The French Initial Public Offering market and the role of Venture Capitalists

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Declaration

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Abstract

The general objective of this thesis is to improve the understanding of how specific characteristics of Venture Capital (VC) backing explain the economics of the Initial Public Offering (IPO) market. We choose to carry our analysis on the French market in order to expand the European evidence, which is still relatively scarce compared to the US one, but also because the French VC market is one of the most active markets in Europe. Within this setting one of our principal objectives is to check the validity of previously documented characteristics of VC-IPO backing but also to test some novel ones. Thus we distinguish between different types of VC funding, namely: Early-stage funding, Development funding, and the funding of Management buy-outs and buy-ins (MBO/MBI), and investigate, to our knowledge for the first time, the impact of VC specialisation on the performance of IPOs. Our second main objective is to provide an alternative investigation of the long researched and still controversial issue of VCs' certification, by looking, again for the first time, at the association between the presence of VCs and the quality of IPO prospectus forecasts. Finally, we provide the first analysis for France of the determinants of the lock-up choice and the performance of IPOs at lock-up expiry, placing emphasis on trying to establish the virtue or otherwise of VC backing.

First, we find that IPOs with a potential conflict of interest between sponsors with an affiliated VC and investors are associated with more underpricing. We argue that the latter may be evidence that the market fears the opportunistic behaviour of affiliated sponsors and as a result requires greater compensation to take shares of those firms. However, there is no evidence in our data that those IPOs issue more opportunistic forecasts or that their stock market performance is worse than other IPOs over the long-run.

Second, we uncover substantial differences between the characteristics of VC backing at IPO time as a function of the type of funding received. MBO/MBI and Early-stage-IPOs both have substantial degrees of VC involvement but only the former are associated with lower underpricing. It could be that the positive effect on investors' sentiment of good monitoring for Early-stage-VC-IPOs is offset by the negative adverse selection effect identified in the literature. In line with the idea that investors may be concerned by adverse selection issues in Early-stage-VC-IPOs we find a large price drop at the first lock-up expiry of those IPOs where VCs are unlocked. However, in the long-run we find no evidence that Early-stage-VC-IPOs perform worse on average.

The evidence of lower underpricing for MBO/MBI-IPOs is not the only finding that tends to suggest that deeper VC involvement matters. When VCs have a blocking minority interest we find that the prospectus forecast displays more prudence.

Although not associated with less underpricing, we find that the reputation of VC backers may also proxy for the better certification ability of VCs since the latter back firms that tend to issue more accurate forecasts. In contrast, IPOs backed by low reputation, less experienced, VCs who may be keen to build a reputation for bringing firms to the market are found to issue less accurate forecasts.

Finally, we also show that the presence of VCs or rather VC sub-groups is not the only characteristic of the capital and ownership structure of IPO firms at work. For instance, we report that managing shareholders are more likely to enter a discretionary lock-up agreement when their shareholding is going to be substantially diluted as a result of the IPO. Moreover, in the long-run there is evidence that the performance of IPOs increases with the post-IPO shareholding of entrepreneurs. To counterbalance the latter, however, we also find that more specialisation by VC backers improves long-term performance. If specialised VCs are able to make better investment decisions and monitor portfolio firms more effectively, our evidence suggests that this is not anticipated by the market at IPO time since the IPOs of specialist VCs are not associated with less underpricing.

Introduction

It has been shown both theoretically and empirically that the presence of Venture Capitalists (VCs) in the shareholding of a firm is an important factor to consider when trying to understand the economics of the market for Initial Public Offerings (IPOs). Although a heavily researched area, we have tried to improve the understanding of how specific characteristics of venture capital backing help to explain how the IPO market works. The analysis is carried out on the French *Nouveau* and *Second Marché*. We were eager to conduct this analysis on the French market not only because most of the academic evidence on the association between VC and IPO performance is non-European but also, and most importantly, because the French market is one of the most active venture capital markets in Europe (AFIC, 2003).

In the US venture capital is defined as a means of investing in high-growth, high-risk firms to finance their product development or growth (Black and Gilson, 1999). It is a subset of Private Equity, which refers to the provision by outsiders of equity capital to unquoted companies. However, in the UK, Continental Europe and much of the world, venture capital and private equity are used interchangeably. In this thesis we refer to VC investments not only for investments made at an early stage in the life a firm, but also for later investment stages such as for the financing of management buy-outs and buy-ins.

VCs are active investors who not only select firms but also monitor their performance. Furthermore, they are believed to ease access to capital, and provide management support and advice. Their intervention seems to be linked with substantial economic gains. For instance, in France, Battini (2001) reports findings from a study by Coopers and Lybrand showing that over a five year period the rate of sales growth was seven times higher for firms that received some venture capital backing than for those that did not. Also, over the same period of time, exports of VC-backed firms were found to have been more than five times greater than their non-VC counterparts. Still further, investments were found to be five times greater in the VC-backed sample than in the non-VC-backed one. The presence of VCs seems to have had some positive impact in terms

of employment levels as well. Indeed, VC-backed firms continued to create more jobs while non-VC firms generated redundancies. Finally, the average profitability of VC firms, over the five years period of the study, was higher than that of non-VC firms. If VCs get involved in their portfolio firms it is because their returns directly depend on the growth and profitability of the investee company. The venture capital fund after having optimised the growth of its portfolio of firms will eventually want to divest to reap its capital gains. A number of exit routes exist for the venture capitalist at this stage: reselling of shares to firms or management, reselling to a financial or strategic third party or taking the firm to the stock market (an IPO). In this thesis we focus on those venture backed firms that are floated or IPO'd on the French *Second* and *Nouveau Marché*.

An IPO typically marks the attempt by a firm to tap a wider source of capital to finance its activity. It can also provide an opportunity for old shareholders to exit their investment and more generally helps the firm to increase its status and strengthen its bargaining power with clients and creditors. Of course, there is nothing like a free meal and by "going public" the firm that sees its shares traded on a stock exchange becomes in turn subject to the rules of that exchange. Amongst those rules is the requirement of detailed information disclosure that can prove to be an important burden and even deter a potential candidate from going public. Another important indirect cost of going public is the well documented IPO underpricing phenomenon, which refers to the fact that offering prices are found on average to be substantially below their market prices at the end of the first day of trading. Finally, direct costs such as the underwriting fee, auditing fee, stock exchange fee, as well as other miscellaneous offering expenses also contribute significantly to the overall cost of going public.

Despite evidence in Europe that a relatively small fraction of the exits chosen by VCs are made via an IPO (EVCA, 2000), previous American studies have underlined the fact that IPOs, at least in the US, are the most attractive possibility of divestment for venture capitalists (see Gompers (1995), Gompers and Lerner (1997), and Gompers and Lerner (1999[b])) with the firms choosing this exit being typically amongst the most successful ones. The source of benefits from exiting via an IPO for venture capitalists

and entrepreneurs come not only in terms of a potentially greater financial reward but also in terms of reputational gains.

A lot of interest has been shown for the analysis of the association between the presence of VCs and the performance of the IPOs they back. This because VC backing has specific characteristics that can shed further light on the economics of the IPO market. For instance, investing in IPOs just after their flotation has long been seen as a poor long-term investment strategy. However, partly for reasons made explicit earlier it has been suggested that the presence of VCs could be associated with better performing IPOs. It is also argued that the presence of VCs could help explain the IPO underpricing phenomenon. For instance, some authors believe that reputational concerns make VCs credible certifying agents that could reduce problems of information asymmetries and in turn the required first day return. Recent evidence suggests that IPOs experience large price drops and increases in volumes of trades at and around lock-up expiry. The analysis of IPO lock-up expiry is very recent, but yet again VCs have been seen as a source of explanation for the observed phenomenon. Indeed, the large price drop and increase in volumes of trades at lock-up expiry have been linked partly to the requirement for VCs to distribute shares of investee firms to their shareholders with the latter selling them automatically. It is also argued that lock-ups may be needed to reduce information asymmetries. Because of their certification ability VCs are believed to be able to reduce the degree of stringency of the lock-up agreement.

It is not only the mere presence of venture capitalists in the shareholding of a firm that has attracted the attention of academics but also the complexities of the economics of VC backing and their impact on IPOs. For instance, researchers have investigated the impact of potential conflicts of interest between underwriters, which have an affiliated VC backing the firm, and outside investors on the underpricing and long-run performance of VC-IPOs. Other characteristics of VC backing that have been investigated include proxies for VCs' monitoring quality, certification ability, and incentives to reduce underpricing. Such proxies include cash flow and control rights prior and after the IPO, the length of the VC-portfolio firm relationship, VCs' selling intensity at IPO time, the reputation of VC backers, and the syndication of investments. Finally, researchers have

looked at the association between the affiliation of VCs and the performance of the firms they back on the ground that different VC structures may have different abilities, performance objectives and reputational concerns.

Even though France has one of the most active venture capital market in Europe (AFIC, 2003) and saw the creation in 1996 of the *Nouveau Marché*, the market for young high growth firms, the evidence so far regarding the performance of French venture backed IPOs is limited. Therefore, our first objective is to enlarge the international evidence on the performance of VC-IPOs by providing a thorough analysis of the French market. There, we investigate between 1996 and 2000 the underpricing, long-run performance and, to our knowledge, for the first time the performance at lock-up expiry of IPOs. The emphasis being of course on documenting the virtue or otherwise of VC backing.

Secondly, we also attempt to contribute by investigating novel characteristics of VC-IPO backing in France. First, we distinguish between the type of VC funding received. The three types of VC-IPOs we look at are ventures that received funding for a management buy-out and buy-in and those that received what is more traditionally regarded as venture capital, i.e. investments in Early and Development stages. Separating these three types of funding is potentially important since not only the purpose of the funding but also the way VCs select and monitor portfolio firms in each one of them differ significantly. We also show that substantial differences exist between the involvement of VCs in each of the stages as is evidenced by their control and cash flow rights, their level of specialisation and syndication, and finally their affiliation at IPO time. Second, we investigate, to our knowledge, for the first time the impact of VCs specialisation on the performance of IPOs. If major differences exist between types of funding it is reasonable to believe that a VC who decide to specialise in an investment stage and face the greater systematic risk that comes with lower diversification will do so only when it has some specific skills to select and monitor firms in that stage and as a result can reduce its risk. For this reason, we argue that VC specialisation may signal better quality firms.

