Benston and Hagerman (1974), note the existence of a positive relationship between their measures of the participation of insiders and of the bid-ask spread. In fact, the insiders retain shares with the aim of maintaining a control over the company. Consequently, they have the privilege of access to private information that the public does not have. They are likely to influence the price. To combat this, in order to reduce their potential losses resulting from negotiations with the insiders, and/or informed investors, the lead underwriters have a tendency to enlarge their bid-ask spread.

Bhide (1993) points out that the liquidity can improve in the case of a dispersion of the property structure. In other words, the company's capital is mainly held by small shareholders. Holmström and Tirole (1993), clarify this notion by making the distinction between the strategic long-term investors and the liquidity traders preferring liquidity. The degree of dispersion refers to the second category of shareholder. Moreover, they confirm that the property concentration in the hands of strategic shareholders (long-term investors) weakens the liquidity of the company's securities. According to the authors, the absence of liquidity for the securities is due to the fact that the short-term investors, who are relatively less informed, reduce the frequency of their negotiations and/or increase the transaction premium in order to avoid a potential loss. Amihud and Mendelson (1986), highlighting these arguments, prove the existence of a positive correlation between the bid-ask spread and the concentration level of the property structure.

However, according to Jensen and Meckling (1976) and Shleifer and Vishny (1986), attaining a high level of liquidity through dispersion of the shareholding provokes significant inconveniences for the company. In fact, if the property structure is dispersed, the small shareholders reduce the marginal gain connected with the gathering of information and with the control of the company's activities. Even if the right information is obtained, property dispersion creates a serious problem of collective action. This latter prevents the shareholders from correcting, in an effective way, the possible actions on the part of the directors whose interest diverges from that of the shareholders. On the other hand, property concentration encourages active investors to monitor and control the company since the absence of liquidity for its securities increases barriers in the long run. More recently, Kahn and Winton (1998), p. 122, point out that the level of concentration must be relatively higher in the transparent industries than in the industries where information is difficult to obtain and the effects of intervention could be more uncertain. Consequently, the original shareholders in some companies that float shares on the stock market can renounce the liquidity, once they have made considerable gains procured through the control and the monitoring of their company.

We can contest the validity of the trade-off principle, between liquidity and control. For example, Holmström and Tirole (1993), maintain the idea according to which, the liquid market always has the ability to monitor a company's performance by a price-discovery mechanism. If the capital of a company is held by small shareholders, supposedly uninformed, the speculator can incur a cost for gathering information which will give him an advantage each time he makes an order on the market. Following this, private information will emerge in the market that will have an effect on the

price of the action until it attains its balanced value. In the model developed by Holmström and Tirole (1993), a high liquidity, despite incomplete information, results in a weakening in the price-discovery mechanism. In practical terms, if the securities of a company are liquid, the director's incompetence will be reflected in the price of the share, making the company vulnerable to a hostile take-over. If, on the other hand, the property structure is very concentrated, the corrective actions undertaken by the majority shareholders could be ineffective, once the latter have tried to evaluate the competence of the director. What is more, it is clear that a liquid financial market makes it possible to correct and sanction the errors of bad management more rapidly and efficiently than monitoring through the control of a certain number of blocks of shares.

This argument raises the following question: *if liquidity provides such advantages, why is it that companies do not turn towards the financial market in order to reduce property concentration*? An explanation to this question is that obtaining and maintaining a high level of liquidity means that the company must bear indirect costs. These costs include the cost of compensation for the small shareholders who are less favoured from the point of view of obtaining information and usually lose money by investing in the IPOs. In order to obtain a widely and perfectly dispersed shareholding structure, we suppose that the underpricing of an IPO is used as a compensatory mechanism that makes it possible to improve the liquidity after the floatation.

D. IPO Underpricing and property structure

We saw in the previous section that several models are to be found in the financial literature to explain the underpricing of stock market offerings based on the asymmetries of information that exist between the different participants in the public offering. The distinction between types of investors made by Rock (1986), p. 205, seems fundamental to us in order to understand this relationship. Intuitively, informed investors who incur costs when collecting information would be likely to participate more often in the good issues, that is to say, those with a higher below-par rating. Consequently, because of a lack of information, the non-informed investors are allocated a low proportion of the undervalued offers and obtain all the overvalued ones. For this reason, the non-informed investors are likely to lower their pricings for any new issues, given that they have no information about the true value of the security. Generally, the non-informed investors withdraw from the market unless the issue price is sufficiently low to remunerate them for this inconvenience.

However, Rock's model (1986) is limited in that it does not take into consideration the increased advantage for the issuer due to the participation of non-informed investors. Numerous studies have highlighted this theory by maintaining the hypothesis according to which, given that the non-informed investors are very likely to be small investors, it is crucial, for the new issues to be a success, to attract the largest number of this type of investor. A reason for this is that the regulations in several countries, in order to reduce the inconveniences for small shareholders, demand a significant degree of dispersion in all stock market floatation operations. Moreover, Bhide (1993) points out that the regulations are different from one country to another. Financial policies aim to promote liquidity and consequently demand more participation on the part of small shareholders. On the other hand, the policies in the countries with a bank-orientated system, in particular in Germany and Japan, favour the advantages obtained through the control of a concentrated property structure.

A second reason is proposed by Chowdry and Sherman (1996). In their view, the fact of favouring the small shareholders can lead to an increase in the revenue that the issuing agent expects from the issues. The authors confirm that the presence of a high number of small non-informed shareholders reduces the risk of information spillover during the phase preceding the issue of the security in the official quotation. The information spillover refers to a potential leak of bad information before the beginning of the exchange. Consequently, the allotment of securities favours minority shareholders. In a similar way, Mello and Parsons (1998) provide a theoretical argument concerning the fact that the best strategy, during the issuing procedure for maximising a company's value should be to begin with the sale of the securities to the small passive shareholders during an IPO whereas the transfer of potential blocks of controlling shares should occur after later sales operations or for new issues of securities.

If the strategy of developing a widely dispersed shareholding structure is achieved, this will largely depend on the correct price discovery for the issue. The theoretical model of Booth and Chua

(1996), corroborates this point of view. The authors confirm that the IPO is used by the investment banks that syndicate issues as a means to compensate the investors for the costs they incurred in collecting information. The reason for this compensatory mechanism is that the merchant bank that carried out the operation limited its marketing capacity. Consequently, it is incapable of providing private information to all investors concerning the true value of the company, but keeps it specifically for its most faithfully institutional clients. However, these investors do not voluntarily transmit this information to other investors without being financially remunerated. Each time the number of required investors increases, it becomes more difficult for an additional investor to gain access to the information. Given that the investors have to incur additional costs in order to obtain the necessary information, a larger underpricing will be required to convince other investors to participate in the operation.

Brennan and Franks (1997) also confirm that the underpricing of the offers is mainly used to ensure over-subscription. Once the objective has been attained, the issuing agents and the owners are very careful when allocating shares. In particular and in order to assure the protection of the company's insiders against a hostile takeover, they are likely to discriminate between those seeking to acquire a large number of shares. The empirical results of their study prove that a high underpricing is mainly connected with small blocks of shares held by new investors. However, some theoretical models confirm that the allotment process will always discriminate against minority shareholders. Nevertheless, these models are mainly concerned with issuing procedures at a guaranteed price and lack an empirical validation.

If we suppose that the liquidity is determined by the property structure, we can expect to find a positive relationship between the liquidity and the degree of underpricing of a security. The study of Miller and Reilly (1987), has been the only one, to our knowledge, concerned with this question. The authors found, in a 21 day observation window, that there was a significant statistical difference in the level of volumes exchanged between the undervalued offers and the over-valued ones. Reese (1998) confirmed the existence of this relationship over a longer period of 3 years. In this study, we will concentrate on the first 60 days that follow the beginning of trading. The choice of this study period conforms to the opinion of Aggarwal and Rivoli (1990). According to these two authors, once the level of a company's liquidity is established, it is likely to remain stable.

E. Formulation of the hypotheses

We presuppose that the controlling shareholders prefer to keep the control of the company after the floatation, with the single objective of avoiding the possibility of a threat of a hostile takeover. Underpricing the IPO can reduce the risk of a takeover, given that an underpricing could lead to an over-subscription. This would enable the issuer to ration the allotment of the securities and to discriminate between the potential buyers in order to reduce, as much as possible, the part of the capital held by each new shareholder and therefore ensure a good dispersion of capital after the floatation. In fact, a dispersion of the property structure means that new investors are less inclined to monitor the directors.

Despite the fact that the original shareholders are incited to allocate the totality of the shares to the minority subscribers before the closing of the operation, it is more effective to allocate the shares to large subscribers in advance, even if the issue is over-subscribed. Without this type of commitment, the large subscribers will disappear from the market. According to Benveniste and Spindt (1989), this provides a role for the issuing agent who is able to fix the allotment rules for the large subscribers because he appears regularly on the market. Chowdry and Sherman (1996), confirm that, under certain conditions, discriminating against large subscribers can maximise revenue, as it makes it possible to reduce the adverse selection problem created by the small non-informed investors.

Property dispersion reduces monitoring of the directors which, in turn, causes the company to operate badly and reduces the value of the share, a cost which will be born by the original shareholders. However, the underpricing costs which are envisaged to provoke the over-subscription, will be born more by the investors who choose to sell securities in the IPO and less by those who choose to retain their securities. Thus we are able to test the following hypothesis:

H 1: The level of the IPO underpricing is positively correlated with the property structure formed after the allotment process.

H 2: The larger the part held by the founder shareholders, the higher the level of underpricing will be. Equally, the higher the number of shares proposed by the insiders in the operation, the higher the level of the underpricing will be

Booth and Chua (1996) point out a second advantage in property dispersion. In fact, property dispersion can improve liquidity. This strategy has a tendency to weaken the rate of returns required by the investors and thus balances the company's share price. This result will be important each time the company insiders sell off additional shares after floatation.

H 3: The level of liquidity between the floatation and the official list is negatively influenced by the property structure formed following this operation.

H 4: A positive relationship exists between the degree of underpricing and the level of liquidity of the securities after floatation.

II. Research methodology

In order to successfully carry out our empirical study, we will use a series of variables which should explain the underpricing phenomenon. Our aim in this study is to explain, in a precise manner, the allotment of capital and the liquidity of securities after the IPO.

A. Measuring the IPO underpricing

For each of the observations in our samples, the returns have been calculated according to the method used in the literature by Aggarwal, Leal and Hernandez (1993), Ibbotson and Ritter (1995), Lee, S. and Walter (1996) and Dewenter and Malatesta (1997). Firstly, we will calculate the underpricing, that is to say, the abnormal return observed on the first day of trading in relation to the subscription price. Then, we will compare them to returns observed in different time periods. The abnormal return has been calculated in the following manner:

$$AR_{i,\,t} = (P_{i,\,t} - P_{i,\,o}) \,/\, P_{i,\,o} \qquad (1)$$

Thus $AR_{i,t}$ represents the non-adjusted return of the company *i*, determined by the difference between the closing price ($P_{i,t}$) the day *t* after floatation (*t* = 1, 7, 21, 30, 60 and 90) and the IPO price ($P_{i,0}$) shown in the IPO prospectus. Then, we will adjust the returns thus calculated with the market return and the expression (1) becomes:

$$MAR_{i,t} = AR_{i,t} - \frac{M_t - M_o}{M_o} \qquad (2)$$

where $MAR_{i,t}$ is the market adjusted return[4] for the company *i*, the day *t* after floatation (*t* = 1, 7, 21, 30, 60 and 90), M_t is the closing price of the day's market index (*t*) and M_0 represents the level of the day's market index the day before the IPO date of the security *i*. For the companies in the EuroNM, we have used the EuroNM all shares index. This index is calculated according to the value of all the companies that are listed. Whereas, for the companies in our Nasdaq sample, we will use the Nasdaq composite index which is also calculated according to the value of all the companies listed on this market.

[4] The return can be calculated differently by using a logarithm according to the following formula: $AR_{i,t} = ln(P_{i,t}) - ln(P_{i,\,t\text{-}1})$; Nevertheless the logarithm creates an increased bias, it is for this reason that we have preferred to use the measure presented in equation (1). For a more in-depth discussion of these calculations methods, the reader can refer to Campbell and Andrew (1997).

B. Short term performance

On order to measure the short-term performance of an IPO, we will use a methodology identical to that of Aggarwal, *et al.* (1993). Using the returns already calculated in the equation (1) and the market return r_m, the abnormal return (AR_{it}) of the security *i* in the time *t* adjusted with the market return for each operation we have calculated in the following way:

$$AR_{i,t} = \left[\frac{(1 + RI_{i,t})}{(1 + r_{m,t})} - 1 \right] \times 100 \qquad (3)$$

This measuring of abnormal returns does not take into consideration the systematic risk connected with each of the floatation operations. In fact, ($AR_{i,t}$) is interpreted by the abnormal return according to the hypothesis that the systematic risk in floatation operations is the same as that in the market index. In other words, the average of the betas of all the operations is equal to 1. In the financial literature, numerous studies, Ibbotson (1975) show that the average of the betas of the recently listed companies is more than 1. Therefore Aggarwal, *et al.* (1993) state that the abnormal return such as it is calculated by the equation (1) shows a certain bias in the performance of the operation relative to each market. However, we suppose that it is improbable that an average of beta coefficients will really affect our results.

The measure of performance of a group of IPOs will be estimated according to the same methodology as that used by Ritter (1991), Levis (1993) and Ljungqvist (1997), and such as it is shown by equation (4). *WR* is the Wealth Relative; AR_i, *t* is the return of the security over the period *t*; $r_{m,t}$ is the market return over the same period. The number of operations in the sample is shown by *N*. A wealth relative higher than 1, signifies that the performance of the IPO is higher than that of the market. On the other hand, if it is lower than 1, all the issues have a lower return than the market. Similarly, the wealth relative has been calculated for *t* = 1, 7, 21, 30, 60 and 90 days.

$$WR_{i,t} = \frac{1 + \frac{1}{N} \sum_{i=1}^{N} AR_{i,t}}{1 + \frac{1}{N} \sum_{i=1}^{N} r_{m,t}} \qquad (4)$$

The average of abnormal returns in our sample for the day *t*, $AR_{i,t}$ can be considered as a performance index reflecting the excess return in relation to the market return, in a monetary unit invested in an equitable manner in the new issues *N*, in each sample:

$$\overline{AR_{i,t}} = \frac{1}{N} \times \sum_{i=1}^{N} AR_{i,t} \qquad (5)$$

C. Measures of control variables

Demsetz and Lehn (1985), Morck, Shleifer and Vishny (1988) and McConnell and Servaes (1990) uses different methods for measuring the ownership concentration (or dispersion). However, the difficulty faced when studying ownership structure and control is the missing of a single measure, considering the degree of concentration of the shareholding. This ambiguity results from the fact that the property structure of a company is made up of the distribution of values that is reflected in the size of the actions that the investor holds. Using a single measure in the form of an average or a proportion does not sufficiently describe the distributions of the different forms of property structure. Therefore, we propose measuring the property structure by simultaneously using two distinct references. The first will try to measure the importance of the different shareholders according to their identities. As for the second, it will be based on the equal distribution of shareholders.

The large distribution of the shareholding structure reflects the size and the variety of the former shareholders after the closing date for subscriptions to the securities proposed during the floatation operation. It is clear that a large number of floatation operations imply a large number of investments. Consequently, the original shareholders are likely to lose the control of their company. We will measure the importance of the original shareholders by the total of the shares that they hold.

The distribution of the ownership structure refers to the difference in the proportion of shares held by the different categories of shareholder. Previous studies in this field used a variety of methods in order to measure this difference. In particular, Sarin, Shastri and Shastri (1996), grouped together the shareholders into two categories: The first, includes the institutions (the majority shareholders), the second, the small shareholders. Their measure is limited in that they do not take into account the possibility that non-institutional investors could obtain a large participation in the company and consequently be influential in the company's management process.

For this, we propose an alternative categorisation, the total of participations held by the institutional investors and those held by the insiders. This typology will enable us to distinguish the impact of the two systems of corporate governance. Above all, that the insiders are active within the corporate management of the company. The group of institutional investors includes the insurance companies, pension funds, banks and risk capital companies. We will define the insiders as shareholders which have had a long-term relationship with the company. This definition includes the families, the holding companies, and the industrial investors. This category of shareholder is likely to have a strategic view in relation to their share portfolio. In fact, as strategic investors, they are either the founders or the inheritors of the company.

Wruck (1989) defines a blockholder as the shareholder who holds a block of securities representative of the company's capital that is beyond the 5% threshold. We mean by this, the percentage of shares (α) of the main shareholders[5] *n*. as a level of concentration, (hereafter CONC).

$$CONC_i = \sum_{k=1}^{n} \alpha_{i,k} \qquad (6)$$

where *k* represents le k^{th} shareholder in an arrangement by decreasing order of importance. We will use this variable to determine the importance of the first five to twenty shareholders, respectively TOP_5 and TOP_{20}.

Other studies have used a statistical type of index, the Herfindahl-Hirschman (H_i) index to measure property concentration. It is calculated, often for the first ten shareholders, in the following manner:

$$H_i = \sum_{i=1}^{n} (P_{i,k})^2 \qquad (7)$$

where $P_{i,k}$ is the participation held in the company *i* by the investor *k* and *n* is the number of shareholders. This index gives each shareholder a weighting equivalent to the relative part of the actions with voting rights that he or she holds. The concentration is maximal when the index is equal to the unit. It is minimal when the shareholders have the same participation in the capital. In this case, the index is 1/*n* .The Herfindhal measure takes into account, both the number of shareholders and their distribution. The concentration is higher when the number of shareholders is lower and the asymmetry in relation to 1/*n* is wide. The limitation of this index is that it accentuates the importance of majority shareholders since all the parts of the capital held are square.

D. Liquidity measures

In relation to the different definitions to be found, particularly in literature on the micro-structure of financial markets, the concept of liquidity appears to be of a complex nature. On the one hand, each author deals with the concept of liquidity in a more or less standard way, preferring to study one or several dimensions. On the other hand, the notion of liquidity is different according to whether it concerns a market governed by price or a market governed by orders. Our study aims to measure all the dimensions of liquidity. Following this viewpoint, we have selected two criteria.

[5] The regulations concerning the transparency of ownership structure whether in European Stock markets or American ones oblige all investors holding a property of 5% to officially declare it to the Stock Market authorities. A complementary declaration is also required each time the investor's participation goes beyond a multiple of 5%. For certain companies, their status requires the declaration at a threshold of 3%.

The first apprehends liquidity by its volume dimension. This concerns the study of Krigman, *et al.* (1999) of turnover of securities. This measure refers to the number of a company's shares in circulation that change hands during a day's market trading, in relation to the total number of securities quoted. As its name indicates, it enables us to understand the negotiation activity of the company's securities independently from that of the size of the total number of quoted securities. It is to be noted that the use of the securities' turnover could bias our study in the sense where this variable could be excessively high during the first days of trading. In the case of the underpricing of an IPO, the trading volume is often high because the informed traders start buying and selling until the price reaches the true value as it is seen by the market. Moreover, Krigman, *et al.* (1999) also present evidence about flippers traders, who try to make instant profits from the underpricing of issues. Consequently, the trading volumes the first day are often higher than those negotiated in the long-term.

Consequently, the turnover volume ($TURNOVER_i$) is calculated as an approximation for the liquidity of the share price in the following manner:

$$TURNOVER_i = \frac{\sum_{d=5}^{30} VOLUME_{i,d}}{26 \times Capital_i} \tag{8}$$

where d is the number of days after IPO date for the company i, $VOLUME_{i,d}$ represents the number of securities exchanged during the day d, $Capital_i$ is the number of shares that are offered.

The second measure apprehends the liquidity by its price spread. This concerns different bid-ask spreads proposed in the literature.[6] Reese (1998), points out that the use of this measure as an approximation can be biased, for the operators do not adjust their estimations in the bid-ask spread as rapidly as the market changes. In order to maintain coherence in our methodology, we will keep to the same bid-ask spread used in measuring the speed of trading turnover for measuring the average bid-ask spread. The measure for the average bid-ask spread is based on the ask and bid closing price, calculated in the following way:

$$BIDASK_i = \frac{1}{26}\sum_{d=5}^{30}\left[\frac{Ask_{i,d} - Bid_{i,d}}{(\frac{Ask_{i,d} + Bid_{i,d}}{2})}\right] = \frac{1}{26}\sum_{d=5}^{30}\left[\frac{Fa_{i,d}}{Mid_{i,d}}\right] \tag{9}$$

Where Ask_i is the closing price at which the securities of the company i are bought the day d, Bid_i is the closing price at which the securities are sold, the day d, $Fa_{i,d}$ is the difference between the two closing prices for the company i the day d ($Bid_{i,d}$ et $Ask_{i,d}$), $Mid_{i,d}$ is the middle of the bid-ask spread on the day d.

E. Risk measures

The main criticism when calculating abnormal returns in IPOs concerns the difficulty in measuring the ex-ante risk. This is very complex for there is no previous data for the estimation. The standard deviation of returns generated after the IPO have frequently been used in the literature as an approximation of the ex-ante risk. Conventionally, the 20 day standard deviation is used. However, this ex-ante risk substitute has not proved its strength in the empirical works. Johnson and Miller (1988) confirm that the standard deviation of returns generated by the transactions after floatation is a weak measure of the ex-ante risk. For this, Carter and Manaster (1990) used different approximations to measure the ex-ante risk.

Beatty and Ritter (1986) showed that risk affects the returns generated after floatation. They use two approximations to measure the ex-ante risk, the first being proceeds mentioned in the

[6] Different bid-ask spreads are mentioned in the literature, that is to say the bid-ask spread exhibited, the actual bid-ask spread and the bid-ask spread achieved. The literature associates liquidity with the bid-ask spread exhibited. When this data is available, its measure makes it possible to have an immediate perceptible approach concerning the liquidity. For a more in-depth reflection, see in this respect Huang and Stoll (1996), Handa, Tiwari and Schwartz (1996), Blume and Goldstein (1997).

floatation prospectus. The second measure used by these two authors is the inverse of the gross product of an issue. Their justification for the use of these two measures, is the regularity in empirical results, according to which, small issues are less speculative than larger ones Beatty and Ritter (1986), find that these two measures are statistically significant as explanatory variables of the initial below par rating. However, the R^2 of their multi-variable regression was only 0.07.

Carter and Manaster (1990) also use the age of the company as an approximation of the risk. Consequently, we expect to find that more recent companies are more risky. However, most of the companies studied in our two samples, are recent (in most cases they are no more than five years old). A quite frequent measure in the literature is the reputation of the market introducing agent. In fact the lead underwriter has more complete and reliable information than the investors. Consequently they must guarantee the success of company operations with a low risk in order to avoid a loss of their capital and with that their reputation. All these studies prove that these ex-ante risk approximations are statistically significant and explain the level of the initial below par rating.

Finally, Parkinson (1980), demonstrates that if the normal logarithm of a share price follows a normal distribution, the extreme value approach is an excellent way of estimating the standard deviation of the share return. By empirically validating his approach, the author finds that the normal logarithm of the ratio (the highest price divided by the lowest share price) is the best estimator of the variance in the rate of return over a period of time. However, in a more recent study, Barry and Jennings (1993) find that, by subdividing their sample into two sub-groups, one underpriced and the other overpriced, that there is a difference in the results when using this risk measure. However, their results have a methodological limitation. In fact, their sample only consists of 229 companies; what is more, the authors have avoided the companies for which the stock market data was unavailable and the cases considered to be speculative.

In our case, we will use two approximations for measuring the risk in the companies studied. The first measure is estimated using Parkinson's extreme value; it is calculated in the following manner:

$$LOGHL_{i,t} = LOG\left(\frac{H_{i,t}}{L_{i,t}}\right) \qquad (10)$$

Where: $H_{i,t}$ is the highest price during the day *t*.

$L_{i,t}$ is the lowest price during the day *t*.

The second measure is the inverse of the gross product ($INVGP_i$) of the operation for each one, it is the product of the subscription price and the number of securities sold.

F. Construction des modèles

We will use the habitual regression methodology using the ordinary least square to explain the relationship between the level of underpricing and the ownership structure; (*hypothesis* 1). The same methodology is used to study the relationship between the liquidity and the ownership structure (*hypothesis* 3). Hypothesis 2 which concerns the relationship between the underpricing and its explanative factors has been tested with a series of multiple regressions using the ordinary least square. Finally, for hypothesis 4, the same methodology is used. Given that in our approach, we not only aim to confirm the relationship between the underpricing and the liquidity, but also to develop models in order to explain the liquidity of the securities after floatation. In constructing our models, we have used a series of control variables.

Firstly, to explain the underpricing, MAR_i, we have defined four independent variables. The first, $Risq_i$, is the risk average over a period of 20 days, calculated according to the equation 10. The second $CRET_i$, is a monitoring variable that makes it possible to measure the importance of the original shareholders after the IPO. The third, $FDEL_i$, is a variable used to measure the dilution of the insiders. The fourth, $RPART_i$, is a ratio that makes it possible to measure the amount of participation of insiders during the operation. Apart from the variables in our base model, we will use a series of binary variables. The variable, *MARKET*, is used to control the possible effect of the financial market. It is a binary variable taking the value 1 if the company is quoted in the Euro NM, and the value 0 in

the opposite situation. The binary variables $BVSIC_i$, are used to class the 7 industrial sectors in our sample. Finally, we have used two independent variables, *IDIL* and *IRP*, these are iteration terms respectively equal to: the product of the dilution factor and the binary variable *MARKET*; the product of the participation ratio and the binary variable *MARKET*. The introduction of these terms is for the purpose of verifying the way in which the interaction of the two markets can influence the level of underpricing.

We created a series of regressions. Firstly we obtained a regression for the four main variables in the base model. Then we introduced the *MARKET* variable then the SIC_i variables. Finally, we introduced the *IDEL* and *IRP* variables. The general model is formulated with the following equation:

$$RIA_i = \alpha + \beta_1 Risq_i + \beta_2 CRET_i + \beta_3 FDEL_i + \beta_4 RPART_i + \beta_5 MARCHE_i + \beta_6 IDEL_i + \beta_7 IRP_i + \sum_{j=1}^{7-1} \gamma_j BVSIC_{i,j} + \varepsilon_i \quad (11)$$

where ε_i represents the term of error that is supposed to follow a normal law with an average of zero and a constant variance.

Secondly, if we measure the liquidity by the bid-ask spread, a series of additional variables must be taken into consideration. According to Lee, Mucklow and Ready (1993),the traders in the financial market, fearing that the information will put them at a disadvantage, are discouraged from buying and selling shares in companies with a very concentrated shareholding structure. In the case of floatation offers, information asymmetry can be represented by the level of underpricing (MAR_i) that supposedly increases the dispersion of the ownership structure. Moreover, in a company with a high financial risk, the adverse selection effect must be multiplied in the same way since those that the information puts at an unfair advantage are very hesitant to begin market exchanges. To measure the level of financial risk, we will use the average of the risk observed over the first 20 days ($Risq_i$). The third variable, $TVOLUME_i$, is used to determine the impact of the volume on the bid-ask spread. Binary variables $BVSIC_{i,j}$, are used to control the effect of specified industrial sector.[7] When these explanative variables are adding together, our regression model is expressed by the following equation:

$$BIDASK_i = \alpha + \beta_1 LN(RIA_i) + \beta_2 LN(TVOLUME_i) + \beta_3 LN(Risq_i) + \sum_{j=1}^{7-1} \gamma_j VBSIC_{i,j} + \varepsilon_i \quad (12)$$

The trading volume is used as an alternative approximation for the liquidity. The problem with this measure is that total number of securities listed includes those held by the original shareholders. These later often wish to keep their securities for at least a period of 12 months. Barclay and Holderness (1989), also confirm that shareholders holding large blocks of shares, can not easily transfer their securities, from the first day of negotiations without losing the value. Consequently, the original controlling shareholders cannot often immediately participate in the market exchange activities, but choose rather to sell off their securities through subscription rights issues or even public issues. Consequently, this measure can be deformed because it shows companies where the original shareholders retain a large part of the capital, it being the least liquid, although their shares can be actively exchanged between the new shareholders. Reese (1998) overcomes this problem by using the share of the capital retained by the original shareholders.