The third and last objective of the thesis is to provide an additional investigation of the long researched and still controversial issue of VCs' certification. To do so we investigate, again to our knowledge, for the first time, the association between the presence of VCs and the quality of IPO prospectus forecasts. This is an important issue given that information on newly listed firms is scarce as well as evidence on past performance (at least for *Nouveau Marché* IPOs) so that performance forecasts may be particularly valuable to investors. The virtue of analysing the French market is clear in this case since not in all markets, and notoriously the US one, are IPO prospectus forecasts commonly issued. We assert that if VCs certify the quality of the information provided VC-IPO prospectus forecasts should be more accurate and less optimistic. This analysis should provide not only some further evidence on the certification ability of venture capitalists but may also be seen as a more direct way of assessing this ability, since it is the actual information quality that is analysed rather than the usual underpricing of IPO firms.

Before presenting the results of our research the first chapter of this thesis provides a literature review of the main issues that we purport to address. VC backing being a major component of this thesis we first explain some of the main characteristics of their involvement, namely: how they screen their projects, how they get involved in the firms they back, and how they monitor portfolio firms' performance. Although VC backing is central to this thesis we hope ultimately to contribute to the IPO literature. The literature review reflects this objective and provides a detailed description of the different theories as well as empirical findings that have marked this area of Finance. Specifically, the first chapter provides a literature review of three IPO issues addressed in the thesis, namely: the IPO underpricing, the IPO long-run performance, and the IPO performance at lock-up expiry as well as the determinants of the lock-up choice. The setting for the thesis now being in place, the following three chapters are concerned with the hypotheses as well as research findings of the thesis. Chapter 2 deals with the underpricing and long-run performance of VC and non-VC-IPOs. Chapter 3 re-assesses the certification ability of VCs in the context of IPO prospectus forecasts. Chapter 4

provides some evidence for the performance of VC and non-VC-IPOs at and around lock-up expiry, as well as some evidence on the determinants of the lock-up choice.

Finally, we are aware that a number of limitations exist in our work, the most obvious one being the size of our sample. This is in spite of our considerable efforts to maximise it within reasonable time limits. In our favour it should, however, be noted that our research is based on very detailed data. Not only that, most of the data used in this thesis could not be easily accessed and had even sometimes to be gathered through questionnaires and interviews. Data limitations obviously imply that some caution be taken when interpreting our results. For instance, the possibility that our findings be period specific should not be overlooked. This point is particularly important to bear in mind in the context of VC backing that is found to have a strong cyclical element attached to it. Gompers and Lerner (2002), for instance, highlight a process of undershooting and overshooting in terms of the interest for venture capital and influx of funds in the venture capital business.

Chapter 1: Literature Review

Venture capital backing is a central component of the thesis and we start this chapter by reviewing this concept. However, VC backing is analysed in the context of the Initial Public Offering market and it is ultimately in this area that we hope to contribute. Therefore, we also provide a detailed description of the different theories as well as empirical findings that have marked this area of Finance. In section 2 we review the well documented phenomenon of IPO underpricing, in section 3 we look at the IPO long-run performance, and finally in section 4 we provide a review of the theories and empirical findings for the recently documented price and volume behaviour at lock-up expiry and decision to lock-up shares.

1.1 The main characteristics of VC backing

We argue in this thesis that VCs can play a certification role and that their monitoring may add value to the firms they back. As a matter of fact, VC-backed firms have been shown in France to increase staff levels, profits, exports, and investments faster than several indices (Battini, 2001). In order to understand why all this may happen we explain in this Chapter how VCs screen their projects, how they get involved in the firms they back, and how they monitor their performance.

1.1.1 The screening process

1.1.1.1 The initial screening process

Because VCs receive much more deals than they could possibly manage they have to resort to some quick and broad criteria to select those deals that will then be subject to an in-depth evaluation. These criteria respond mainly to the general portfolio strategy followed by the particular VC. The most common ones are described below.

The first commonly used selection criterion is the size of the investment. Given the costs of following up each venture the VC may prefer not to invest in too many small deals. Conversely, too few investments would jeopardise portfolio diversification.

Another important selection criterion is the technology and market sector of the venture. Many VCs choose to invest in areas where they have developed a certain expertise, which facilitates the in-depth evaluation of the firm and the post-investment monitoring.

The stage of development of the venture is also an important selection criterion. Indeed, some VCs specialise in certain types of funding. The following categorisation can be made between each type of funding[1]:

Early stage funding

-Seed: financing provided to research, assess and develop an initial concept before a business has reached the start-up phase;

-Start-up: financing provided to companies for product development and initial marketing; companies may be in the process of being set up or may have been in business for a short time, but have not sold their product commercially;

-Other early stage: financing to companies that have completed the product development stage and require further funds to initiate commercial manufacturing and sales; they will not be generating a profit;

Expansion and Development funding: financing provided for the growth and expansion of a company which is breaking even or trading profitably; capital may be used to finance increased production capacity, market or product development and/or to provide additional working capital;

MBO and MBI:

-Management Buy Out: financing provided to enable current operating management and investors to acquire an existing product line or business;

-Management Buy In: financing provided to enable a manager or group of managers from outside the company to buy-in the company with the support of venture capital investors.

[1] The definitions of each stage come from the European Venture Capital Association (EVCA).

Bridge Finance: financing made available to a company in the period of transition from being privately owned to being publicly quoted.

Turnaround: financing made available to existing businesses that have experienced trading difficulties, with a view to re-establishing prosperity;

Replacement Capital (Secondary purchase): purchase of existing shares in a company from another venture capital investment, organisation, or from another shareholder or shareholders;

Purchase of Quoted Shares: Purchase of shares on a public stock market.

Finally, VCs also take into account the geographical location of the investee firm when deciding to invest or not. The rationale for doing so being that it may be very difficult for a VC to participate in the management of firms which are located far away.

1.1.1.2 The in-depth evaluation or due diligence

The potential investments that went through the initial screening stage are then subject to the due diligence process. During this process the VC reviews all the features and details of the investment in order to decide whether or not to invest, and how and how much to invest. The due diligence process is very important for the VC because from its quality will partly depend the success of the investment. Moreover, the quality of the due diligence process may be one of the factors that institutional investors look at when deciding in which venture partnership to invest. During the due diligence process attention is focused on several areas, the most important ones are described below.

Firstly, The quality of the entrepreneur and the management team (including commitment, drive, honesty, reputation, creativity) are assessed. Amit et al (1990) suggest that if VCs cannot gauge managers' performance before the deal completion they will face a potential adverse selection problem at the time the investment is considered.

Wang et al (2003) argue that as the information asymmetry is more severe for early stage ventures when investors' products and services have not yet been proven, the problem of adverse selection should be more severe for Early-stage-VC backers. Wright and Robbie (1998) also point out that the adverse selection problem may vary with the stage and sector of the investment. For instance, the authors pinpoint that during buy-outs VCs may be guided by incumbent management's experience in post and their knowledge of the business, though management may have an incentive not to reveal full information in an attempt to obtain the most favourable terms. In a buy-in deal, the authors suggest that information asymmetries may occur in relation to the true skills of the management team and the inability to observe them ex ante. Furthermore, Wright and Robbie argue that even in development capital investments it may be difficult to judge whether the entrepreneur's previous performance will continue in the future where his/her equity stake is diluted by the introduction of venture capital.

Other obvious areas that VCs spend time analysing include the characteristics of the product (including price, distribution, assessment of the competitive advantage), the technology to be used and its vulnerability, and finally the market potential.

A team of the VC that will generally include an accountant and a lawyer gathers information. The team will meet several times with the entrepreneurs and the key managers. The team will also contact other employees as well as actual or potential customers, credit agencies, and business associations. It will conduct extensive reference checks, carefully analyse the company business plan and the actual and projected financial statements, examine plant and equipment, etc.

All this process will be very time consuming for the VC. Elango et al (1995) note, however, that earliest stage investors spend much less time (88.80 hours) evaluating a proposal than does a late stage investor (339.77 hours). The authors explain the latter by the fact that there is more information available for the investor to evaluate in late-stage deals, where firms and their industries have longer histories. This difference in the availability of hard evidence depending on the stage of investment make Wright and

Robbie (1998) to suggest that the ability to carry out due diligence may differ between different stages.

Furthermore, Muzyka et al (1996) emphasise that VCs have to make trade-offs between several criteria in their screening process. They actually argue that VCs would prefer to invest in a project which offers a good management team and reasonable financial and product market characteristics, even if the opportunity does not meet the overall fund and deal requirements.

Still further, Wright and Robbie (1996) show that while accounting information is important for deal screening and to arrive at a valuation and a target rate of return, VCs place most emphasis on very detailed scrutiny of all aspects of a business, typically including sensitivity analysis of financial information, discussions with personnel and accessing considerably more information of unpublished and subjective kind.

Finally, Elango et al (1995) and Fried and Hisrich (1991) note that for later stage investments VCs appear to be more concerned by the market acceptance of a product, whereas during early stage investments they seem to be more interested in investment built upon proprietary products, product uniqueness, and high growth markets.

1.1.1.3 The Syndication of Venture Capital Investments

Sah and Stiglitz (1986) show that hierarchical organisations where investments are made only if several independent observers agree may be superior to ones where projects are funded after one affirmative decision. Thus, Lerner (1994[a]), amongst other, suggests that another VC's willingness to invest may be an important factor in influencing the Lead-VC to invest. In other words, syndication might lead to a superior selection of investments.