(Insert Table 2)

Thirdly, if we use this measure as a liquidity offer, we must use other variables to overcome the previous problem. Apart from the variables used in the previous equation, we have used an independent variable, $INVGP_i$, which serves to neutralise the volume effect of the offer and the effect of capital raised in the IPO. The other independent variables were defined in the previous section. Consequently, the regression model for the liquidity is expressed in the following manner:

[7] This classification is based on sectional classifications made by the Stock Market authorities in each market which refers to the company's main activities.

$$TVOLUME_i = \alpha + \beta_1 RIA_i + \beta_2 RISQ_i + \beta_3 INVGP_i + \beta_4 CRET_i + \beta_5 FDIL_i + \beta_6 RPART_i + \sum_{j=1}^{7-1} \gamma_j VBSIC_{i,j} + \varepsilon_i \quad (13)$$

Purchasing securities after the financial market operation is the only alternative for the investors who cannot procure a share in the offer, in this way they can satisfy their share requirements. According to Mauer and Senbet (1992), the new industries, for which there is a lack of demand on the part of investors and whose market access is weak, are likely to have negotiation activities that go beyond those of more established companies.

III. Sample characteristics and data

A. The sample of IPO

We have selected a list of IPOs in the Euro NM market, and paired equivalent operations in the NASDAQ between 1997 and 1999. This sample was therefore created covering a 3 year or a 36 month period for the purpose of our study of the explanatory factors for control, for liquidity and for the short-term performance of IPOs.

Firstly, we will concentrate on the 322 operations carried out in the different segments of the Euro NM (Amsterdam, Brussels, Frankfort, Milan and Paris) and which were provided by the statistical service of the Brussels Stock Exchange. Secondly, we will concentrate on the 1252 operations carried out in the Nasdaq (value of the offers: 193,424 million dollars) and which are listed in the annual report of this Stock Exchange called the Fact Book. These two selections have been used to create two comparable samples, one European and the other US. Thirdly and finally; we set selection criteria so that our sample was not influenced by large scale operations, by specificity or by sector dominance: (i) the floatation of companies with portfolios or banks have were omitted from our sample (ii) For each floatation operation in the Euro NM, we selected an operation of the same size carried out in the same year in the NASDAQ and that belonged to the same sector of activity. (iii) We eliminated the operations that were eliminated from the stock market a few weeks after floatation on the official list. (iv) We had to obtain a IPO prospectus for the European companies and the document *S*-1 or the document 424-*B* for the American companies. This sampling enabled us to use a group of 277 IPO in each market for which we carried out a study of the initial below par rating, of the process of allocating capital, of the monitoring structure and of the liquidity of the offerings.

For all the observations in our two samples, the data concerning the IPO date, the IPO price, the number of shares made available to the public by the company and by the old shareholders, the capital raised and the identity of the lead underwriter was collected from the IPO prospectus. The data concerning the highest and lowest opening, closing and, bid/ask, prices and the volume handled was taken from the Datastream data base.

The information concerning the ownership structure before the IPO obtained from the prospectus. On the other hand, the information concerning the shareholding structure after IPO from the notification report in relation to property which is required by market authority of each of the European and American Stock Exchanges.

B. Statistiques descriptives

Our sample is made up of 277 companies that issued ordinary shares in the Euro NM between 1997 and 1999. Our comparable sample is made up of 277 companies listed during the same period in the NASDAQ. This pairing was made according to the size of the company at the time of IPO, the year of IPO and the industrial sector. Table 2 shows the divisions of our sample by sector over the period studied.

Table 3 presents the characteristics of the offers in our two samples. The results show that the NASDAQ companies issue, on average, twice as many securities as Euro NM. What is more, in order to ensure the liquidity of their securities, these companies propose their securities at half the price during the subscription. As for the size of the operations in our two samples, the average operation size in the Euro NM is 35 million euros and that of NASDAQ, 36 million dollars. The third characteristic that distinguishes the two markets is the Green Shoe that the companies make available

to the lead underwriter in order to stabilise the price. It is much higher for the Nasdaq companies (an average of 406,000 securities) than that of the Euro NM (232,000 securities). Finally, table 3 shows that the original shareholders in the companies in our Euro NM sample participate up to a level of 21.45% in the operation. On the other hand, those in our Nasdaq sample only participate to a level of 5.22% in the operation. In general, the Nasdaq companies favour floatation by increasing capital, unlike the Euro NM companies whose shareholders have a tendency to prefer an immediate liquidity.

(Insert Table 3)

Table 4 shows the statistics in the IPO for the 544 observations in our sample studied in the two markets. The average of adjusted returns (and gross) observed in our Euro NM sample on the first day, is higher than that observed in the Nasdaq. The Italian segment of the Euro NM is the highest with an average adjusted return of 130.84 %. On the other hand, the Belgian segment shows the lowest average return (4.10%) with a tendency to become negative after three weeks of floatation. However, these two segments only represent 6% of our Euro NM sample. The German segment represents the next highest (51.41% after the Italian sector, despite the fact that it represents 60% of our Euro NM sample. The average of market adjusted returns observed in the Paris segment is only 25.83%. It is even lower than the average observed in the two Nasdaq sections, that is 33.68% for Nasdaq NNM and 19.58% for Nasdaq SCM. The averages of the adjusted and gross returns are all positive in our two samples. For our sample made up of Euro NM offerings, this average is 43.99% and significant at a 0.01 level. On the other hand, in our Nasdaq sample, it is 30.57% a result above zero at a significant level of 0.01. These results prove that it is better for the shareholders to list their company in the Nasdaq rather than the EuroNM. Our results corroborate the results of Dewenter and Malatesta (1997).

(Insert Table 4)

Table 5 shows the monitoring structure for our two samples. On average, the original shareholders of companies with floatation in the Euro NM keep the control of 64.77% of the constituent total amount of the capital in their company. On the other hand, this category of shareholder only retains 55.32%. However, this result varies considerably (from 0 to 91.08% for Euro NM and from 1.14% to 83.7%) and this is probably what justifies the diversity of motivations in IPO, essentially if the shareholders want an immediate liquidity following the IPO or to maximise the amount of capital that is raised. The table also shows that the institutional investors take advantage of the IPO to take out very large amounts of capital, above all the companies with high risk capital. In fact, this category of shareholder takes advantage of this opportunity to ensure an immediate liquidity, whereas this would not be safe in the future.

(Insert Table 5)

Figure 1 reveals that the IPO in the two markets show a very high volume of turnover in the first five days. After this period, the volume of negotiations has a tendency to stabilise. This observation conforms to that observed by Miller and Reilly (1987) in their sample made up of 1,598 floatation operations in the Nasdaq between 1977 and 1987.

(Insérer Figure 1)

This result justifies our methodology for estimating the post-operation liquidity in a window going from the 5^{th} to the 60^{th} day. Table 6 presents the descriptive characteristics of the liquidity in our two samples. The results show that the average turnover volume in our Euro NM sample is lower than that in our Nasdaq sample. For this later, the Bid/Ask spread calculation is impossible because of the absence of data for the American markets in the Datastream data base.

(Insert Table 6)

IV. Empirical analysis

We have divided up each of our two samples (Euro NM and Nasdaq) of IPOs into a first group made up of underpriced issues and a second group made up of overpriced issues. For the two groups, we have compared, on the one hand, the transaction characteristics, and on the other hand, the difference in relation to the shareholding structure. The results are shown in Table 7.

(Insert Table 7)

A company where the offer is undervalued is characterised, on average by a concentrated ownership than that where the offer is overpriced. This type of company is above all characterised by a higher concentration of original shareholders. The liquidity is higher in the undervalued companies as their average bid-ask spread is lower than that of overpriced companies and the transaction turnover is higher. Most of our results are statistically significant except the Herfindhal statistical indexes.

A. Analyse of the underpricing and the money left on the table

We calculated two measures for each of the IPOs. The underpricing called AR_i, shows the non-adjusted abnormal returns calculated according to the equation 1 and the adjusted underpriced called MAR_i, shows the market adjusted return. To adjust these returns, we have used the EURO NM All-Shares index for the Euro NM operations, this is made up of all the values listed in the market. For the sample of operations carried out in the Nasdaq, we have used the Nasdaq Composit index which is made up of all the valued quoted in the market. Then we have carried out a series of demonstrations conforming to the methodology of Barry (1989). The appendix again uses this methodology for the allotment of costs in the different categories of shareholder.

Table 8 represents a synthesis of the results of the average underpricing as well as the allotment of costs in our two samples. The student statistical test for the underpricing used in table 4 shows that our results are significantly different to zero for the two samples. What is more, the table shows that the underpricing is higher in the Euro NM market than that of the Nasdaq. If we compare our results with previous studies (see table 1), we note that the level of underpricing observed during the study period in the two markets is relatively high. According to Ritter (2001), this is due to the euphoria in relation to technological values in the American markets. Graph 2, shows the general tendency in the two markets and confirms that this phenomenon is also present in the Euro NM market.

(Insert Table 8)

The results show that the insiders in European companies actively participate in the floatation offer by proposing their own shares. The ratio of participation for these latter is 5.92% whereas for the American companies it is 1.55%.

The average of the money left on the table is the same for the insiders in our two samples and is 10 million euros. On the other hand, it is double for the Institutional Europeans if we compare it to that of companies quoted in the Nasdaq. This result can be explained by the fact that high-risk European companies, that are shareholders in the companies studied, prefer immediate liquidity after floatation and to leave the market as soon as possible without taking into account the destruction of value that this causes for them.

B. Short-term Performance

In order to study the relationship between the underpricing and the explanatory variables that we determined in the theoretical framework of our research, we firstly propose studying the daily returns during the first five days that follow the stock market floatation.

(Insert Table 9)

Table 9 shows the adjusted returns in the two samples on the first seven days of negotiations. Actually, the fact that there are no significant returns between the second and the seventh day implies that the presence of the phenomenon of underpricing, as confirmed in previous studies, is only observed on the first day of transactions. Panels A.2 and B.2 show the results of the returns during the study period for the undervalued issues, that is to say, those which show a positive abnormal return on the first day. Whereas, panels A.3 and B.3 show the same information for the overpriced issues, that is to say, those which show an abnormal negative return. The data shows that the price adjustment, whether for the overpriced or the undervalued group, takes place on the first day in the two markets without any significant returns being observed on the other days. This result is also confirmed by the 'wealth relative' which shows that an investment in a portfolio made up of all the issues is more profitable than an investment in a market portfolio.

Rock (1986) model supposes that the investor bears a cost and can obtain information on the balance price of an issue and therefore become an informed trader. If, it is the case, an informed trader obtains an average return of 57.74% in the Euro NM and 42.85% in the equivalent Nasdaq companies, since such a trader only wants to invest in underpriced issues. On the other hand, the non-informed trader, in order to achieve an ideal diversification, wishes to invest in all the issues. The average return for these investors is 43.99% in the Euro NM and 30.57% in the Nasdaq a difference of 13.75% in the Euro NM and 12% in the Nasdaq constitutes the upper limit of the costs that the non-informed investor is prepared to accept to become informed.

(Insert Table 10)

Table 10 shows the abnormal return between the first day of transactions and four weeks (21 days of trading) after the IPO. This analysis shows the profit potential for the investors who are unable to obtain shares at the subscription but acquire them during the period after IPO.[8] The market adjusted returns after IPO are not significant to the 0.01 threshold. These results corroborate the works of Miller and Reilly (1987) that show that it is practically impossible for the investors to profit from the initial underpricing during the period after IPO.

If we examine the returns after IPO in each sample, the statistical test is significant for the issues with a negative return on the first day. This result suggests the possibility of abnormal returns by short-term selling of the securities that are decline at the end of the first day and which are bought at the end of the 21st day. However several lead underwriters, with the help of syndicates, prevent the short sales situations during the first trading days. These excessive returns, just after IPO, are not observed for the securities that plummet during the first day of transactions.

C. Study of the underpricing and the shareholding structure

C. 1. Univariate Analysis

We carried out a Univariate study using the ordinary least square method to explain the relationship between the underpricing and the shareholding structure after the floatation operation (*hypothesis* 1). We have divided the two samples into two groups, the first underpriced and the second overpriced. We previously showed that there was a significant difference in the level of ownership structure in these two groups in the two samples. The Univariate results, resulting from the regression using the least ordinary square method (Table 11), corroborate the linear relationship between the underpricing and the ownership structure of these issues. The positive sign of the coefficients and the p-value of certain variables rejects the nil hypothesis according to which there is no relationship between the underpricing and the ownership structure. The results (Panel A) show, for the Euro NM sample, that an increase in the level of underpricing is due, on average, to the fact that the five majority shareholders retain 45% of the capital. The results in the Nasdaq sample (Panel B) are more significant and confirm this relationship. Moreover, the results show that an increase of 10% in the underpricing was due to the fact that the original shareholders retained 60% of the company's shares.

(Insert Table 11)

[8] The returns after floatation were calculated using the asking price the first day and the bid price on the 21st day.

The results of the regressions in Table 11 show the possibility of a violation of the homoskedasticity. To correct this problem, we will use a logarithmic transformation of the variable to be explained $LOGMAR_i = LN(1 + MAR_i)$. This transformation is theoretically based on Booth and Chua (1996), who provided for a non-linear relationship between the underpricing and the number of investors participating in the floatation.

By applying this transformation to the European sample, table 11 shows that, if the explanatory variable is the share of the capital retained by the insiders, the relationship is significant to the 5% threshold. By using the coefficient sign as a basis, we can interpret the result by the fact that an increase in the underpricing of an issue means that the insiders tend to obtain the largest concentration of shares.

According to Brennan and Franks (1997), the result signifies that the underpricing is a factor that makes it possible to remunerate the other investors with all types of benefits in kind that the insiders are able to obtain through their controlling position.

By using Herfindhal's statistical index, the results are significant for the first five to twenty shareholders in the Euro NM sample. On the other hand, the use of this index for the Nasdaq sample rejects this relationship for all the variables. One explanation for this is that that the number of original controlling shareholders is much lower in the Euro NM sample than that of the Nasdaq. In conclusion, we can confirm the direct relationship between the level of underpricing and the formation of the shareholding structure after floatation.

C. 2. Multivariate analysis of IPO

In order to study the relationship between the underpricing and the share of the capital held by the original shareholders and their role in the IPO (*hypothesis* 2), we carried out a series of regressions using the ordinary least square method. Table 1 shows the results obtained.

(Insert Table 12)

The first model considers all the variables in the two samples. We note that all the coefficients are significant. The risk variable has a higher coefficient than the other variables, which is explained by the fact that underpriced IPOs are allocated to investors that have good price information. Adding the term *MARKET* as an independent binary variable (model 3) slightly modifies the results. The independent variable *PART* (ratio of insiders' participation), becomes statistically insignificant. This means that the insiders do not participate in the same way in IPO in the two markets. We introduced two independent interaction variables, the first for the dilution factor (MARKET*FDEL variable) and the second for the insiders' ratio of participation (MARKET*RPRT variable). The results are shown in Table 13.

(Insert Table 13)

The results show that the interaction variable for the dilution factor is not statistically significant. On the other hand, the coefficient of the interaction variable for the ration of participation is statistically significant at the 10% threshold whereas that of the ratio of participation is not. The results confirm that there is a slight peculiarity in the Euro NM market. This difference is explained by the fact that the insiders in the Euro NM companies propose more old securities in the offer than the insiders in the Nasdaq companies. We also note that, with or without interaction variables, the binary variables for companies belonging to the information technology sector (BVSIC3) and the high technology sector (VBSIC6) are significantly underpriced. This is explained by the fact that this concerns companies recently setup and that investors are not sufficiently confident in their activities. In conclusion, we can confirm the relationship, on the one hand between the underpricing, the share of the capital retained by the original shareholders and on the other hand the insiders' participation in the operation.

D. Study of the liquidity and the ownership structure

D. 1. Univariate analysis of the liquidity

We used the average turnover of the transactions and the bid-ask spread as an approximation for measuring the liquidity. The results are only available for the Euro NM sample, as Datastream does not provide this data for the American markets. We carried out a series of regressions using the ordinary least square. The results are shown in table 14.

(Insert Table 14)

The results in table 14 show the existence of a negative relationship between the ownership structure and the liquidity. Our empirical results concur with the model of Bolton and Von Thadden (1998). This model proposes that once the ex-ante dispersion of the property is attained, it becomes very difficult to form a long-term controlling group. The authors confirm that, for the original shareholders, there is a trade-off between liquidity and control. If we use the trading turnover as an explanative variable, the coefficients are negative and the p-value are very significant. The relationship can be interpreted in the following manner. To increase the average turnover of the transactions by 1%, the share of the capital retained by the original shareholders must be reduced by 1.13%. In other words, if the original shareholders decide to retain 1% of the capital or more, the transaction turnover diminishes by 1.13%.

If the bid-ask spread is used as an explanative variable, all the coefficients are not significant. The result is explained by the fact that price spread is correlated with the number of investors making up the float and not correlated with the shareholding concentration. In conclusion, our results confirm a third hypothesis according to which, the level of liquidity after the IPO is negatively correlated to the property concentration.

D. 2. Multivariate analysis of the liquidity

The results of table 15, panel A for the Euro NM sample and panel B for the Nasdaq sample show that there is a significant difference in the level of the trading turnover during the four days after the issue of the official listing. On the first day of tradings, the average volume is 964 million securities exchanged for the Euro NM sample and 1,225 million for the Nasdaq sample. This respectively represents 30.68% for each sample and 25.94% of the average of the shares issued during the IPO. Such percentages are huge id we compare them to the average annual turnover of 30-40% for the Nasdaq tradings. The volume of exchanges falls considerably the second day and around the sixtieth day, the transaction turnover is only 0.84% for the Euro NM and 0.93% for the Nasdaq. This reduction is observed in the two sub-samples of overpriced and underpriced issues. In general, the results show a large volume on the first day, during which significant changes take place in the price level. This proves that the volume and the price movements (underpriced and overpriced) are correlated.

(Insert Table 15)

The quantity of transactions could signify how much the investors agree with the value of the security. If there is considerable uncertainty regarding the underpriced issues, this signifies that the volume of transactions must also be very high. We have carried out a student statistical test concerning the average differences in transaction volume between the overpriced and the underpriced groups in the two samples. The results indicate (table 15) a high significant level (a 1% threshold) in transactions between the second and the fifth day in the Euro NM sample. The difference is significant even on the sixtieth day. On the other hand, the results were less significant in the Nasdaq sample. Consequently, the high volume of negotiations in the underpriced group confirms the increased risk that characterises this group.

The results for the average bid-ask spreads (Panel C) show that there is a slight significant difference on the tenth day in the overpriced group. Taking into account these significant differences in the level of volume in the first five days, we had to divide our analysis of the liquidity into two parts. The first, examined the liquidity in the first five days, as for the second, it examined it in a window going from the fifth to the sixtieth day.

Stoll (1978) and Glosten and Milgrom (1985) confirm that the bid-ask spread is a linear function of the degree of risk and of the information asymmetry. Ho and Stoll (1983) confirm that the degree of risk depends on the volatility of the price and the number of securities exchanged. The risk of information asymmetry affects the bid-ask spread since the market-makers are obliged to negotiate solely with the investors who have good information. Glosten and Milgrom (1985) show that the bid-ask spread is wide when informed traders are present. In other words, the market-makers increase the bid-ask spread in order to compensate for the risk of dealing with informed traders. This signifies that the initial bid-ask spread must be wider for the underpriced IPOs as the informed traders are involved in the issues, contrary to the overvalued operations where there are only uninformed traders.

We used the logarithm demonstrating the relationship between the highest and the lowest price to measure the price volatility. The daily volume is used as an approximation of the frequency of trading. Stoll (1978) observed that an interruption in the price listing leads to describing the quoted bid-ask spread in an extreme way and that the bias increases with the price increase. To diminish this effect of price discontinuity, we introduced the daily bid price for each issue as in the methodology of Miller and Reilly (1987). Then we used the following equation:

$$BidAsk_{i,t} = \alpha + \beta_1 \ln(Bid\ \mathrm{Pr}\, ice_{i,t}) + \beta_2 \ln(Volume_{i,t}) + \beta_3 \ln(Risk_{i,t}) + \beta_4 DummyMAR_i + \varepsilon_{i,t} \quad (14)$$

If we use the square root of the price range as the dependent variable, the coefficients are often significant. Consequently, this must be taken into account and the results adjusted by squaring the coefficients in the equation. This transformation is not used for the bid/ask spread multivariate analysis.

The model does not include any explicit measure of the risk of an information asymmetry the effect of the average of the information asymmetry is shown by the intercept of the equation (α). The results of the regression using the least ordinary squared method for the first five days are given in table 15.

(Insert Table 16)

The results show that all the variables are significant on the first day of trading. On the other days, the volume and the risk are very significant. On the other hand, the significant level is lower for the BidPrice variable and the binary variable.

We can conclude from this analysis that the risk of an information asymmetry affects the bid-ask spread since the market makers can only negotiate with the investors who have good information. Our results corroborate Rock's model (1986). According to this author, the price range for the undervalued group must be wide, because of the information asymmetry since informed and uninformed investors invest in these issues.

The second part of the analysis of the price range is focused on a 55 day window (up to 11 weeks after IPO). This period begins on the fifth day and ends on the sixtieth day after the start of negotiations. We constructed two models that we estimated using the ordinary least square method. These models explain the relationship that exists between the level of underpricing of an IPO and the ex-post liquidity.

(Insert Table 17)

Table 17 shows the results for the two models. The first, being without sectoral binary variables and the second with the variables. When using the bid-ask spread as an approximation of the liquidity, we see that all the coefficients of the explanatory variables are significantly different to zero with the exception of the binary sectoral variables. We note that taking into account the binary sectoral variables in model 2, slightly reduces the value of the adjusted R^2 whereas, the significant level (F-statistic) of the model diminishes. Moreover, no coefficient in these variables is significant.

After the multivariate analysis of the bid-ask spread, we can conclude that with or without the binary variables, the nil hypothesis that there is no relationship between the underpricing and the ex-post liquidity is to be rejected. According to equation 12, the first model, everything being equal,

demonstrates that an increase of 1% in the level of the underpricing leads to a reduction of 0.41% in the bid-ask spread (see table 17). However with an adjusted R^2, the model is not strategically significant, that is to say, there is only 6.5% of variation in the price range, which is explained by the underpricing, the transaction volume and the risk.

(Insert Table 18)

In order to find more explanations for this relationship, we used the trading turnover as a dependent variable. In a similar way to the bid-ask spread models, but including other explanatory variables, we carried out three regressions in the Euro NM and Nasdaq samples using the ordinary least square method. These models explain the liquidity in a much better way than the previous ones, with an adjusted $R^2$of 42.3%. The first model shows the negative relationship between the turnover volume and the level of underpricing for the two samples, (Euro NM, Panel A and Nasdaq, Panel B). However, the coefficient is not significant (see table 18).

(Insert Table 19)

The liquidity is negatively correlated with the share of the capital retained by the original shareholders. On the other hand, it is strongly correlated with the insiders' participation in the operation. Contrary to the bid-ask spread model, the third model (table 18) shows that the binary sectoral variables lead to an improvement in the level of the explanative capacity of the model. Table 19 shows the matrix of the correlation between the different explanatory variables. We note that there is no significant correlation; therefore we can conclude that there is no multi-colinearity between the explanatory variables studied. We conclude that the relationship between the liquidity and the underpricing of the IPOs is significant.

V.Conclusions

In this work, we have studied the relationship between the underpricing of an IPO, its property structure after the capital allotment process and its level of ex-post liquidity. We have shown that the level of underpricing is positively correlated to the bloc of shares held by the original shareholders. If the company IPO is underpriced it is very probable that the founder shareholders will prefer to retain a large part of the capital in order to maintain the control. The ownership structure helps to explain the variation in the level of liquidity. The liquidity of a company where the IPO is underpriced is higher than that of an overpriced company. In fact, a company with underpriced issues is characterised by a low average in the ranges and a higher trading volume than that of the overpriced offers.

The results show that the market adjusts the errors in the pricing of IPO from the first day of trading. Besides the fact that the abnormal returns are no longer available to investors during the after market period, the underpricing has been positively correlated with the risk as in the hypothesis of Beatty and Ritter (1986). The trading volume is also correlated with the underpricing.

We have also studied the bid-ask spread. The results show that it is negatively correlated to the degree of underpricing. On the other hand, the study of the trading volume shows that it is positively correlated with the insiders' participation in the IPO. In fact; the more this category of shareholder participates in the offer, the higher the level of the trading volume is. Some sectors are more (or less) liquid than others. Our results concerning the liquidity corroborate those of Miller and Reilly (1987), of Schultz and Zaman (1994) and of Hanley (1993).

Moreover, this study shows that the ownership structure plays a primordial role in the relationship that is formed between the underpricing and the liquidity. The underpricing of a floatation offer can help to stabilise the ownership structure after the IPO. This signifies that there is an attitude of discrimination against large investors in the process of capital allotment. Our results confirm the ideas of Brennan and Franks (1997) and Booth and Chua (1996).

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Appendix: The cost allocation of the initial public offering

Several measures have been suggested in the financial literature to quantify the transfer of wealth created by the underpricing of the IPO which new investors benefit from. Dawson (1987) proposes a value destruction measure for the original shareholders after an IPO. However, this measure can only be applied for floatation offers made through the sale of existing shares. Barry (1989) considers that the cost of underpricing is only a transfer of the former shareholders' wealth that the new shareholders benefit from. In his model, he examines the total cost allocation created by the underpricing, between the shareholders who transfer a part or the total of their shares and those who prefer to retain their shares. This model is valid to measure the cost connected with the underpricing of the IPO realised with new and/or old issues. Brennan and Franks (1997) have empirically validated Barry's model (1989) to measure the cost allotment of the underpricing between the board members and the other original shareholders in the sample of 69 offerings at the London Stock Exchange.

In this appendix, we have used Barry's model (1989) to analyse the cost allotment of the underpricing between the insiders and the institutions in our Euro NM and Nasdaq samples.