Lerner (1994[a]) further argues that if VCs value the opinions of others they should be careful in their choice of first-round syndication partners. If so, established VC firms are unlikely to involve either new funds or small and unsuccessful ones as co-investors. In later rounds, Lerner argues that syndication should become less critical. As expected, Lerner using a sample of 271 US biotechnology firms finds that in the first round, established VCs tend to syndicate with one another whereas later rounds involve less established ventures.

One should note, however, that this is not the only explanation proposed for the tendency of VCs to syndicate. Admati and Pfleiderer (1994) develop a rationale for VC syndication in later rounds that is based on informational asymmetries between initial VC investors and potential new ones. According to the author the only way for new investors to be sure that the VC is not trying to exploit its informational advantage and set an overstated price for the securities of the portfolio firm in the next round of financing is for it to maintain a constant share of the firm's equity. In turn the latter implies that later-round financings must be syndicated.

Yet another explanation for syndication is related to Lakonishok et al (1991) "window dressing" hypothesis. Although the authors developed their hypothesis in the context of pension funds, it could also be applied to the VC case. VC may want to make investments in the late rounds of promising firms even if financial returns are low in order to represent themselves in marketing documents as investors in these firms. Lerner (1994[a]) argues that if early VC investors curry favour with their colleagues it must be in the hope that the syndication partner will reciprocate in the future. The latter also suggests that VCs should offer shares in the best deals to established VCs since they are most likely to be able to reciprocate.

Lerner (1994[a]) finds in line with the "window dressing" hypothesis that when established funds join as new investors in later rounds, the firm's valuation has often increased sharply prior to the investment. Evidence consistent with Admati and Pfleiderer's constant share hypothesis is also presented.

Finally, another explanation relates syndication to the attempts by VCs to reduce their risk via risk sharing. Gompers and Lerner (1996) note that many contracts establishing VC partnerships prohibit investing in other funds. However, by investing in many syndicated investments VCs can achieve much the same effect.

1.1.2 The involvement of VCs and the monitoring of performance

1.1.2.1 The impact of VCs beyond the provision of funds

Venture capitalists are expected to provide more than just financing to their portfolio firms. For instance, a non-financial advantage of VC backing is their ability to provide managerial assistance to their portfolio firms. This ability comes from their

extended experience of particular industries. For instance, they can assist the portfolio firms in recruiting valuable managers and technical personnel. The reputation of venture capitalists can also be seen as a valuable asset for portfolio firms. Indeed, the reputation of VCs can be thought to enhance the credibility of portfolio companies with third parties. As a matter of fact, the presence of venture capitalists is commonly believed to provide an early signal about the future performance of a company. For instance, it is expected that talented managers are more likely to work for a venture backed company. Furthermore, because of the credibility of venture capitalists' monitoring, suppliers will be more willing to risk committing capacity and extending trade credit to venture backed companies. For the same reason, customers as well will be more inclined to deal with venture backed firms since they will put more weight on promises of future product delivery.

It seems logical to believe that the monitoring and counselling needs of portfolio firms should depend on the investment stage. Very young organisations being less developed should require more non-financial resources (such as business assistance), so that the VCs may need to be more involved in the operations of early stage ventures than later stage ones. For instance, Rosenstein et al (1993) found VCs to be more involved in negotiating employment contracts, contacting potential vendors, evaluating product/market opportunities, formulating and evaluating marketing plans, and contacting potential customers when the investment was early stage. In the same vein, Sapienza and Timmons (1989) found VCs' role as a financier, professional and industry contact to be more important in the early stage than in the late stage. In line with the previous findings, Elango et al (1995) show that the earlier the stage of investment the greater the importance attached by VCs to making introductions to potential customers and suppliers, and assisting with operational planning. However, in contrast to the finding of Gomez-Mejia et al (1990), Gorman and Sahlman (1989), and Sapienza (1992) who found monitoring to be heaviest in early stage ventures, but in line with those of MacMillan et al (1989) who find that the level of VC involvement does not depend on the investment stage but rather on the general style the VC wishes to adopt, Elango et al find no significant difference between the investment stage and the amount of time spent with a portfolio company. Finally, it is interesting to note that Elango et al (1995) report that

VC investing at early stage place more emphasis on evaluating and recruiting management than their later stage counterparts. These findings echo the evidence from Sapienza and Timmons (1989) that early-stage investors are more involved in management recruiting. According to Elango et al, although all VCs want high quality management, early-stage-VCs expect more problems with management, hence the high importance they attach to evaluating management after the investment is made.

1.1.2.2 VC financing contracts and the implementation of control mechanisms

VC financing enables VCs to separately allocate cash flow rights, voting rights, board rights, liquidation rights, and other control rights. Kaplan and Stromberg (2003) make a review of some of the important terms and conditions that can be included in the VC financing of young firms. Also, the authors show how these terms and conditions relate to the predictions of financial contracting theories. These theories try to explain how financial contracts solve the conflicts of interest between the investors and the entrepreneurs. According to these theories conflicts of interest between these two parties arise because entrepreneurs have to compensate investors for their funding by giving them a portion of the profits. Because the entrepreneur does not get all the monetary benefit of his/her actions, he or she may try to implement actions that will give him/her some other private benefits. For instance, as a result of conflicts of interest, the entrepreneur may decide not to exert the optimal amount of costly effort. He or she may take actions that yield private benefits instead of monetary benefits. The entrepreneurs may want to spend resources on perks or steal the profit of the company. Finally, he or she may hold up the investors by threatening them to leave the project.

We believe that it is important to know the major characteristics of venture capital contracts and understand their purposes in order to be able to appreciate part of the way VCs add value to the firms they back. However, we do not want to get into the details of financial contract theories, since this is not an area in which we purport to focus. The article of Kaplan and Stromberg (2003) presents much of what we need to know in terms of venture capital contracts. Consequently, we present below some of their findings sometimes complemented by other relevant articles. We note, however, that the work of

Kaplan and Stromberg is very much focusing on the provision of VC funding in the US for firms in their early stage, 39% of the financing rounds considered where done at a pre-revenue stage (and around 79% at a pre-profit stage[2]). Having said this, their article gives an idea of the kind of provisions that VCs can put in place in other countries and for later stage fundings as well. When possible we complement their findings with some French evidence and evidence for later stages.

1.1.2.2.1 The choice of securities

Kaplan and Stromberg point out that convertible preferred stock is the most commonly used security in VC contracts. However, VC financings frequently include securities in addition to convertible preferred stock. Moreover, the authors show that in 82 of the 213 cases that they considered VCs used participating convertible preferred. These securities have the characteristic that in time of liquidation or exit investors receive both the principal amount of the preferred[3] and some common stock. With participating convertible preferred, VCs will require a lower percentage ownership. For this reason, it is not unreasonable to assume that good entrepreneurs will prefer them to convertible preferred. In turn, participating convertible preferred might be potentially useful in screening entrepreneurs who are better or more optimistic.

1.1.2.2.2 Cash flow, control and liquidation rights

Interestingly, Kaplan and Stromberg point out that while VC financings utilise different types of securities, the financings are similar in that they allow for different allocations of cash flow, voting, board, and liquidation rights.

Cash flow rights relate to the portion of the equity of a portfolio firm investors and management have a claim to. Evidence from the US suggests that managers keep substantial equity ownerships, although it is also shown that they have to give up a large fraction of ownership to VCs. Kaplan and Stromberg actually show that VCs control on average half of the cash flow rights, while founders control 30% of them.

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[2] This figure was obtained in an earlier version of Kaplan and Stromberg (2003), but is not reported in the published version.

[3] It may happen, however, that when the company return is high enough no principal payment is made.

According to the traditional principal-agent theories, it is in the investor's interest to make the entrepreneur's compensation contingent on as many performance measures as possible, in order to divert him/her from trying to satisfy his/her private benefits. One of the predictions of these theories is that entrepreneurs get some interest in the performance of the company, such as in the form of substantial equity holding, with this interest increasing in line with the firm's performance. Another prediction is that pay performance sensitivity increases with the uncertainty about the quality of the venture and the founder. As predicted the authors report that the allocation of cash flow rights is based on some contingencies. They also find evidence that if performance is good, entrepreneurs' cash flow rights are larger. Still further, Kaplan and Stromberg find the pay performance sensitivity to be greater in early stage, pre-revenue financings than in later stage, post-revenue ones. Also, Kaplan and Stromberg find the pay performance sensitivity to be larger in first VC rounds compared to subsequent rounds, and lower for repeat entrepreneurs than for other entrepreneurs.

Furthermore, it is worth noting that the allocation of cash flow rights to the entrepreneur can be made contingent on some non-performance related measures, such as the time it remained with the company (a.k.a time vesting). The authors find the pay performance sensitivity due to time vesting to be higher for pre-revenue ventures and early VC-founder relationship. Interestingly, Kaplan and Stromberg also notice that as explicit performance signals become noisier measures of true performance, the contracts substitute explicit performance benchmarks with more vesting. With time vesting, the founder's compensation is contingent on the board's decision to retain the founder, rather than on explicit benchmarks.

Finally, we note that the allocation of cash flow rights in venture capital contracts also finds an explanation in the so-called screening models. According to these models contracts can be used as a screening device if the ability of the entrepreneur is uncertain. Such models suggest that by setting the agent's compensation as an increasing function of performance, the VC in effect discourages less able agents from accepting the contract. In line with the objectives of such models are the performance related contingencies for cash flow rights which should not only motivate entrepreneurs to provide effort, but also discourage entrepreneurs with bad projects from accepting the contract.