The abnormal returns, that is to say the underpricing; note as AR_i:

$$AR_i = \frac{P_{i,1} - P_{i,0}}{P_{i,0}} \qquad \text{(A-1)}$$

Where $P_{i,0}$ represents the IPO price for the company i, $P_{i,1}$ is the closing price on the first day of company listing. The total cost of the underpricing for a company and for the shareholders selling shares is called by the practitioners: Amount of money left on the table; noted as TC_i. TC_i represents the gains made, valued at the subscription price $P_{i,0}$, by the purchasers of new shares issued by the company i (primary offer) and those transferred by the original shareholders (secondary offer).

$$CT_i = RI_i * P_{i,0} * (S_{i,n} + S_{i,0}) = RI_i * P_{i,0} * S_{i,v} \qquad \text{(A-2)}$$

Where, $S_{i,n}$ represents the number of new shares issued by the company during their stock market floatation, $S_{i,0}$ represents the number of shares transferred in the operation by the original shareholders and $S_{i,v}$ is the total number of shares offered to the public in the operation such as $S_{i,v} = S_{i,n} + S_{i,0}$. Given that during the floatation operation, only a part is sold to the public, the cost of underpricing, understood to be represented by AR_i, is a fraction smaller than the global value of the company. Consequently, we define $UND_{i,p}$, the cost of the IPO as a proportion of the company's value before listing, valued at the IPO price:

$$UND_{i,p} = \frac{CT_i}{N_{i,0}P_{i,0}} = AR_{i,p}\frac{S_{i,v}}{N_{i,0}} \qquad \text{(A-3)}$$

Where $N_{i,0}$ represents the number of constitutive shares of the capital of the company i before its listing. Then, we will determine the cost of the underpricing per share for the investors who transfer shares and those who retain them in the offering. In fact, if the offer is made without new share issues, the total of the costs is born by the shareholders who transfer shares during the operation. However, the new issues are floated with a discount which causes a dilution for the original shareholders who retain their shares. Thus, we will define the cost of the underpricing provoked by the dilution due to new issues, born by each old share, in the following expression:

$$WL_{i,N_{i,0}} = \frac{AR_i * S_{i,n} * P_{i,0}}{N_{i,0}} \qquad \text{(A-4)}$$

Thus, the underpricing for the shareholders who prefer to retain their shares, priced at the IPO price; noted as $UND_{i,r}$, is obtained by dividing the previous expression by P_0.

$$UND_{i,r} = \frac{AR_i * S_{i,n}}{N_{i,0}} \qquad \text{(A-5)}$$

The cost for the investors who prefer to transfer shares in the IPO, noted as $UND_{i,v}$, is much more complex to calculate, given that the first price $P_{i,1}$ is reduced by the underpricing of the issue. If the IPO is not

positive, that signifies that the shares are valued at a price above $P_{i,1}$; that is to say, $P_{i,s} + AR_i*S_{i,n}*(P_{i,0}/S_{i,0})$. The last term in the previous expression represents the dilution effect provoked by the issue of new shares with a discount. This means that $UND_{i,v}$, the cost for the share that was sold, valued at the IPO price $P_{i,0}$, for the investor who prefer to sell his shares in the operation is shown by the following equation:

$$UND_{i,v} = \frac{P_{i,1} + (\frac{AR_i S_{i,n} P_{i,0}}{S_{i,0}}) - P_{i,0}}{P_{i,0}} = \frac{P_{i,1} - P_{i,0}}{P_{i,0}} + \frac{AR_i S_{i,n}}{S_{i,0}} = AR_i + UND_{i,r} \quad \text{(A-6)}$$

We have determined the cost for the insiders in the company *i*, noted as $C_{i,\text{Ins}}$, and the cost for the institutional in *i*, noted as $C_{i,Inst}$, by the two following equations:

$$C_{Insiders} = [S_{i,\,rIns}\, UND_{i,\,r} + S_{i,v\,Ins} UND_{i,\,v}]P_{i,0} \quad \text{(A-7)}$$

$$C_{Institutionnel} = [S_{i,\,rInst}\, UND_{i,\,r} + S_{i,\,vInst}\, UND_{i,\,v}]P_{i,0} \quad \text{(A-8)}$$

where $S_{i,rIns}$ and $S_{i,vIns}$, respectively represent the number of shares retained and the number of shares sold by the insiders; $S_{i,rIns}$ and $S_{i,vIns}$ represents the number of shares retained and the number of actions sold by the institutional. It is to be noted that $CT_i = C_{Insiders} + C_{Institutionnel}$. By deriving $C_{Insiders}$ in relation to the variable UND_i, we obtained the marginal cost of the IPO for the insiders, shown in the following equation:

$$\frac{dC_{Insiders}}{DEC_i} = (\frac{S_{i,n}}{N_{i,0}} + \frac{S_{i,vIns}}{S_{i,Ins}})S_{i,Ins}P_{i,0} \quad \text{(A-9)}$$

where $S_{i,Ins}$ represents the number of shares owned by the insiders. In the previous equation we observed that the marginal cost of the IPO increases according to the dilution factor ($S_{i,n}/_{Ni,0}$) and the participation factor ($S_{i,vIns}/S_{i,Ins}$) in the operation.

Finally, we have expressed the underpricing cost for the insiders as a proportion of their portfolio in the company before its stock market floatation by the following equation:

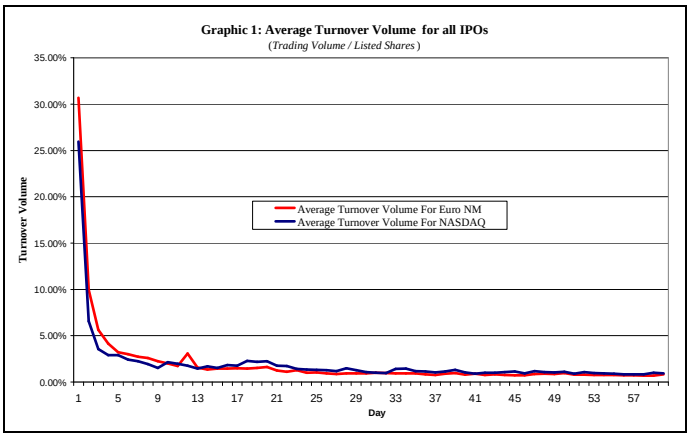
$$c_{Insider} = \frac{C_{Ins}}{(S_{i,vIns} + S_{i,rIns})P_{i,0}} \quad \text{(A-10)}$$

$$c_{Institutionnel} = \frac{C_{Inst}}{(S_{i,vInst} + S_{i,rInst})P_{i,0}} \quad \text{(A-11)}$$

Table 1: Results of some studies carried out on the underpricing of IPOs

This table presents a synthesis of the results on the underpricing of IPOs in different markets. The returns have been calculated differently from one market to another over different periods. In most cases, the returns have been realigned with the market movements. They have been calculated based on the IPO price and the closing price on the first day of trading.

Country	Study	Period	Size and sample	MAR (in %)
Germany	Ljungqvist (1997)	1970-93	180	9,2
Australia	Finn and Higham (1988)	1966-78	93	29,2
Australia	Lee, *et al.* (1996)	1976-89	266	11,9
Brazil	Aggarwal, *et al.* (1993)	1979-90	62	78,5
Canada	Jog and Srivastava (1996)	1971-92	254	7,4
Chilli	Aggarwal, *et al.* (1993)	1982-90	19	16,3
USA	Aggarwal and Rivoli (1990)	1977-87	1.598	10,7
USA	Ibbotson, *et al.* (1994)	1960-92	10.626	15,3
USA	Ritter (1987)	1977-82	664	14,8
France	Jenkinson and Mayer (1988)	1986-87	11	25,1
Hong Kong	McGuiness (1992)	1980-90	80	17,6
Japan	Dawson (1987)	1979-84	106	51,9
Japan	Jenkinson (1990)	1986-88	48	54,7
Mexico	Aggarwal, *et al.* (1993)	1987-90	37	33,0
UK	Jenkinson and Mayer (1988)	1983-86	143	10,7
Singapore	Koh and Walter (1989)	1973-87	66	27,0
Switzerland	Kunz and Aggarwal (1994)	1983-89	42	35,8



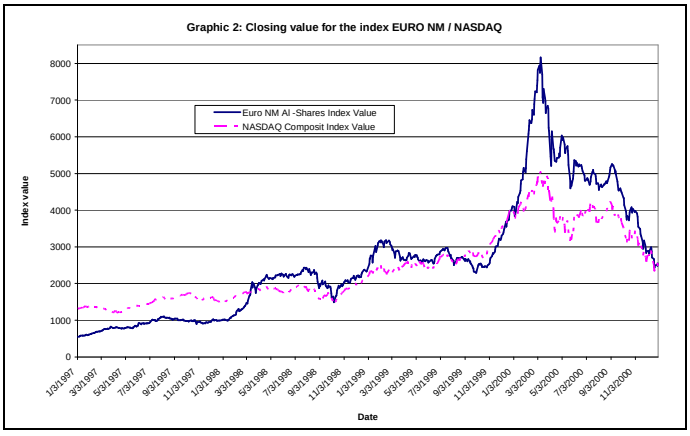


Table 2: Sector classification of the two samples

This table presents a sector classification according to the Stock market authorities in the Euro NM. For our sample, the companies listed in the NASDAQ use the code SIC (Standard Industrial Classification) as a basis, this is used by the SEC to accept or refuse a company in index calculations. This classification has enabled us to use binary variables as in the methodology of Lee, *et al.* (1993).

Industry	**Variable**	**Frequency**	**Percentage**
Biotechnology	$BVSIC_1$	15	5.42
Industrial	$BVSIC_2$	23	8.30
IT services	$BVSIC_3$	77	27.80
Medtech & Health Care	$BVSIC_4$	13	4.69
Software	$BVSIC_5$	61	22.02
Technology	$BVSIC_6$	65	23.47
Telecommunication	$BVSIC_7$	23	8.30
Total sub-sample		**277**	**100**
Total sample		**554**	

Table 3: Descriptive Statistics of our sample

This table presents the descriptive statistics of stock market issues carried out between 1997 and 1999 in the different segments of the Euro NM (Amsterdam, Brussels, Frankfort, Milan and Paris) and for our sample of operations carried out in the NASDAQ.

Panel A. Characteristics of Euro NM sample						
	Mean	**Median**	**St-deviation**	**Min**	**Max**	**Skew**
IPO volume	1,774,705	1,050,000	2.249.935	133,334	21,000,000	4.18
New shares (% of IPO)	78.63	80.90	21.67	25.15	100.00	-1.16
Old shares (% of IPO)	21.45	19.42	21.64	0.00	100.00	1.16
Green-Shoe	231,778	147,000	293,407	0	2,225,000	2.87
IPO price	25.73	21.00	35.66	0.76	559.87	12.37
IPO size (in M€)	34.89	20.80	44.39	2.96	447.90	4.50
IPO capitalisation (in M€)	123.39	72.00	141.67	10.12	899.50	2.68
Panel B. Characteristics of NASDAQ sample						
	Mean	**Median**	**St-deviation**	**Min**	**Max**	**Skew**
IPO volume	3,202,306	2,880,000	1,924,788	700,000	14,678,000	1.93
New shares (% of IPO)	94.91	100.00	12.27	26.32	100.00	-2.73
Old shares (% of IPO)	5.22	0.00	12.40	0.00	76.68	2.67
Green-Shoe	406.179	375.000	299.487	0	1.406.250	0.72
IPO price	10.19	9.50	4.43	3.50	30.25	1.11
IPO size (in M$)	36.26	29.17	31.27	3.50	187.00	1.85
IPO capitalisation (in M$)	157.79	99.60	176.72	9.17	1,053	7.54

Table – 1: Abnormal returns observed on the Euro.NM and NASDAQ between 1997 and 1999

This table presents the average and the median of the abnormal adjusted and non-adjusted returns IPOs for the whole of the period 1997-1999 on the various segments of Euro.NM (Amsterdam, Brussels, Frankfurt, Milan and Paris) and the paired IPOs carried out on the NASDAQ for the same period. The outputs are measured over various periods: 1st, 7th, 21st, 30th 60th and 90th day of the negotiations. The non adjusted returns are computed according to equation 12 and market adjusted returns according to the equation 13. α, β and γ indicate respectively the significant levels to the threshold of 10%, 5% and 1% of the Student test-statistics. The test is carried out to test if the average of returns is different from zero. It is estimated by the ratio: mean/standard deviation; where, the standard error represents the standard deviation divided by the square root of the number of observations.

Mean; Median (*t*-statistic; simple size)

	Non-adjusted returns (%)						**Market adjusted returns (%)**					
Market	**1st day**	**7th day**	**21st day**	**30th day**	**60th day**	**90th day**	**1st day**	**7th day**	**21st day**	**30th day**	**60th day**	**90th day**
All Euro.NM sample	43,98;19,35 (9,49γ;277)	48,20;20,40 (9,73γ;277)	56,04;24,94 (10,85γ;277)	61,27;25,52 (10,82γ;277)	93,71;29,63 (8,84γ;277)	131,86 ;43,08 (8,07γ;277)	43,99;19,32 (9,50γ;277)	45,78;18,02 (9,29γ;277)	49,67;17,42 (9,95γ;277)	51,78;20,66 (9,64γ;277)	72,42;21,34 (7,70γ;277)	96,64;27,40 (6,70γ;277)
Germany	51,30;24,02 (8,48γ;167)	52,70;28,93 (8,82γ;167)	60,06;32,52 (9,95γ;167)	66,32;39,09 (9,79γ;167)	101,52;52,27 (8,34γ;167)	136,44;64,21 (8,56γ;167)	51,41;25,84 (8,48γ;167)	50,82;27,03 (8,57γ;167)	54,97;30,38 (9,33γ;167)	58,49;35,13 (8,99γ;167)	80,44;35,59 (7,57γ;167)	99,57;42,60 (7,34γ;167)
Belgium	3,17;1,16 (0,75;10)	1,95;-2,06 (0,29;10)	-2,78;-1,89 (-0,58;10)	-6,91;-5,85 (-0,95;10)	-3,90;-8,38 (-0,40;10)	-8,92;-14,35 (-0,74;10)	4,10;4,94 (0,92;10)	0,07;-1,55 (0,01;10)	-6,15;-6,13 (-1,59;10)	-9,12; -9,91 (-1,48;10)	-8,56;-10,58 (-0,99;10)	-16,19;-28,19 (-1,57;10)
France	25,95;10,13 (5,90γ;80)	29,86;8,76 (4,71γ;80)	38,62;12,07 (4,17γ;80)	42,15;9,69 (4,38γ;80)	64,73;10,74 (3,52γ;80)	98,87;12,09 (3,40γ;80)	25,83;9,47 (5,89γ;80)	26,87;6,80 (4,30γ;80)	31,17;9,37 (3,51γ;80)	30,91;6,14 (3,45γ;80)	45,14;5,86 (2,78γ;80)	68,98;9,63 (2,78γ;80)
Italy	132,06;21,62 (1,39;7)	143,82;94,35 (2,45α;7)	218,93;247,7 (4,27γ;7)	251,53;245,9 (4,13γ;7)	422,76;235,1 (2,43α;7)	739,30;264,9 (2,15α;7)	130,84;20,42 (1,39;7)	134,51;81,53 (2,25α;7)	191,76;217,8 (3,82γ;7)	158,81;17,23 (3,58β;7)	335;422,76 (2,00α;7)	593,27;76,81 (1,75;7)
Netherlands	44,76;29,87 (4,15γ;13)	134,09;45,29 (1,98α;13)	69,08;31,22 (2,44β;13)	64,00;27,08 (2,58β;13)	69,57;28,09 (2,42β;13)	57,27;44,14 (2,26β;13)	44,32;28,72 (4,13γ;13)	127,83;37,14 (1,87;13)	61,76;25,83 (2,14α;13)	53,22;17,09 (2,08α;13)	57,68;22,55 (1,95α;13)	48,66;30,29 (1,78α;13)
All NASDAQ market	30,69;10,00 (8,31γ;277)	28,65;8,69 (8,10γ;277)	38,26;11,11 (7,60γ;277)	33,92;8,80 (6,64γ;277)	38,54;7,60 (5,92γ;277)	51,53;8,44 (6,00γ;277)	30,57;9,86 (8,30γ;277)	27,97;8,45 (8,02γ;277)	36,21;11,85 (7,40γ;277)	30,36;6,49 (6,17γ;277)	30,45;2,18 (4,84γ;277)	38,36;-2,50 (4,60γ;277)
NASDAQ NNM	33,85;10,71 (7,53γ;216)	32,28;10,12 (7,49γ;216)	45,75;12,50 (7,32γ;216)	41,22;10,65 (6,49γ;216)	50,19;17,98 (6,21γ;216)	66,65;22,92 (6,32g;216)	33,68;10,29 (7,51γ;216)	31,51;10,11 (7,41g;216)	43,46;15,04 (7,14γ;216)	37,31;8,62 (6,08γ;216)	41,42;10,69 (5,30γ;216)	52,76;10,23 (4,15γ;216)
NASDAQ SCM	19,53;9,33 (3,84γ;61)	15,81;7,33 (3,36γ;61)	10,53;4,08 (2,67γ;61)	8,05;5,00 (1,92α;61)	-2,71;-7,81 (-0,60;61)	-2,00;-12,40 (-0,25;61)	19,58;9,36 (3,87γ;61)	15,40;6,32 (3,35γ;61)	10,53;4,08 (2,74γ;61)	5,75;-1,25 (1,52;61)	-8,42;-9,55 (-1,90;61)	-12,64;-19,86 (-1,60;61)

Table 4: Descriptive Statistics of ownership structure of our sample

This table represents the descriptive statistics of the ownership structure for our sample listed in the different segments of the Euro NM (*Panel A*) and of the sample listed in the Nasdaq (*Panel B*). It aims to describe the aftermarket ownership structure.

Panel A. Ownership structure on EURO NM (N = 277)						
Measures of ownership structure	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Skew**
***Distribution of the ownership structure*:**						
Shares owned by the majority shareholders	33.87	30.00	18.75	0.00	87.77	0.50
Shares owned by the old shareholders	64.77	69.07	15.49	0.00	91.08	-1.53
Shares owned by the Top 5 shareholders	59.17	63.12	18.84	0.00	89.59	-0.86
Shares owned by the Top 20 shareholders	63.14	66.80	15.86	0.00	91.08	-1.36
Shares owned by the insiders	51.71	57.00	22.20	0.00	92.00	-0.74
Shares owned by the institutional	10.93	2.33	16.12	0.00	80.74	1.79
***Statistic index*:**						
Herfindhal index of the majority shareholders	19.05	14.82	13.92	0.00	71.86	1.06
Herfindhal index of the top 5 shareholders	18.60	14.39	14.24	0.00	71.86	1.02
Herfindhal index of the top 10 shareholders	18.74	14.39	14.13	0.00	71.86	1.04
Panel B. Ownership structure on NASDAQ (N = 277)						
Measures of ownership structure	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Skew**
***Distribution of the ownership structure*:**						
Shares owned by the majority shareholders	28.25	21.70	17.63	1.14	83.70	1.03
Shares owned by the old shareholders	55.32	57.60	15.97	1.14	83.70	-0.62
Shares owned by the Top 5 shareholders	51.85	53.70	16.04	1.14	83.70	-0.36
Shares owned by the Top 20 shareholders	55.29	57.60	15.99	1.14	83.70	-0.62
Shares owned by the insiders	44.82	45.40	19.43	1.14	83.70	-0.15
Shares owned by the institutional	10.43	0.00	14.93	0.00	58.50	1.48
***Statistic index*:**						
Herfindhal index of the majority shareholders	13.93	9.41	13.05	0.01	70.06	1.79
Herfindhal index of the top 5 shareholders	13.80	9.33	13.12	0.01	70.06	1.79
Herfindhal index of the top 10 shareholders	13.29	9.41	13.05	0.01	70.06	1.79

Table 5: Descriptive statistics of the liquidity in our two samples

This table presents the characteristics of the measures used for the liquidity of our sample. The average trading volume is determined by the average of the ratio between the daily turnover volume and the total number of securities listed. Over a period from the fifth to the thirtieth day after the start of trading (*see equation* 8). The average of the price spread has been calculated by the average of the ratio between the Bid-Ask spreads and the middle point of the Bid-Ask spreads (*see equation* 9).

Panel A. IPO liquidity on EURO NM (N = 277)						
Measures of the liquidity	**Mean**	**Median**	**SD**	**Min**	**Max**	**Skew**
Average of trading turnover (in %)	1.64	1.24	1.85	0.02	17.47	3.40
Average of bid-ask spread (in %)	2.13	2.05	0.98	0.20	6.04	0.62
Panel A. IPO liquidity on NASDAQ (N = 277)						
Measures of the liquidity	**Mean**	**Median**	**SD**	**Min**	**Max**	**Skew**
Average of bid-ask spread (in %)	1.87	1.10	2.88	0.01	24.70	5.66

Table 6: Difference between the underpriced IPOs and overpriced IPOs

This table presents the descriptive statistics of the ownership structure and the level of liquidity in our sample of companies listed in the Euro.NM (*Panel A*) and companies listed in the Nasdaq (*Panel B*). It concerns showing the aftermarket ownership structure and the importance of the original shareholders, the insiders and institutional investors. The t-statistic designates a student test that compares the average of the overpriced IPOs with that of the average of the sample with underpriced IPOs. Tests α, β and γ are significant at the respective significance level of 1 %, 5 % and10 %.

Panel A. Sample of EURO NM IPOs **(N=277)**					
Variables	**Underpriced IPO (N_1=216)**		**Overpriced IPO (N_2=61)**		**t-statistic (p-value)**
	Mean	**St. Dev.**	**Mean**	**St. Dev.**	
Ownership structure:					
Shares owned by the majority shareholders	34.57	18.40	31.37	19.89	1.18 (0.120)
Shares owned by the old shareholders	65.37	15.18	62.67	16.51	1.20 (0.115)
Shares owned by the Top 5 shareholders	60.49	16.49	54.51	17.38	2.47 (0.007^{α})
Shares owned by the Top 20 shareholders	64.01	15.69	60.04	16.22	1.73 (0.042^{β})
Shares owned by the insiders	52.90	21.68	47.52	23.69	1.68 (0.047^{β})
Shares owned by the institutional	11.21	16.21	9.92	15.88	0.55 (0.292)
Herfindhal index of the majority shareholders	19.46	13.55	17.60	15.18	0.92 (0.179)
Herfindhal index of the top 5 shareholders	19.10	13.85	16.81	15.55	1.11 (0.135)
Herfindhal index of the top 20 shareholders	19.22	13.74	17.01	15.40	1.08 (0.141)
Liquidity:					
Average of Bid-Ask spread* (%)	2.13	0.87	2.71	0.95	-4.54 (0.000^{α})
Average of Turnover volume* (%)	1.29	1.12	0.78	0.88	3.29 (0.006^{α})

Panel B. Sample of NASDAQ IPOs **(N=277)**					
Variables	**Underpriced IPO**		**Overpriced IPO**		**t-statistic (p-value)**
	Mean	**St. Dev.**	**Mean**	**Mean**	
Ownership structure:					
Shares owned by the majority shareholders	28.56	18.26	27.19	15.37	0.54 (0.294)
Shares owned by the old shareholders	56.08	16.09	52.75	15.42	1.46 (0.073^{γ})
Shares owned by the Top 5 shareholders	52.49	16.06	49.67	15.90	1.23 (0.111)
Shares owned by the Top 20 shareholders	56.04	16.11	52.75	15.42	1.44 (0.073^{γ})
Shares owned by the insiders	45.48	19.75	42.58	18.30	1.04 (0.150)
Shares owned by the institutional	10.57	15.04	10.17	14.67	0.19 (42.54)
Herfindhal index of the majority shareholders	14.43	13.75	12.21	10.25	1.19 (0.118)
Herfindhal index of the top 5 shareholders	14.31	13.82	12.10	10.33	1.18 (0.120)
Herfindhal index of the top 20 shareholders	14.43	13.75	12.21	10.25	1.19 (0.118)
Liquidity:					
Average of Bid-Ask spread* (%)	1.39	1.85	1.14	1.32	1.03 (0.153)
Average of Turnover Volume** (%)	1.97	2.18	1.56	1.56	1.40 (0.086^{γ})

* The average during the period between the 5^{th} and the 60^{th} day

** The average during the period between the 1^{st} and the 60^{th} day

Table 7: Difference between the underpriced IPOs and overpriced IPOs

This table presents the underpricing allocation between insiders and others old shareholders for our EURO NM sample (277 IPOs) and NASDAQ. The table presents the abnormal return or the non adjusted return observed the first day of trading calculated according the equation (1). The table show the average cost supported by different categories of shareholders; see the appendix different demonstrations.

Panel A. The underpricing cost for EURO NM sample **(N=277)**						
***Variables*:**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Skewness**
Abnormal return: AR_i	43.98	19.35	77.11	-24.85	692	3.93
Underpricing as % of the old shares: $UND_{i,p}$	18.04	6.39	32.86	-12.41	263	3.39
Cost par detained share (in %): $UND_{i,r}$	13.54	4.48	23.95	-10.10	175	2.98
Cost par sold share (in %): $UND_{i,v}$	57.52	25.58	99.16	-34.95	867	3.67
Wealth loose by old share: $Wl_{i,Nr0}$	3.45	1.02	7.68	-4.78	76.50	2.98
Cost for the insiders (in M€): $C_{Insiders}$	10,246	1,814	28,536	-10.864	297.034	6.95
Cost for the institutional (in M€): $C_{Institutional}$	4,124	320	13,428	-3,042	150,303	6.96
Cost for the insiders as a proportion of their portfolio before IPO: $c_{Insiders}$	16.42	5.88	29.59	-10.90	239	3.33
Cost for the institutional as a proportion of their portfolio before IPO: $c_{Institutional}$	30.29	6.12	62.58	-27.86	504	3.96
Money left on the table (in M€): CT_i	14,370	3,542	38,783	-38,456	467,100	7,36
Participation ratio in the IPO for insiders (in %): $PR_{Insiders}$	5.92	4.76	6.59	0.00	50.00	1.97
Dilution factor (in %): $DF_{Insiders}$	32.26	28.08	20.98	0.00	195	2.99
Panel B. The underpricing cost for NASDAQ sample **(N=277)**						
***Variables*:**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Skewness**
Abnormal return: AR_i	30.69	10.00	61.49	-56.25	474	3.23
Underpricing as % of the old shares: $UND_{i,p}$	10.63	3.68	25.67	-52.95	213	4.05
Cost par detained share (in %): $UND_{i,r}$	10.17	3.49	25.44	-52.95	213	4.19
Cost par sold share (in %): $UND_{i,v}$	40.87	14.65	81.76	-109.20	618.22	3.02
Wealth loose by old share: $Wl_{i,Nr0}$	1.15	0.26	2.91	-8.47	24.60	3.68
Cost for the insiders (in M$): $C_{Insiders}$	10,603	724	31,661	-30,242	247,593	4,72
Cost for the institutional (in M$): $C_{Institutional}$	2,915	0	10,068	-18,589	93,879	5.41
Cost for the insiders as a proportion of their portfolio before IPO: $c_{Insiders}$	10.49	3.65	25.56	-52.95	213	4.11
Cost for the institutional as a proportion of their portfolio before IPO: $c_{Institutional}$	11.24	4.89	25.14	-52.95	203	3.45
Money left on the table (in M€): CT_i	16,657	1,688	42,952	-34,200	295,000	3,71
Participation ratio in the IPO for insiders (in %): $PR_{Insiders}$	1.55	0.00	3.98	0.00	29.79	3.38
Dilution factor (in %): $DF_{Insiders}$	41.64	34.08	30.84	5.62	302.30	3.29

Table 8: Daily returns for the seven after market days

This table represents average daily returns observed for the EURO NM and NASDAQ sample during the seven aftermarket days. The daily returns are calculated according the equation (2) for the seven days. The wealth relative return is computed according to the Aggarwal, *et al.* (1993) method. The panel A.2 and B.2 indicate the results for the underpriced IPOs for both samples. The panel A.3 and B.3 indicate results for the overpriced IPOs. The t-statistic is a test to difference from zero, it's compared to a Student's *t* distribution with N-1 degrees of freedom. α, β and γ respectively indicate the significant level of the 10%, 5% and 1%.