The control theories make similar assumptions and predictions regarding cash flow rights to the one made by the traditional principal-agent theories. The difference between the two comes from the fact that control theories in addition to saying something about cash flow rights also look at control rights. Board rights and voting rights give the controlling party the right to decide on any action that is not pre-specified in the original contract. Therefore, such rights are valuable in an incomplete contracting world, when it is neither feasible nor credible to specify all possible actions and contingencies in an ex ante contract. It is argued that giving up control is costly in terms of loss of private benefits for the entrepreneur. As a result it is expected that the entrepreneurs will try to avoid it as much as possible. Moreover, if entrepreneurs are to give up part of their control, it is expected that they will do so in those states where control rights are the most valuable to investors. As the verifiability of monetary benefits increases and as agency problems decrease, control should shift from the investors to the entrepreneur.

As for cash flow rights, Kaplan and Stromberg show that some contingencies can be put in place for the allocation of voting rights. These contingencies can be based on some financial but also non-financial measures of performance. Kaplan and Stromberg report that in the US VCs have a voting majority in 53% of the financing in the minimum contingency case and in 41% of the first VC rounds. In the maximum VC vote contingency cases, VCs control a voting majority in 69% of all financings and 61% of first VC rounds. Furthermore, and in line with the predictions of control theories the authors point out that VCs are more likely to have voting control in pre-revenue ventures, and less likely to have voting control with repeat entrepreneurs.

Board rights tend to be related to voting rights although they need not be identical. Like with voting control VCs are found to be more likely to have board control in pre-revenue ventures. Kaplan and Stromberg also show that in 18% of the contracts considered they have found board provisions giving full control of the board to the VCs in case of bad performance. In line with the latter, Lerner (1995) suggest that VCs, as intensive monitors of managers, should be more intensively involved as directors when the need to oversight is greater. As a matter of fact the author shows that VCs representation on the board increases around the time of chief executive office turnover,

while the number of other outsiders remain constant. Still further, Lerner recognises that the costs of overseeing new firms are substantial, but argue that they should reduce if VCs are proximate to their portfolio firms. In line with his assertion Lerner shows that geographic proximity is an important determinant of VC board membership.

Finally, in addition to cash flow and control rights VCs have liquidation rights. One can distinguish between two types of liquidation rights. The first type of liquidation rights relates to the seniority rights of the VC in case of bankruptcy or liquidation. The second type of liquidation rights relates to the ability a VC has to force repayment of its investment.

Kaplan and Stromberg report that in all the cases but one the VCs had claims senior in liquidation to the common stock claims of the founder. Moreover, the authors point out the fact that liquidation rights are in 98% of the cases at least equal to the amount of funds invested by the VC.

Kaplan and Stromberg show liquidation rights to be sometimes granted for other events than just default. For instance, in some of the contracts they considered, liquidation rights were granted for events such as Sale, Merger, or IPO, so enabling the VC to redeem at liquidation value rather than market value. Still further, in a small number of cases, the authors have found that liquidation rights were granted for events such as the termination of the firm's founder.

To make liquidation rights stronger it is common to give investors cumulative preferred dividends (44% of the cases), that will be added to the liquidation claim. Also, optional redemption and put provisions can be used (79% of the cases). These provisions give VCs the right to ask for the redemption of its claim after some period of time, on an agreed value basis.

The authors find that founders have more liquidation rights the longer the period since the first VC round and when they are repeat entrepreneurs (i.e. when the founders have been successful in the past, and as the VC learns more about the firm). These two findings are consistent with less pay performance sensitivity as asymmetric information declines. Interestingly, however, there is no evidence that the VC's liquidation claim is larger when asymmetric information problems are more severe.

1.1.2.2.3 Other provisions

In addition to the above-described rights VCs can include in contracts vesting and non-compete clauses, which are methods used to make it costly for entrepreneurs to leave the company. If entrepreneur's shares vest over time, the company will be able to buy back the unvested shares for some low value if the entrepreneur leaves early. The earlier the entrepreneur leaves, the more shares are still unvested. According to Hart and Moore (1994) this is because the entrepreneur's specific skills are more crucial for the company in the earlier stage of its life. As time passes by, the firms become less dependent on its entrepreneur's skills and as a result more and more of its shares vest.

Furthermore, the VC can require the entrepreneur to sign a non-compete contract with the firm. In such contracts the entrepreneur engages himself/herself not to work for another firm in the same industry for some period of time.

Kaplan and Stromberg show Founder vesting to be used in 41% of financing rounds. Such vesting is also shown to be more frequent in first VC financings (48%). Non-compete clauses are very frequently used, this is the case in approximately 70% of the financings.

Another provision that can be used by VCs to deal with problems of conflicts of interest is the automatic conversion of their securities. Kaplan and Stromberg show that in 95% of the contracts they looked at such provisions were mentioned. Under these provisions, the security held by the VC –it be convertible debt, convertible preferred stock, or a class of common stock- automatically converts into common stock under certain conditions. The conditions for conversion often relate to the attainment of a certain market value at the time of an IPO exit. The effect of these provisions, upon completion of the objectives agreed upon, is to require the VC to give up its superior voting, board and liquidation rights. These provisions are, therefore, expected to motivate entrepreneurs to maximise the firm's value. Kaplan and Stromberg report that for most of those financing rounds that involved a conversion provision the median conversion price required at the IPO time was three times the stock price of the financing round. The authors also show that the conversion price is higher for pre-revenue ventures

and lower for repeat entrepreneurs, in line with the idea that VCs should demand more control as the uncertainty about the quality of the venture increases.

Antidilution protection is another provision that is often used by VCs. Such provisions protect the VCs against future rounds being made at a lower valuation than the protected round. Under the most extreme type of antidilution protection –"Full ratchet antidilution protection"-, the protected security obtain a claim to as much common shares as needed to reduce its price to the price of the new issue. More simply, in the case of a convertible issue, the conversion price of the protected issue is reduced to the conversion price or common stock price of the new issue. Kaplan and Stromberg mention another common type of antidilution protection –the weighted average ratchet-. Under a weighted average ratchet, the reduction in the conversion price/common stock price of the protected issue is a function of the existing shares, the number of shares issued and the conversion price/common stock price of the new issue.

Kaplan and Stromberg report than 95% of the rounds received antidilution protection, with 78% of the rounds using the weighted average ratchet rather than full ratchet. Finally, it could be argued that such antidilution provisions are performing some screening functions. Indeed, antidilution provisions penalise entrepreneurs with bad projects or bad skills because the protected VC investment will be re-priced downward if a future financing is completed at a lower price.

Finally, in 15% of the rounds they consider, Kaplan and Stromberg have found the funding itself to be contingent on the attainment of some milestones. This is known as the staging of financing. This is an important feature of many venture capital investments and, as noted by Wright and Robbie (1998), especially early stage ones. The staging of capital is a powerful mechanism to manage agency costs and monitor the performance of portfolio firms (see Sahlman, 1990).

As explained earlier, VCs are concerned that entrepreneurs take actions that may prove to be detrimental to shareholders. The private benefit entrepreneurs get from managing a firm is, indeed, not always correlated with shareholders' monetary returns. Some projects may, for instance, lead to high personal benefit for the entrepreneur while

having low monetary returns for investors. In that sense the staging of capital infusion represents a clear incentive for entrepreneurs to focus on maximising shareholders' value, if they want to get the next stage of financing.

Furthermore, if venture capitalists use their information in investment decisions, one should find a higher number of financing stages for successful projects than failures. Indeed, the staging of financing enables venture capitalists to discontinue funding a project if they learn negative information about the firm's prospects. As expected, Gompers (1995), using a sample of firms that received venture capital between 1961 and 1992, finds that firms that go public received significantly more financing and a greater number of rounds than firms that are acquired or liquidated. Therefore, those firms which go public are the ones which received the highest level of monitoring and can be though as being the "best in class" from the portfolio of firms that a venture capitalist monitors.

Gompers (1995) further argues that the duration of funding and, therefore, the intensity of monitoring should be negatively related to the expected agency problems. Thus, as tangibility of assets declines, the share of growth options in the firm value rises, and asset specificity grows the duration of each round should decrease. In line with expectations, the author finds that as agency costs decrease duration increases. The author also shows that early stage firms receive significantly less money per round.

Note, however, that some authors have also pointed out potential drawbacks to the capital staging practice. Namely, Wright and Robbie (1998), amongst others, suggest that the staging of investments can lead to "myopia" and over-investment where initially entrepreneurs and subsequently first round VCs present misleading information to outsiders in an attempt to persuade them to invest.

1.1.2.2.4 Further comments

We have shown earlier that financings very often (73% of the cases) include some type of contingencies. In addition to being contingent on some measures of financial or non-financial performance, Kaplan and Stromberg also show that VC contracts can be contingent on certain actions being taken –such as committed funding being contingent on new business plans being completed, new executive being hired, or a new facility

being developed-. Furthermore, the authors give examples of some contracts being contingent on the sale of securities –ownership or vesting is often linked to a subsequent IPO or sale of the company-. Still further, Kaplan and Stromberg report that contingencies are more common in first VC and early stage financings. Also, the authors point out the fact that those contingencies appear to be related to the performance measure that is the most important to the investors and the company.

Another interesting finding is that the founder's cash flow, voting, and board rights decline over financing rounds, while the VCs rights increase. The authors argue that this is due to the fact that VCs demand more and more equity and control as compensation for providing additional funds to the venture. Therefore, a less successful venture will see control being transferred from the founder to the VC through two mechanisms: specific state-contingent control and through the dilution of control as the VC has to provide additional subsequent financing.

A striking feature of Kaplan and Stromberg's findings is the complexity of real world contracts. Firstly, control rights, cash flow incentives and liquidation rights are all used simultaneously. Moreover, control rights are multi-dimensional, with several different types of control being allocated between VCs and entrepreneurs, and switching gradually with performance. Secondly, Kaplan and Stromberg pinpoint that the contractual relationship between the VCs and entrepreneurs evolves. Each new rounds involving a new set of contract terms, and previous contracts being potentially renegotiated.