Panel A. Average daily return (in %): EURO NM sample								
***Panel A.1. Average daily return (in %): All EURO NM sample* (*N*=277)**								
Time	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Skew**	**t-stat**	**Daily Wealth Relative**
1st day	43.99	19.32	77.07	77.07	-23.31	3.92	9.50^{γ}	1.44
2nd day	-0.46	-1.65	9.49	9.49	-46.40	1.16	-0.81	1.00
3rd day	0.02	-0.87	7.30	7.30	-22.15	1.57	0.05	1.00
4th day	-0.11	-0.95	6.49	6.49	-14.37	1.94	-0.29	1.00
5th day	0.01	-0.50	6.57	6.57	-17.12	1.78	0.02	1.00
6th day	0.56	-0.44	7.06	7.06	-15.75	2.36	1.32	1.01
7th day	0.49	-0.74	6.51	6.51	-15.95	20.30	1.25	1.00
***Panel A.2. Average daily return (in %): Underpriced IPOs* (*N*=216)**								
Time	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Skew**	**t-stat**	**Daily Wealth Relative**
1st day	57.74	28.94	82.19	0.10	688.84	3.71	10.33^{γ}	1.58
2nd day	-0.70	-1.89	9.69	-46.40	50.66	0.71	-1.06	0.99
3rd day	0.41	-0.70	7.92	-22.15	38.72	1.48	0.76	1.00
4th day	0.09	-0.94	7.08	-14.37	34.39	1.86	0.20	1.00
5th day	0.24	-0.41	7.26	-17.12	31.31	1.61	0.48	1.00
6th day	0.99	-0.23	7.53	-15.75	50.39	2.26	1.93	1.01
7th day	0.47	-0.75	6.69	-15.95	35.59	1.99	1.02	1.00
***Panel A.3. Average daily return (in %): Overrpriced IPOs* (*N*=61)**								
Time	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Skew**	**t-stat**	**Daily Wealth Relative**
1st day	-4.72	-3.16	4.85	-23.31	-0.03	-1.88	-7.60	0.95
2nd day	0.37	-0.97	8.74	-11.47	46.63	3.52	0.33	1.00
3rd day	-1.35	-1.59	4.26	-11.90	11.69	0.10	-2.47	0.99
4th day	-0.84	-0.97	3.66	-9.32	8.45	0.04	-1.80	0.99
5th day	-0.82	-0.78	3.00	-7.91	9.06	0.47	-2.13	0.99
6th day	-0.96	-1.30	4.84	-15.09	24.51	2.05	-1.56	0.99
7th day	0.67	-0.59	5.88	-8.44	26.34	2.28	0.75	1.01
Panel B. Average daily return (in %): NASDAQ sample								
***Panel B.1. Average daily return (in %): All NASDAQ sample* (*N*=277)**								
Time	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Skew**	**t-stat**	**Daily Wealth Relative**
1st day	30.57	9.86	61.32	-55.29	470.39	3.22	8.30^{γ}	1.31
2nd day	0.31	-0.46	10.13	-35.76	72.65	1.77	0.51	1.00
3rd day	0.09	-0.54	7.38	-31.52	29.00	0.72	0.21	1.00
4th day	-0.37	-0.64	7.35	-27.73	35.39	0.60	-0.85	1.00
5th day	-0.52	-0.62	7.03	-26.65	46.33	0.93	-1.24	0.99
6th day	-0.55	-0.79	6.43	-17.73	48.33	1.80	-1.42	0.99
7th day	-0.08	-0.80	5.93	-17.26	29.60	1.10	-0.21	1.00
***Panel B.2. Average daily return (in %): Underpriced IPOs* (*N*=214)**								
Time	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Skew**	**t-stat**	**Daily Wealth Relative**
1st day	42.85	19.55	64.49	0.10	470.39	3.11	9.72^{γ}	1.43
2nd day	0.66	-0.19	11.06	-35.76	72.65	1.66	0.87	1.01
3rd day	-0.02	-0.62	7.41	-31.52	29.00	0.70	-0.03	1.00
4th day	-0.11	-0.48	7.45	-25.08	35.39	0.82	-0.021	1.00
5th day	-0.33	-0.47	7.35	-26.65	46.33	1.05	-0.65	1.000
6th day	-0.35	-0.39	5.80	-17.73	48.33	0.43	-0.88	1.000
7th day	0.25	-0.61	6.19	-16.13	29.60	1.12	0.59	1.000
***Panel B.3. Average daily return (in %): Overpriced IPOs* (*N*=63)**								
Time	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Skew**	**t-stat**	**Daily Wealth Relative**
1st day	-11.12	-5.78	12.75	-55.29	-0.03	-1.67	-6.93	0.89
2nd day	0.86	-1.03	5.94	-12.87	23.60	0.99	-1.15	0.99
3rd day	0.46	0.13	7.33	-18.64	28.16	0.79	0.50	1.00
4th day	-1.28	-1.56	6.98	-27.73	19.93	-0.35	-1.46	0.99
5th day	-1.20	-0.66	5.82	-16.34	13.96	-0.14	-1.63	0.99
6th day	-1.22	-2.05	8.25	-13.65	48.33	3.50	-1.18	0.99
7th day	-1.17	-0.94	4.82	-17.26	18.04	0.56	-1.93	0.99

Table 9: Market adjusted returns from the first day up to the 21st day (after four weeks) after the beginning of negotiations in the Euro.NM sample

MAR_i represents the market adjusted return for the company *i*, calculated according to the equation 2, $LOGMAR_i$ is a logarithmic transformation of MAR_i. α, β and γ respectively indicate the significant level of the 10%, 5% and 1%.

	Average return in* (%)	Median	St. Dev.	Min	Max	Skew.	t-stat.
All EURO NM sample	49.67 (1.07)	17.42	83.06	-48.47	492.44	1.92	9.95^{γ}
Underpriced IPO	66.65 (3.91)	34.69	86.12	-40.81	492.44	1.73	11.38^{γ}
Overpriced IPO	-10.47 (-8.97^{γ})	-13.05	21.01	-48.47	96.28	2.17	-3.89^{γ}

* The values in brackets present the adjusted returns between the end of the first day and the fourth week after floatation (20 days). The returns have been calculated using the ask price on the first day and the bid price on the 20th day. The t-statistic is a test of the difference in relation to zero; it's to be compared with a student law with *N*-1 degrees of freedom. *g* indicates the significant level of the bilateral test-statistic threshold of 1 %

Table 10: Multivariate analysis of the underpricing

MAR_i represents the market adjusted return for the company *i*, calculated according to the equation 2, $LOGMAR_i$ is a logarithmic transformation of MAR_i. α, β and γ respectively indicate the significant level of the 10%, 5% and 1%.

Panel A. Regression result for the EURO NM sample

	Dependent variable			
	MAR_i		***$LOGMAR_i$***	
Independent variables	**Coefficients**	**p-value**	**Coefficients**	**p-value**
Shares owned by the majority shareholders	0.387	0.110	0.145	0.219
Shares owned by the old shareholders	0.352	0.241	0.232	0.104
Shares owned by the Top 5 shareholders	0.452^{α}	0.090	0.266^{β}	0.043
Shares owned by the Top 20 shareholders	0.488^{α}	0.090	0.309^{β}	0.030
Shares owned by the insiders	0.316	0.131	0.202^{β}	0.043
Shares owned by the institutional	-0.064	0.824	-0.035	0.800
Herfindhal index of the majority shareholders	0.512	0.120	0.192	0.229
Herfindhal index of the top 5 shareholders	0.538^{α}	0.090	0.212	0.173
Herfindhal index of the top 20 shareholders	0.546^{α}	0.090	0.216	0.168

Panel B. Regression result for the NASDAQ sample

	Dependent variable			
	MAR_i		***$LOGMAR_i$***	
Independent variables	**Coefficients**	**p-value**	**Coefficients**	**p-value**
Shares owned by the majority shareholders	0.120	0.566	0.073	0.540
Shares owned by the old shareholders	0.602^{γ}	0.009	0.349^{γ}	0.007
Shares owned by the Top 5 shareholders	0.482^{β}	0.036	0.275^{β}	0.034
Shares owned by the Top 20 shareholders	0.598^{γ}	0.009	0.346^{γ}	0.008
Shares owned by the insiders	0.387^{γ}	0.041	0.183^{α}	0.087
Shares owned by the institutional	0.135	0.586	0.131	0.348
Herfindhal index of the majority shareholders	0.379	0.181	2.090	0.190
Herfindhal index of the top 5 shareholders	0.366	0.194	0.201	0.206
Herfindhal index of the top 20 shareholders	0.378	0.181	0.209	0.192

Table 11: Multivariate analysis of the underpricing

Dependant Variable: logarithm of the market adjusted return [$LOG(1 + MAR_i)$] The statistic *t* is indicated in brackets: α, β and γ respectively indicate the significant levels of 10 %, 5 % and 1 %.

Dependent variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Intercept	-0.139	-0.173	-0.189	-0.263
	(-2.050^{β})	(-2.654^{γ})	(-2.829^{γ})	(-3.115^{γ})
Risk	2.811	3.614	3.619	3.225
	(8.959^{γ})	(10.729^{γ})	(10.711^{γ})	(8.900^{γ})
Shares hold by the shareholders	0.326	0.158	3.609	0.162
	(3.715^{γ})	(1.783^{α})	(10.745^{γ})	(1.777^{α})
Dilution factor	-0.115	-0.105	0.171	-0.086
	(-2.102^{β})	(-1.991^{β})	(1.912^{β})	(-1.584)
Participation ratio	0.769		0.286	0.3070
	(3.099^{γ})		(1.19)	(1.174)
Dummy variable = 1 if EURO NM IPO		0.207	0.194	0.179
= 0 if NASDAQ IPO		(6.408^{γ})	(5.673^{γ})	(5.190^{γ})
Dummy variable: SIC_1				0.0398
				(0.521)
Dummy variable: SIC_2				0.120
				(1.776^{α})
Dummy variable: SIC_3				0.175
				(3.158^{γ})
Dummy variable: SIC_4				0.081
				(1.024)
Dummy variable: SIC_5				0.085
				(0.129)
Dummy variable: SIC_6				0.117
				(2.097^{β})
Diagnostics				
Adjusted R^2	0.153	0.198	0.199	0.208
F – statistic	(25.995^{γ})	(35.188^{γ})	(28.414^{γ})	(14.232^{γ})
P – value	0.000	0.000	0.000	0.000

Table 12: Multivariate analysis of the underpricing with interaction variables

Dependant Variable: logarithm of the market adjusted return [$LOG(1 + MAR_i)$] The statistic *t* is indicated in brackets: α, β and γ respectively indicate the significant levels of 10 %, 5 % and 1 %.

Dependent variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
Intercept	-0.234	-0.173	-0.161	-0.247	-0.242	-0.165	-0.244
	(-4.053$^{\gamma}$)	(-2.654$^{\gamma}$)	(-2.406$^{\gamma}$)	(-4.227$^{\gamma}$)	(-4.129$^{\gamma}$)	(-0.414$^{\gamma}$)	(-2.821$^{\gamma}$)
Risk	3.624	3.614	3.609	3.629	3.617	3.598	3.221
	(10.731$^{\gamma}$)	(10.729$^{\gamma}$)	(10.711$^{\gamma}$)	(10.754$^{\gamma}$)	(10.723$^{\gamma}$)	(10.693$^{\gamma}$)	(8.891$^{\gamma}$)
Shares hold by the shareholders	0.188	0.158	3.609	3.629	3.617	0.183	0.174
	(2.140$^{\beta}$)	(1.783$^{\alpha}$)	(10.711$^{\gamma}$)	(10.754$^{\gamma}$)	(10.723$^{\gamma}$)	(2.044$^{\beta}$)	(1.905$^{\beta}$)
Dilution factor		-0.105	-0.137			-0.141	-0.121
		(-1.991$^{\beta}$)	(-2.155$^{\beta}$)			(-2.206$^{\beta}$)	(-1.844$^{\alpha}$)
INT-DIL			0.1010			-0.131	0.0959
			(-0.899)			(-0.131)	(0.847)
Participation ratio				0.353	-0.228	-0.372	-0.352
				(1.389)	(-0.466)	(-0.757)	(-0.710)
INT-PART					0.795	0.924	0.914
					(1.391)	(1.607$^{\alpha}$)	(1.594)
Dummy variable = 1 if EURO NM IPO	0.214	0.207	0.171	0.198	0.175	0.120	0.118
= 0 if NASDAQ IPO	(6.666$^{\gamma}$)	(6.408$^{\gamma}$)	(3.339$^{\gamma}$)	(5.782$^{\gamma}$)	(4.604$^{\gamma}$)	(2.091$^{\beta}$)	(2.062$^{\beta}$)
Dummy variable: SIC_1							0.036
							(0.471)
Dummy variable: SIC_2							0.120
							(1.778$^{\beta}$)
Dummy variable: SIC_3							0.171
							(3.081$^{\gamma}$)
Dummy variable: SIC_4							0.0879
							(1.106)
Dummy variable: SIC_5							0.085
							(1.520)
Dummy variable: SIC_6							0.116
							(2.068$^{\beta}$)
Diagnostics							
Adjusted R^2	0.194	0.198	0.198	0.195	0.197	0.201	0.210
F – statistic	(45.352$^{\gamma}$)	(35.188$^{\gamma}$)	(28.302$^{\gamma}$)	(34.554$^{\gamma}$)	(28.077$^{\gamma}$)	(20.856$^{\gamma}$)	(12.292$^{\gamma}$)
P – value	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 13: Univariate analysis of the liquidity

This table represents the results for the regressions of the independent variables carried on the liquidity measures. The trading turnover is the average, over a period of sixty days, of the relationship between the volume of negotiations and the number of listed shares, according to the equation 8. The Bid-Ask spread has been calculated according to the equation 9; α, β, and γ respectively indicate the significant levels of the 10 %, 5 % and 1 %.