Finally, it was noted from the beginning of this presentation that the work of Kaplan and Stromberg is very much based on early stage VC investments and concerns only the US market. However, we also argued that their article might still give us an idea of the kind of provisions that VCs can put in place in other countries and for later stage fundings as well. Actually, Battini (2001) points out that in the early creation stage because firms need some equity capital VCs tend in France to use ordinary and convertible preferred stocks. Later it can become a good strategy for VCs to add some convertible debt as well as warrants. This would enable the VC not only to increase its gain in case the venture is a success by subscribing additional shares at a predetermined price, but it also gives it the ability to sanction the company in case the objectives of the

business plan are not met. This is because the conversion into equity capital would give to the VCs more control over the firm's affairs. Still further, for investment in the development stage when exit opportunities are not very clear, Battini (2001) argues that complementing equity capital with convertible debt and warrants may be the best strategy for the VC to follow. This will give an exit opportunity to the VC when the debt matures. Moreover, in case of exit the VC will be able to convert its debt and exercise its warrants. In contrast, if exit opportunities are clear over a period of two to three years from the investment time, VCs should prefer to put more emphasis on convertible preferred stocks, as well as to use warrants. This would enable the VC to maximise the return on its investment until and at the exit. Finally, the funding of MBO/MBIs is complex. Battini points out that MBO/MBIs make use of equity capital, convertible debt and more and more often warrants. In addition, this type of operation often involves some debt finance usually issued by banks. Still with MBO/MBIs, Robbie, Wright, and Thompson (1992) show in the UK that for those investments a place in the board is the most popular method of monitoring the portfolio company, with VCs also requiring the regular provision of accounts. The authors further show that the degree of control is greater for buy-ins than buy-outs, especially in terms of a greater requirement for financial reports and greater use of equity ratchets[4]. However, Wright and Robbie (1998) point out that it is for large buy-ins that the monitoring is active and extensive, with this difference illustrating the comparative cost-effort-reward trade-offs involved in the active monitoring of large and small investments.

1.1.2.3 The special case of MBOs/MBIs

In MBO/MBI the added value is not expected to come only from the presence of VCs. Although operations of MBO/MBI funding backed by VCs make greater use of equity and quasi-equity than investments by Leverage Buy-Out (LBO) associations (see Wright and Robbie, 1998), those operations typically involve a substantial increase in corporate debt financing that aims at enabling the purchase of the stockholding of the company. It is commonly argued that the debt service obligations that come with this

[4] Term used to describe convertible financial instruments that may give financiers control under certain conditions.

increase in leverage require the generation of cash and the avoidance of resource wasting. Gompers (1995) notes that debt in highly leveraged transactions plays a similar role than capital staging by restraining owner/managers and reducing potential losses from bad decisions. Moreover, following a buy-out or buy-in managers obtain a large share of the company's equities that gives them an incentive for being more efficient. All this, along with the monitoring and counselling of MBO/MBI specialists, is said to lead to substantial improvements in the firms' operating performance (see in that sense: Jensen, 1986).

In the US, Muscarella and Vetsuypens (1990), Smith (1990), and Kaplan (1989), amongst others, have shown some evidence that following an LBO firms improve their profitability, reduce their costs, and increase cash flows. In the UK, Wright, Thompson, and Robbie (1992), based on a survey of 182 MBOs, show that two-third of the firms experienced clear improvements in profitability.

We note also that some differences have been pointed out between MBO and MBI. Robbie and Wright (1996) and Wright, Wilson, and Robbie (1996) point out that the performance of MBIs has generally been less strong. One reason advocated for such a difference is the less detailed knowledge by outside managers of the business, with this believed to have made more difficult the enhancement of short-term profitability by managers and investors.

Finally, we note that Desbriere and Schatt (2002) point out that French buy-outs are far less indebted than in the US. It is has been shown, however, that the change in management shareholding has a greater effect on the emphasis on efficiency goals and productivity as well as on excess return on capital invested than does the change in debt (see Phan and Hill (1995), and Thompson et al. (1992)). As a result, performance enhancements in France are still expected but should come primarily from the transfer of ownership to managers and VCs. We note, however, that Desbriere and Schatt (2002) find, contrary to the Anglo-Saxon evidence, no evidence that MBOs in France improve the performance of acquired firms. They also find that MBOs of family business –where the departure of the founder is often an important risk factor- to underperform MBOs of group subsidiaries.

1.2 IPO underpricing

Having introduced some of the main issues behind venture capital backing we can now concentrate our review on IPO issues addressed in the thesis. The first stylised fact that we review is the extensively documented IPO underpricing. The section goes from general to specific. We first introduce a broad range of different concepts and theories, but then concentrate our review on the role of third parties, which bears similarities to that of VCs. We finish discussing those specific theories that give VCs a central role in explaining underpricing. Finally, the last part of this section is reviewing the main empirical findings on the presence of VCs and IPO underpricing.

The underpricing of IPOs typically refers to the fact that offer prices are found on average to be substantially below their market prices at the end of the first day of trading. This phenomenon can be more explicitly expressed as follows:

$$\bar{R}_1 = \frac{1}{n}\sum_{i=1}^{n} \frac{P_{i,t=1} - P_{i,t=0}}{P_{i,t=0}} > \text{Average Required Rate of Return} \qquad (1)$$

$\bar{R}_1$ = Average First Day Return of all IPOs.

$P_{i,t=1}$ = Price of security i at the end of the first trading day (t=1).

$P_{i,t=0}$ = Offer Price of security i.

Loughran, Ritter and Rydqvist (1994) present evidence that the underpricing phenomenon is common to a number of countries. There is a wide variation in the magnitude of the first day price run-up depending on the method of issue, and the characteristics of the issuer. For instance, Levis (1993) and Byrne and Rees (1996) find that Placings have more underpricing than Offers for Sale in the UK. Still in the UK, Jackson (1986) reports that offer for sales by tender are more accurately priced than offer for sale by subscription. In France, Derrien and Womack (2003) have investigated the role of different methods of listing in incorporating market conditions into the IPO price and as a result reduce underpricing. Indeed, IPO shares appear to follow "boom or bust" cyclical patterns (see for instance Ibbotson, Sindelar and Ritter, 1994). In cold market times it is sometimes very difficult to sell stock at a reasonable price, in hot market times however all issuers want to take advantage of the "windows of opportunities" and

underpricing is very large. As expected Derrien and Womack show that current and past market conditions are positively related to the amount of IPO underpricing. The proxies for market conditions are a 3-month weighted average of the MIDCAC (the Index of French mid-capitalisation), and the standard deviation of the daily return on the MIDCAC in the month just prior to the IPO. Interestingly, the authors also show that different listing methods incorporate differently market conditions into the IPO price. For instance, Derrien and Womack, who compare two methods that allow for some kind of information extraction about the IPO price, show that the Offre à Prix Minimum method (an auction-like mechanism) incorporates more information than the Placement method (a book-building procedure).

It also appears that the higher the uncertainty attached to an issue the higher the first day return. As a result, firms that are young, small in size, and make small issues have higher first day returns. For instance, Ritter (1984) finds firms with small sales to be more underpriced while Beatty and Ritter (1986), Levis (1993) and Mauer and Senber (1992) find that firms, which make smaller issues, have higher first day returns. Mauer and Senber (1992) also report that older firms are characterised by lower first day returns. The strongest evidence for the relationship between first day return and uncertainty comes, however, from studies of non-operational IPOs, such as IPOs of closed end funds and Master Limited Partnerships. Indeed, the uncertainty attached to the value of these firms is low and as a matter of fact Levis and Thomas (1995), and Michaely and Shaw (1994) find for such companies little evidence of underpricing.

Finally, despite the high first day return observed at the IPO time[5], Purnanandam and Swaminathan (2001) construct a measure of intrinsic value based on industry-matched Price/Sales and Price/Ebitda from comparable publicly traded firms for a sample of 2000 IPOs from 1980 to 1997 and find that when the offer price is used IPOs are priced about 50% above comparables.

[5] And bearing in mind the difficulty to value IPO firms since many of them are valued based on their growth options rather than historical financials.

1.2.1 Theories of underpricing

Researchers have come up with different theories to put some rationale behind the underpricing anomaly. These theories are, in general, not mutually exclusive. Moreover, a given reason can prove to be more important for some IPOs than for others. We present below some of those theories that claim to explain the underpricing phenomenon.

1.2.1.1 Information asymmetries-type of explanations for underpricing

One information asymmetries-type of underpricing hypothesis, known as Signalling Hypothesis, assumes that the issuer is more informed than investors. Under this setting rationale investors are expected to fear a "lemons" problem where only issuers of average quality are willing to sell shares at the average price. In order to signal their quality to investors, good issuers would choose deliberately to underprice their shares hence distinguishing themselves from bad issuers which are not able to recover the underpricing cost. Supporters of this hypothesis have pointed out a number of ways for good issuers to recoup their underpricing cost. For instance, Welch (1989) argues that good issuers can recoup the underpricing cost by selling shares at a higher price in future equity issues. Allen and Faulhaber (1989) suggest that good issuers can trade a lower IPO offer price for more favourable market responses to future dividend announcements. The evidence in favour of this hypothesis is mixed however. Michaely and Shaw (1994) find no evidence of either a higher propensity to return to the market for a seasoned offering or of a higher propensity to pay dividends for those IPOs that were more underpriced.

Another underpricing hypothesis, known as Adverse Selection Hypothesis or "winner's curse", assumes that investors are differently informed. It has been modelled by Rock (1986) and suggests that the high initial IPOs' returns are required by uninformed investors as a compensation for the risk of trading against superior information. Uninformed investors are assumed to apply equally for good and bad IPOs, whereas informed investors apply only for those IPOs with a market price that is higher than the offer price. Therefore, good IPOs are more rationed[6] than bad ones and

[6] "Rationing", in the IPO market, relates to the number of shares received relative to the number of shares demanded.

uninformed end up holding disproportionately more of the bad shares than of the good ones. As a result, if there were no underpricing in the IPO market uninformed on average would be making a loss, and would not have any incentive to participate.

Michaely and Shaw (1994), using a sample of IPOs for the period 1984-1988, present some results that are consistent with some of the implications of the adverse selection hypothesis. For instance, they find that when uninformed investors do not have to compete against informed investors, IPOs are not underpriced. In line with the adverse selection hypothesis, Levis (1990) presents evidence that the first day return in the UK may well be just enough to compensate uninformed investors for the winner's curse problem and the interest cost attached to the application for the shares of new issues. However, the Rock's model has not escaped criticisms because it does not answer why firms want to attract uninformed investors and pay such a big cost, and why institutional (informed) investors bid not only for undervalued issues but for overvalued or fairly priced issues as well. Moreover, Ritter (1984) finds that the explanation for the hot issue market of the 1980s could not come from the Rock's model. Instead, he argues that the hot issue market was due to the non-stationarity of the relation between risk and average initial return for natural resource stocks.

Under the Information Cascades Hypothesis (Welch, 1992) investors try to judge the interest of other investors, and will only request shares when they believe the issue is hot. Therefore, underpricing is used to induce the first few investors to buy the offer and set off a cascade in which all subsequent investors want to buy irrespective of their private information. According to this theory, a reverse cascade could be created if a firm chooses not to underprice enough. In line with this hypothesis, Amihud et al (2001) find that IPOs tend to be either undersubscribed or hugely oversubscribed, with only a few offering being moderately oversubscribed.

Still further, under the Dynamic Information Acquisition Hypothesis of Benveniste and Spindt (1989) issuers are less informed than informed investors but underwriters can obtain information from informed investors thanks to the practice of "bookbuilding". In the bookbuilding practice a price range for the offer price is first set.

During the "road show" period underwriters uses this price range to gauge demand from investors. When demand is high, a high offer price will be set. However, investors would only reveal positive information if they get something in return. Underpricing is the incentive for investors to reveal their private information. To elicit truthful revelation the investment banker must underprice the issues for which good information is revealed by more than those IPOs for which bad information is revealed. Truthful revelation is also rewarded by an increase in share allocation. However, this mechanism is not fully exploited by issuers who seem to prefer leaving money on the table than diluting original owners' claims. Empirical evidence is strong for this hypothesis. For instance, Hanley (1993) finds that when the share price is revised upwards from their original estimate in the preliminary prospectus, underpricing tends to be higher. Also, Lee et al (1999) and Cornelli and Goldreich (2001) show that informed investors request more, and preferentially receive more, allocations.

Baron (1982) also proposed a theory, known as Principal-Agent Theory, where the issuer is seen as being less informed but this time relative to the underwriter rather than investors. As a result, issuing firms use underpricing to compensate investment bankers for their superior information about demand in capital markets. Muscarella and Vetsuypens (1989) find that when underwriters themselves go public, their shares are just as underpriced even though there is no monitoring problem. As pointed out by Ritter and Welch (2002), however, the latter finding if they do not favour Baron's theory, do not refute it either. Indeed, underwriters may want to underprice their own offerings so as to make the case for the necessity of underpricing.

Under Habib and Ljunqgvist's (2001) Minimisation of Wealth Losses Hypothesis old shareholders will engage in costly actions to reduce information asymmetries and underpricing only if there is a net benefit to such an action. The authors point out that the marginal benefit is not the reduction in underpricing per se, but the reduction in underpricing-induced wealth losses. Generally speaking, Habib and Ljungqvist argues that the incentive to reduce undepricing, and therefore wealth losses, should be an increasing function of the participation of old shareholders in the offering and the size of

any capital increase. Empirically, Habib and Ljungqvist (2001) and Ljungqvist and Wilhelm (2003) show that the underpricing is indeed more severe when current stakeholders have less at stake in the offer price.

Finally, Loughran and Ritter (2002) refer to two practitioners-types explanations that fall into the context of information asymmetries between the different parties of the IPO process. The first one argues that potential investors anchor to the mid-point of the file price range[7], so that a too sharp increase in the offer price may lead investors to defect, and this even when the increase was motivated by public information. As a result underwriters have little scope for adjusting to public information and this ultimately leads to underpricing. The second one, also known as the "Leaning against the wind" hypothesis, suggests that there is in fact no underpricing on the part of underwriters but rather overreaction on that of investors. An implication of this theory is that IPOs should have long-term performance negatively related to the level of first day return.

1.2.1.2 Share allocation and trading-type of explanations for underpricing

In recent years the allocation of shares and the way shares are traded has attracted a lot of academic interest. We present below some of the many models proposed.

We have already introduced one model that uses shares allocation to partly explain underpicing, namely: The Dynamic Information Acquisition Hypothesis of Benveniste and Spindt (1989). More recently, Loughran and Ritter (2002) have proposed a new share allocation-type of explanation for underpricing. Firstly, the authors use the prospect theory to explain why, under a good state of the world (when the amount of upward revision in investors' remaining holdings is high enough to compensate the loss due to underpricing), issuers are found not to be too upset about leaving money on the table. According to the prospect theory issuers care more about changes in wealth than about levels of wealth. Issuers may therefore obtain greater utility from expected gains in wealth generated by a future increase in the value of the shares and the stock options they retain than from minimising the underpricing of the amount sold at IPO. At the same

[7] The price range at which the issuer expects the securities to be offered.

time, Ritter and Loughran argue that underwriters may be able to get higher compensation by underpricing than receiving higher fees from a higher offer price, because investors may be willing to offer quid pro quos to gain favourable allocations on hot deals. In addition, the authors suggest that issuers are more concerned by direct costs than opportunity costs, such as money left on the table. For all those reasons, Loughran and Ritter argue that underwriters have a clear incentive to underprice an issue, in a good state of the world, since the issuers will be less likely to resist it. However, in a bad state of the world, the issuers' resistance to underpricing should be greater and, therefore, the amount of money left on the table should be lower.

Therefore, although the Dynamic information Acquisition Hypothesis can only explain the partial adjustment of the offer price to private information, the prospect theory explanation predicts sluggish adjustment to both private and public information. Bradley and Jordan (2002), Loughran and Ritter (2002), and Lowry and Schwert (2002) provide some evidence that when the overall market rallies during the road show period, underwriter do not fully adjust their pricing.

Stoughton and Zechner (1998) argue that underpricing is needed to create an incentive to acquire a block of shares and then monitor the firms' management. For instance, large blockholders will be able to displace poorly performing management. However, in contrast with the idea that big investors add value, Booth and Chua (1996) link allocation to aftermarket trading and therefore argue that small investors are better since they increase liquidity via more investor dispersion.

Ljungqvist and Wilhelm (2003) suggest that a directed share program creates an incentive to underprice an offering in order to benefit the target clienteles. In actual fact, the authors show in the US that for the period 1996-2000 the larger the size of directed share programs the greater is the degree of underpricing.

Ruud (1993) proposes a theory for the first day return, known as the Underwriter Price Support, that is based on the way shares are traded in the aftermath of the IPO. The author shows that the distribution of first day return is positively skewed and peaks at

zero. As the holding period lengthens, however, the skewness and kurtosis decrease. Moreover, the author shows the minimum return, as calculated from the offer price, drops dramatically from the first day of trading to the first week. In contrast, the maximum return changes only slightly form the first day of trading to the fourth week. The author uses a tobit analysis to estimate the true mean of the observed distribution of first day returns, assuming that this distribution is censored at zero. The resulting mean of the tobit analysis is close to zero, and the underlying distribution of returns is found to be nearly symmetric. Finally, Ruud points out some evidence that IPOs with a first day return of zero are very likely to experience a fall in price in the week following the issue. All the above evidence make the author to argue that the positive initial first day return is not caused by some deliberate underpricing, but rather by some price support actions exercised by underwriters, which allow prices to rise but prevent them from falling significantly. Underwriters price stabilisation involves passing some bids so as to support prices. In the case of an IPO the maximum support price is the Offer Price.

Fishe (2002) proposes a model where stock flippers (investors who subscribe to an issue but re-sell their shares immediately) are the main source of explanation for underwriters' price support activities. Stock flippers are a problem since they create an artificial demand that overstate the true market demand, with this being in turn likely to decrease after market prices. In this model the author explain that underwriters respond to stock flipping by shorting the issue in order to re-purchase shares in the aftermarket at a lower price or by exercising the over-allotment option. In this setting underwriters support prices to increase their own profit, not to reduce investors' losses.

Still with the issue of how shares are traded is Boehmer and Fishe (2001) Trading Volume Hypothesis. The authors point out that more underpricing is associated with higher aftermarket trading volume. Thus, an underwriter that makes a market in a Nasdaq-listed IPO gains additional trading revenue.

Finally, Loughran and Ritter (2003) have recently proposed a new hypothesis, known as the Changing issuer objective function hypothesis, that attempt to explain why

IPO underpricing has changed so dramatically from the 1980s (average underpricing in the US=7%) through the 1990-1998 period (average underpricing=15%) and to the Internet Bubble years of 1999-2000 (average underpricing=65%). The authors attribute much of the higher underpricing to a changing issuer objective function. Firstly, according to Loughran and Ritter, analyst coverage has become more important and issuers have had to pay their Lead underwriter for this service indirectly via greater underpricing. Secondly, they argue that the executives of issuing firms have been co-opted through the setting up of personal brokerage accounts to which IPO shares are allocated. The latter give decision makers an incentive to choose a Lead underwriter that underprice more. The authors suggest that although executives suffer wealth losses from the dilution of their equity holding due to the greater underpricing, they recoup this loss via gains on their personal accounts when other hot issues are allocated to them. Still further, Loughran and Ritter suggest that because profits from the allocation of other IPOs' shares are imperfectly correlated with decision makers' paper wealth from their own company the latter are willing to accept excessive underpricing.