	Dependent variable			
	Trading turnover		**Trading turnover**	
Independent variables	**Intercept**	**Coefficient**	**Intercept**	**Coefficient**
Shares hold by the majority shareholder	0.0140	-0.0057	0.0230	-0.0011
	(9.677$^{\gamma}$)	(1.530)	(20.088$^{\gamma}$)	(-0.365)
Shares hold by the old shareholders	0.0194	-0.0113	0.0199	0.0041
	(6.467$^{\gamma}$)	(-2.503$^{\gamma}$)	(8.383$^{\gamma}$)	(1.164)
Shares hold by the Top 5 shareholders	0.0166	-0.0076	0.0240	-0.0024
	(6.469$^{\gamma}$)	(-1.817$^{\alpha}$)	(11.882$^{\gamma}$)	(-0.729)
Shares hold by the Top 20 shareholders	0.0178	-0.0090	0.0220	0.0009
	(6.182$^{\gamma}$)	(-2.036$^{\beta}$)	(9.689$^{\gamma}$)	(0.262)
Shares hold by the insiders	0.0131	-0.0019	0.0240	-0.0028
	(7.330$^{\gamma}$)	(0.613)	(17.160$^{\gamma}$)	(-1.116)
Shares hold by the institutional	0.0123	-0.0016	0.0221	0.0048
	(14.416$^{\gamma}$)	(-0.371)	(39.139$^{\gamma}$)	(1.416)
Herfindhal index for the old shareholders	0.0138	-0.0089	0.0224	0.0011
	(11.605$^{\gamma}$)	(-1.70$^{\alpha}$)	(23.867$^{\gamma}$)	(0.275)
Herfindhal index for the Top 5 shareholders	0.0135	-0.0079	0.0226	-0.003
	(11.745$^{\gamma}$)	(-1.599)	(24.599$^{\gamma}$)	(0.067)
Herfindhal index for the Top 20 shareholders	0.0136	-0.0081	0.0226	-0.0001
	(11.669$^{\gamma}$)	(0.106)	(24.599$^{\gamma}$)	(-0.029)

Table 14: The Trading Volume in the Euro.NM and the Nasdaq samples between 1997 and 1999

This table represents the trading turnover and the price spread after the IPO for our sample of 277 operations carried out between 1997 and 1999 in the different segments of the Euro NM and the equivalent operations carried out in the Nasdaq during the same period (the price spread is not available with Datastream for the Nasdaq sample).The trading turnover is defined by the total number of negotiations divided by the number of listed shares. The price spread is defined by the difference between the daily price and the closing price. Bid and Ask divided by the middle of the Bid-Ask value. The t-statistic test (*a*) is the test of the difference between the daily trading volume (or the bid-ask spread) of an observed day and the previous day. The t-statistic (*b*) is the test of the difference between the daily volume of the underpriced and overpriced IPO. They are to be compared with a student distribution with N_1+N_2-2 degrees of freedom. We also show the number of securities exchanged over different short-term periods. These tests are significant at the 10 %, 5 % and 1 % level, respectively the α, β and γ estimators.

Panel A. Daily volume (in 000) as percentage of IPO: EURO NM sample

Volume	EURO NM sample (N=277) 3,225,641 shares			Underpriced IPO (N=216) 2,657,234 shares			Overpriced IPO (N=61) 568,407 shares			
Days (*after IPO*)	Shares	Trading Turnover		Shares	Trading Turnover		Shares	Trading Turnover		
		Mean (%)	t-test[a]		Mean (%)	t-test[a]		Mean (%)	t-test[a]	t-test[b]
1	963,756	30.68		867,493	34.28		96,263	17.93		2.71^{γ}
2	298,765	9.95	10.61^{γ}	267,224	10.90	10.29^{γ}	31,541	6.57	3.49^{γ}	2.69^{γ}
3	160,654	5.65	5.53^{γ}	145,766	6.26	3.46^{γ}	14,888	3.47	1.75^{α}	3.22^{γ}
4	117,823	4.14	3.11^{γ}	108,346	4.72	2.76^{γ}	9,477	2.09	1.61	3.19^{γ}
5	99,339	2.23	2.45^{β}	91,737	3.67	2.40^{γ}	7,602	1.68	0.74	2.98^{γ}
6	85,212	3.01	0.62	75,794	3.27	1.05	9,418	2.11	-0.52	2.44^{β}
7	75,006	2.72	0.78	64,806	2.86	1.11	10,200	2.24	-0.13	1.77^{α}
10	62,991	2.02	0.86	56,154	2.25	1.03	6,837	1.21	-0.45	1.77^{α}
15	47,270	1.45	-0.52	40,153	1.52	-0.27	7,117	1.18	-0.75	1.01
21	36,729	1.24	0.98	32,945	1.42	0.75	3,784	0.63	1.36	2.13^{β}
30	29,443	0.92	0.02	27,365	1.06	-0.06	2,078	0.43	0.32	2.78^{γ}
40	26,617	0.79	1.33	23,379	0.83	1.33	3,238	0.65	0.27	1.64
50	38,576	0.98	-0.67	34,258	1.07	-0.94	4,318	0.65	0.48	1.02
60	23,899	0.84	-1.45	21,646	0.95	-1.42	2,253	0.44	-0.35	2.38^{β}

Panel B. Daily volume (in 000) as percentage of IPO: NASDAQ sample

Volume	NASDAQ sample (N=277) 4,623,171 shares			Underpriced IPO (N=214) 3,934,807 shares			Overpriced IPO (N=63) 688,364 shares			
Days (*after IPO*)	Shares	Trading Turnover		Shares	Trading Turnover		Shares	Trading Turnover		
		Mean (%)	t-test[a]		Mean (%)	t-test[a]		Mean (%)	t-test[a]	t-test[b]
1	1,224,772	25;94		1,039,781	27.12		184,991	21.93		1.87^{α}
2	323,386	6;56	11.94^{γ}	286,123	7.19	10.63^{γ}	37,263	4.46	5.50^{γ}	2.08^{β}
3	191,371	3;54	5.40^{γ}	167,985	3.70	5.08^{γ}	23,386	2.98	1.99^{β}	1.38
4	137,024	2.91	1.82^{α}	119,279	3.09	1.46	17,745	2.30	1.32	1.82^{α}
5	127,995	2.90	0.02	113,519	3.21	-0.18	14,476	1.83	1.12	2.04^{β}
6	104,907	2.41	0.83	86,253	2.51	0.96	18,654	2.07	-0.37	0.96
7	103,931	2.24	0.40	85,036	2.24	0.56	18,017	2.25	-0.19	0.82
10	78,474	2.16	-1.20	60,457	2.02	-0.79	18,017	2.63	-0.97	-0.03
15	66,554	1.54	0.43	59,647	1.70	0.34	6,907	1.00	0.57	2.15^{β}
21	80,243	1.78	0.81	67,551	1.87	0.61	12,692	1.51	0.74	0.94
30	51,575	1.09	0.91	43,518	1.10	0.82	8,057	1.03	0.42	1.20
40	48,637	1.04	1.26	40,556	1.06	0.99	8,081	0.99	0.87	1.08
50	52,081	1.11	-0.49	43,929	1.13	1.06	8,152	1.06	-0.56	1.34
60	50,372	0.93	0.54	44,029	0.94	0.89	6,343	0.89	-0.57	1.31

Panel C. Bid-Ask spread for the EURO NM IPOs sample

Days (*after IPO*)	EURO NM sample		Underpriced IPO (N=216)		Overpriced IPO (N=61)	
	Bid-Ask spread (%)		Bid-Ask spread (%)		Bid-Ask spread (%)	
	Mean	t-test[a]	Mean	t-test[a]	Mean	t-test[a]
1	1.94		1.99		1.78	
2	2.14	1.12	2.22	1.10	1.85	0.28
3	1.81	-2.01	1.73	-2.58	2.09	0.74
4	1.95	0.98	1.91	1.13	2.08	-0.03
5	1.97	0.18	1.98	0.41	1.96	-0.41
6	1.94	-0.22	1.90	-0.46	2.09	0.43
7	2.17	1.49	2.10	1.15	2.40	1.03
10	2.10	0.82	1.96	-0.47	2.60	2.50^{β}
15	2.04	-0.43	1.82	-1.11	2.82	0.68
21	2.06	0.20	2.06	1.17	2.05	-1.49
30	2.26	1.27	2.26	13.09	2.28	-0.19
40	2.21	-0.27	1.98	-0.84	3.04	0.63
50	2.47	0.21	2.35	0.54	2.88	-0.39
60	2.51	0.02	2.39	0.34	2.94	-0.44

Table 15: Multivariate models with the Bid-Ask Spread as an independent variable

This table shows the results of the linear regression of the Bid-Ask spread, calculated over a period from the 5th day up to the 60th day after the IPO date. These regressions have been based on the following equation:

$$BIDASK_i = \alpha + \beta_1 LN(MAR_i) + \beta_2 LN(TVOLUME_i) + \beta_3 LN(RISK_i) + \Sigma b_j BVSIC_{i,j} + e_i$$

Where MAR_i represents the IPO market adjusted return; $Risk_i$ is the volatility of the security price determined by the logarithm of the ratio: High price/low price for the day *i*, the average for the first 20 days; $INVGP_i$ is the inverse of the Gross Proceeds; $CRET_i$ is the part of the capital retained by the original shareholders; $FDEL_i$ is the dilution factor, the relationship between the number of new securities proposed in the operation and the number of securities existing before the listing; $PART_i$ is the ratio of insiders' participation in the operation (the number of shares sold / the number of shares retained by the insiders); $VBSIC_{i,j}$ are the binary variables, used to control the effect of the correspondent industrial sector, such as they are listed in table 2.

Day	Intercept	Bid price	Volume	Risk	Dummy MAR_i	Adj. R^2	F – statistic
1	0.0136 (0.420)	-0.0096 (-1.889$^{\alpha}$)	0.0085 (3.820$^{\gamma}$)	0.3140 (6.767$^{\gamma}$)	-0.0257 (-2.502$^{\gamma}$)	0.289	28.938$^{\gamma}$
2	0.0509 (1.455)	-0.0077 (-1.425)	0.0063 (2.382$^{\gamma}$)	0.327 (4.367$^{\gamma}$)	-0.0076 (-0.689)	0.136	11.736$^{\gamma}$
3	0.0197 (0.642)	0.0066 (1.317)	0.0078 (3.307$^{\gamma}$)	0.119 (1.728$^{\alpha}$)	-0.0292 (-2.867$^{\gamma}$)	0.073	6.373$^{\gamma}$
4	0.0 (1.602)	-0.0030 (-0.632)	0.008 (3.823$^{\gamma}$)	0.247 (2.770$^{\gamma}$)	-0.0271 (-2.862$^{\gamma}$)	0.118	10.184$^{\gamma}$
5	0.0926 (3.446$^{\gamma}$)	-0.0082 (-1.715$^{\alpha}$)	0.0044 (2.082$^{\gamma}$)	0.262 (2.976$^{\gamma}$)	-0.0116 (-1.231)	0.066	5.871$^{\gamma}$

Table 16: Multivariate models with the trading turnover as an explanative variable

This table represents the results of the linear regression of the trading turnover, defined by the average of the daily volume of negotiations, that is to say, the percentage of the volume transferred in relation to the number of listed shares. The average of the trading turnover has been calculated over a period from the 5th day up to the 60th day after the IPO date. These regressions have been based on the following equation:

$$BIDASK_i = \alpha + \beta_1 LN(MAR_i) + \beta_2 LN(TVOLUME_i) + \beta_3 LN(RISK_i) + \Sigma b_j BVSIC_{i,j} + e_i$$

Where MAR_i represents the IPO market adjusted return; $Risk_i$ is the volatility of the security price determined by the logarithm of the ratio: High price/low price for the day *i*, the average for the first 20 days; $INVGP_i$ is the inverse of the Gross Proceeds; $CRET_i$ is the part of the capital retained by the original shareholders; $FDEL_i$ is the dilution factor, the relationship between the number of new securities proposed in the operation and the number of securities existing before the listing; $PART_i$ is the ratio of insiders' participation in the operation (the number of shares sold / the number of shares retained by the insiders); $VBSIC_{i,j}$ are the binary variables, used to control the effect of the correspondent industrial sector, such as they are listed in table 2.

Results	**First model**		**Second model**	
Variables	**Coefficient**	***p-value***	**Coefficient**	***p-value***
Intercept	0.0249	0.000$^{\gamma}$	0.0227	0.000$^{\gamma}$
MAR	-0.0041	0.002$^{\gamma}$	-0.0043	0.007$^{\gamma}$
Risk	0.0036	0.000$^{\gamma}$	0.0034	0.000$^{\gamma}$
TVOLUME	-0.0022	0.001$^{\gamma}$	-0.0022	0.001$^{\gamma}$
Binary variable: SIC_1				0.308
Binary variable: SIC_2				0.324
Binary variable: SIC_3				0.145
Binary variable: SIC_4				0.504
Binary variable: SIC_5				0.632
Binary variable: SIC_6				0.690
Diagnostics				
R^2 *adjusted*	0.065		0.059	
F-statistic	7.306	0.000$^{\gamma}$	2.902	0.003$^{\gamma}$

Table 17. Pearson's Matrix correlation

	MAR	**Risk**	**Gross proceeds**	**Part of capital retained**	**Dilution factor**	**Participation ratio**
MAR	1.000					
Risk	0.294	1.000				
Gross proceeds	-0.112	-0.309	1.000			
Part of capital retained	0.131	-0.033	-0.060	1.000		
Dilution factor	-0.104	0.049	0.074	-0.210	1.000	
Participation ratio	0.061	-0.184	-0.074	0.013	-0.177	1.000