1.2.1.3 Other types of explanations for underpricing

Not all theories of underpricing assume some kind of information asymmetries between the different parties of the IPO or are based on the allocation of shares and the way shares are traded at IPO time. For instance, under the Reducing Legal Liability Hypothesis (Tinic (1988), Hughes and Thakor (1992)), underpricing is used to reduce the frequency and severity of future law suits. Contrary to expectations, however, Drake and Vetsuypens (1993) show that sued IPOs had higher underpricing. Ritter and Welch (2002) refer to the popular explanation for the high underpicing of the Internet bubble where underwriters could allegedly not justify higher offer prices, perhaps out of legal liability concerns, given the already high valuations of these companies. They criticise, however, this argument pointing out the fact that investment banking firms were making other efforts to encourage overvaluations during the bubble, such as the issue of "buy" recommendation even though prices had risen well above offer prices.

Regulatory Constraints have also been used to explain IPO underpricing. For instance, in some countries the regulator requires that the offer price be based on book values. Therefore, for growth firms this requirement very often results in underpricing.

Still further, Political Motives have been linked to IPO underpricing. It has been argued that underpricing and the allocation of shares mechanism may be used by issuers and investment bankers to fulfil some political objectives.

Finally, Mauer and Senbet (1992) use a segmented market approach to explain IPO underpricing. The authors develop a framework where IPOs are traded in two different markets, the primary and secondary markets. At the offer stage IPOs trade in the primary market. In this market firms may have little operating history and few comparable firms in the larger and more centrally accessed secondary market, where after-market prices are established. The price differential (underpricing) between the two markets is a risk premium that captures both investors limited accessibility of the IPO in the primary market and the imperfect substitutability of the IPO in the secondary market. As investors access at the offer stage and the spanning of primary issues in the secondary market increase, underpricing decreases.

1.2.1.4 Conclusion

To conclude several explanations have been given for the underpricing of IPOs. However, they are not all relevant to the understanding of the role VCs may play in explaining portfolio firms' underpricing. In fact the most widely used theories for the role of VCs in explaining the underpricing of the firms they back relate to problems of information asymmetries between insiders and outside investors and the general uncertainty regarding the value of the issuing firm. Before presenting those theories that give VCs a central role in explaining underpricing, and in order to understand them better, we introduce some of those models that give third parties a certification ability since it is based on those models that the role of VCs in explaining the underpricing of portfolio firms started to develop.

1.2.2 The impact of third parties on the magnitude of the first day return

Booth and Smith (1986) explain that firm value can be increased if "bonding investments" are made to certify that the new issue price is consistent with inside information about future earnings prospects. The authors also suggest that in some cases, when firms re-issue less frequently, the net benefit from certification can be greater if issuing firms are able to lease the use of a bond from an underwriter, over the period necessary for inside information to become public.

According to the authors, one way for underwriters to develop their reputation (bonding investment) is to underprice issues in the short-run and absorb the underpricing loss. The authors explain the first day return anomaly by arguing that IPOs tend to be handled by smaller, less established investment bankers, that are expected to underprice to build up their reputation. Moreover, the authors argue that seasoned underwriters could be underpricing as well in order to protect their reputation. Generally speaking, it is believed that the magnitude of underpricing should be negatively related to the completeness of the certification and positively related to the potential impact of adverse inside information.

The first scholars to have given a role to underwriters in the equilibrium model of Rock (1986) are Beatty and Ritter (1986). They postulate that firms would choose not to underprice their issue if no intermediary could ensure investors were compensated for the ex-ante uncertainty of the new issue. They show that underwriters have incentives to correctly price the issue and provide evidence for the fact that too little or too much underpricing is reducing underwriters' market share.

Like Beatty and Ritter (1986), Carter and Manaster (1990) have used the equilibrium model of Rock (1986) as a basis for their model. This model takes into account the attempts of low dispersion firms to reveal their low risk to the market in order to reduce their underpricing. Carter and Manaster in their model argue that a firm can use the reputation of its underwriter to disclose its risk and cut the amount of money "left on the table", as reflected in the initial price run-up. According to the authors, reputable

underwriters are associated with IPOs of lower uncertainty[8]. A lower uncertainty means that there will be less investment in information for IPOs backed by prestigious underwriters, so that investors should be requiring less underpricing for those IPOs.

Carter and Manaster refer to the model of Titman and Trueman (1986) to explain why IPOs of lower uncertainty should be associated with highly regarded underwriters. The model of Titman and Trueman attempts to explain how the choice of a third party can signal the quality of inside information to investors, and in turn how this signal can impact on the offer price of IPOs. Taking the choice of the auditor as an example, the authors postulate that it is worthwhile for an entrepreneur with favourable information to use a prestigious auditor, because the latter should confirm the firm's better prospects. By contrast, it would not be profitable for entrepreneurs with less favourable information to do so, because they would incur a higher auditing cost while not experiencing a substantial increase in their firms' valuation.

The model of Carter and Manaster uses the same arguments than Titman and Trueman (1986) to explain why reputable underwriters should be associated with better firms. However, instead of arguing that the choice of an investment bank communicates information on the value of the firm, they argue that the underwriter communicates information on the uncertainty of the issue. Although it would be worthwhile for an IPO with a low uncertainty to use a reputable underwriter, a high uncertainty firm would still face high underpricing because the reputable underwriter would correctly assess the firm's dispersion and on the top of that the firm would have to pay higher underwriting fees. Finally, a low dispersion firm would not find it worthwhile to use an underwriter with a poor reputation because the underwriter to maintain its customer base would still have to fix substantial levels of underpricing.

Beatty and Welch (1996) have found some anomalous evidence of a positive effect of underwriter reputation on underpricing. Ljungqvist (1999), however, find evidence of a possible conflict of interest between certain types of venture backers and entrepreneurs that may help to explain the latter result. The author bases his analysis on

[8] The term uncertainty refers in this model specifically to the dispersion of possible secondary market values.

Habib and Ljunqgvist's (2001) Minimisation of Wealth Losses Hypothesis. Ljunqgvist actually shows that for those IPOs where the entrepreneur but not the VC sells part of his/her shares there is a positive effect of underwriter prestige on underpricing. Ljungqvist suggests that this finding may come from the fact that VCs, in this situation, have less incentive to put pressures on the underwriter to price the IPO accurately. The fact that VCs tend in these cases to be more prone to engage the most prestigious underwriters leads in turn to a positive correlation between underpricing and underwriter quality.

1.2.3 The presence of Venture Capitalists and the underpricing of IPO firms

1.2.3.1 The Certification Hypothesis for Venture Capitalists

Building on the previous models, Megginson and Weiss (1991) have developed a model of VC certification. In their model VCs are being seen as playing a crucial role in reducing information asymmetries at the time of an Initial Public Offering. If investors are concerned by the asymmetry of the information on an issuing firm, they will fear that managers hide some adverse information in order to obtain a better deal for the shares of their company. According to Megginson and Weiss (1991) VCs can credibly commit themselves to the completeness and accuracy of disclosed information, and in turn reduce the information asymmetry as well as the fears of opportunistic behaviour by insiders. This is because VCs have some incentives to develop a trustworthy reputation for certifying the information provided at the time of the IPO.

For this third party certification to be believable by investors, Megginson and Weiss argue that it should meet three criteria. As mentioned above the third party should have reputational capital at stake, with the latter being forfeited in case it certifies falsely. Moreover, the one-time wealth that could be obtained from certifying falsely should be lower than the value of the reputational capital of the third party. Finally, it should be costly for firms to get the certification and this cost should be an increasing function of the information asymmetry.

It seems very likely, as pointed out by Megginson and Weiss (1991), that the venture capitalist is meeting these three criteria.

Firstly, many of the most famous venture capitalists have as one of their many activities to bring companies to the market. Therefore, venture capitalists have a strong incentive to establish a good reputation so as to access the market on favourable terms. Not only this, a trustworthy reputation in the IPO market should enable the venture capitalist to establish long-term relationship with pension fund managers and other institutional investors in other parts of its activity. Furthermore, if entrepreneurs believe the venture capitalist to have favourable access to the market, a continuing flow of deals will be generated.

Secondly, it has been shown by Sahlman (1990) that successful venture capitalists can achieve high returns on small capital outlays. Success is directly related to age, historical performance and size of the investment portfolio of the venture capitalist. Moreover, successful venture capitalists are able to attract more funds from investors and deals from entrepreneurs. The constant monitoring of venture capitalists' performance ensures that they keep on improving their reputational capital so as to remain competitive in the venture capital industry and the capital markets.

Finally, it is obvious that the cost of getting a venture capitalist certification is quite high for a firm. As pointed out by Megginson and Weiss (1991), this is because venture capitalists not only provide financial capital but also managerial and technical expertise to investee firms, and for these services require returns on their investment as high as 25% to 50%. Therefore, entrepreneurs usually end up giving away large holdings of equity in their company for only small cash infusions. Furthermore, venture capitalists structure their investment so that the financial and business risk is shifted to the owner. They stage their investment and conserve the right to cancel a venture. Moreover, they may use convertible preferred stocks as an investment vehicle that gives them a claim senior to that of the owner and an enforceable nexus of security covenants. They may also want to retain the option to replace the manager in case investment objectives are not met.

1.2.3.2 The value of VCs' Monitoring in alleviating uncertainty

In addition to the model of Megginson and Weiss, it has been argued that VCs may end up backing firms of better quality –other things being equal-, i.e. firms with

better information quality, because they are expected to select the best project, they monitor performance, they ease access to capital, and give management support. As a matter of fact, Jain and Kini (1995) have found the post-IPO operating performance of VC-IPOs to be superior to that of non-VC-IPOs. The authors also show the improvement in the operating performance of VC-IPOs to be positively related to the quality of VC monitoring. Following this line of reasoning Barry et al (1990) have suggested that the ability and monitoring skills of VCs should signal better future performance for the firms they back and therefore less uncertainty and required underpricing. The authors further expect that those firms, which received the best quality monitoring, should have lower first day returns.

1.2.3.3 The "Grandstanding" Hypothesis

Yet another explanation for the association between the presence of a VC and the underpricing of IPO firms is Gompers's (1996) "Grandstanding" hypothesis. According to the author, young VCs have some incentives to bring their portfolio firms to the market prematurely so as to signal their ability and attract investors in follow-on funds, and in turn incur the greater underpricing associated with younger more risky firms. As noted by Gompers (1996) the "Grandstanding" hypothesis is not inconsistent with the idea that VC can certify the quality of offerings. VC certification could lower underwriting cost and underpricing on average, but young VCs may still have an incentive to bring their IPO to the market earlier than their older counterparts so as to signal their ability and raise new capital. The author notes, however, that Megginson and Weiss's (1991) certification hypothesis does not predict that younger VCs should bring their portfolio firms to the public earlier. Still further the "grandstanding" hypothesis predicts that young VCs have some incentives to incur the cost of going public pre-maturely, with this being not only the greater underpricing but also potentially lower equity stakes. Instead, the certification hypothesis only implies that older VCs with more reputational capital at stake should face lower costs of going public early.

1.2.3.4 The Adverse Selection Hypothesis

Amit et al (1990) adverse selection hypothesis predicts a positive association between the presence of VCs and underpricing is. This is a relatively unexplored hypothesis for predictions on the underpricing of VC-IPOs. According to the author in a setting with asymmetric information about entrepreneurs' skill level best ventures will be self funded, but average ventures may be funded by venture capitalists because of the same pricing for all "lemons" in the VC market. Therefore, the quality of VC-backed IPOs is not expected to be the best. Thus Wang et al (2003) argue that if this hypothesis is true VC-IPOs should be expected to face greater degrees of underpricing rather than lower ones due to their lower quality and higher risk. Still further, the authors suggest that as the information asymmetry is more severe for early stage ventures when investors' products and services have not yet been proven, the effect of adverse selection should be more severe in firms supported by VCs from the early stage.

1.2.3.5 The Conflict of Interest Hypothesis

There are some theorists (see for instance Gompers and Lerner (1999[a])) who would argue that the presence of VCs could, instead of certifying information, signal potential abuse of information. When a sponsor backs the securities of a firm in which it holds a prior financial claim through an affiliated venture capitalist, the sponsor may have an incentive to use the private information it gets from its venture capitalist to time the issue and set a high offer price. This would enable the VC to reap a high return if it is selling a large percentage of its shares at the time of the IPO. Even if the VC is not selling shares at the time of the IPO a high offer price would mean a lower dilution of its equity holdings. It is believed that if investors anticipate the potential for such conflicts of interest they may require larger underpricing to be compensated for the greater uncertainty surrounding the IPO.

1.2.4 Evidence on the impact of Venture Capitalists on the underpricing of their portfolio firms

Megginson and Weiss (1991), using a sample of US VC and non-VC-IPOs for the period 1983-1987 matched closely in terms of industry and offer size, find the first day

return to be lower for VC-IPOs. They view their results as being due to the certification role of VCs that should reduce the information asymmetry between insiders of the firm and outside investors, and in turn the required first day return of VC-IPOs. The findings of the authors are different from earlier ones made by Barry et al (1990), who used a sample of US IPOs for the period 1978-1987 and could not uncover any difference between the underpricing of VC and non-VC-IPOs.

Barry et al (1990) find, however, that those VC-IPOs with a higher quality monitoring are underpriced less than other VC-IPOs. The proxies for the quality of monitoring used in the paper are presented below along with the authors' view on how those variables should be related to the monitoring and guidance effectiveness of the VC backers.

On of the measures of monitoring quality used by the authors is the number of venture capitalists owning equity in the issuer (syndication). A large number of VCs indicates that the issuer has managed to convince several sophisticated investors that it has favourable prospects and is willing to open itself for scrutiny and guidance. Moreover, by soliciting the intervention of other VC investors the Lead-VC faces an increased reputational risk and as a result has additional incentives to monitor the firm carefully.

The authors also control for the time the venture capitalist has served on the company board. The longer the Lead-VC has served on the company board the greater the opportunity it had to monitor the firm and exercise a beneficial influence.

The impact of the age of the Lead venture capitalist is also investigated. Age should reflect the experience and therefore ability of the Lead-VC to monitor and guide effectively the portfolio firm. A related measure of monitoring quality used by Barry et al is the number of prior IPOs in which the Lead participated.

Still further the authors looked at the funds under management of the VC. The amount of resources that is controlled by a VC may serve as a proxy for its expertise as perceived by investors in the VC's funds.

Finally, Barry et al controlled for the fraction of the issuer's equity owned by the venture capitalist. The larger the VC's share ownership, the stronger their incentives as well as ability to monitor and participate in management.

All the above variables are related to significantly reduced underpricing but the capital under management variable.

Megginson and Weiss explain the difference between their findings and those of Barry et al by the fact that they took into account in their study the industrial characteristics of firms. Their results remain unchanged after controlling for the size of the issue, the certification provided by the quality of the underwriter, and the age of the firm.

Megginson and Weiss also suggest that VC-IPOs should attract higher quality underwriters and auditors since the presence of a VC should reduce their cost of due diligence, i.e. the cost of personally certifying the issue, and protect their own reputational capital. In turn, it is argued that the association with higher quality underwriters should increase the ability of VC-IPOs to be placed with institutional investors. As a matter of fact, the authors find confirmation that VC-IPOs are followed by more reputable auditors and underwriters, and have a greater percentage of their shares being held by institutional investors as well as more institutional investors holding their shares in the aftermath of the IPO. In line with the idea that the certification of VCs should lower the cost for other third parties of personally certifying an issue, Megginson and Weiss find evidence of lower underwriter compensation and miscellaneous offering expenses paid as auditor, legal, printing, and registration fees for VC-IPOs.

As explained earlier Gompers (1996)'s "grandstanding" hypothesis is not inconsistent with the idea that VC can certify the quality of offerings. However, it predicts that younger VCs should bring their portfolio firms to the public earlier, and that they have some incentives to incur the cost of going public pre-maturely. Instead, the certification hypothesis only implies that older VCs with more reputational capital at stake should face lower costs of going public early. In line with his hypothesis Gompers, using a sample of 433 US IPOs, finds that the IPOs of young VCs are younger and more underpriced than those of older VCs, and that young VCs spend less time on the board of directors before bringing their portfolio firm to the market. Furthermore, the author

shows evidence that young VCs hold smaller equity stakes in their portfolio firms at IPO time, and time IPOs to precede or coincide with raising money for follow-on funds.

Following Megginson and Weiss (1991), Barry et al (1990) and Gompers (1996) a number of studies have investigated the value of VC investors in the going public process. For instance, Hamao, Packer and Ritter (2000), using a sample of 456 Japanese IPOs over the period 1989-1995, find the presence of venture capitalists to be associated with lower first day returns, but only after controlling for cross-sectional determinants of underpricing. In contrast to their findings in Japan and to the earlier findings of Megginson and Weiss (1991), however, the authors also report that US venture backed IPOs are more underpriced than non-venture backed ones over the period 1989-1995, and this even after accounting for cross-sectional determinants of short-run underpricing.

The latter findings for the US are not the only ones that seem to contradict the VC certification hypothesis. A number of other international studies have shown similar results. Thus, Ljungqvist (1999) using US VC and non-VC-IPOs from two different time periods, 319 pairs of VC and non-VC-IPOs for the period 1983-1987 (effectively Megginson and Weiss' (1991) sample), and a sample of 1,421 IPOs for the period 1996-1998, finds after controlling for the incentives of entrepreneurs and VCs to reduce underpricing that even though VC-IPOs are sometimes less underpriced, in neither time period their presence lead to lower wealth losses. This finding leads Ljungqvist to argue that VCs may, in contradiction to the certification hypothesis, not lower the cost of going public.

Frankze (2001) tests the certification of VCs on the German Neuer Markt between 1997 and 2000. Controlling for cross-sectional determinants of underpricing she finds reputable VCs be associated with higher degrees of underpricing.

Francis and Hasan (2001) have also extended the evidence that VCs add to underpricing of IPOs. Using a stochastic frontier model, and a sample of US IPOs for the period 1990-1993, they show that the pre-market underpricing is higher for VC-IPOs.

They also report that VC-IPOs have greater first day returns, with the latter being attributed to the greater degree of what they refer to as pre-market deliberate underpricing found for those IPOs.

Lee and Wahal (2004) propose a model that controls for the endogeneity in the receipt of venture funding. Using their model they find for the 1980 to 2000 period the underpricing of VC-IPOs to have been greater than that of non-VC-IPOs. They argue that VCs might have attempted to gain some publicity from high first day returns hoping that this would transform into future commitments of capital. As a matter of fact they show that commitments of capital are positively related to first day returns.

Jelic et al (2003) using a sample of 167 UK MBOs floated over the period 1964-1997 have shown that VC-backed MBOs have been more underpriced than their non-VC-backed counterparts, when initial returns are computed on a value weighted basis.

Finally, Wang et al (2003) test the implications of the Certification hypothesis, Monitoring hypothesis, Adverse Selection hypothesis and "Grandstanding" hypothesis in Singapore using a sample of IPOs floated between 1987 and 2001. They find VC-IPOs to be younger, to have lower degrees of underpricing, and higher quality underwriters than their non-VC-backed counterparts. They do not find, however, VC-IPOs to have higher proceeds, lower issuing costs or higher quality auditors. Therefore, as far as the going public process is concerned their results support VCs' certification to the public, while VCs' certification to the financial intermediaries is only partly supported since VC-IPOs are associated with higher quality underwriters but not with lower IPO cost. They further note that the lower underpricing and higher quality of underwriters is more prominent for IPOs with at least two years of VC support.

As pointed out earlier, there are some theorists who would argue that the presence of VCs could, instead of certifying information, signal potential abuse of information. For instance, when a sponsor backs the securities of a firm in which it holds a prior financial claim through an affiliated venture capitalist. It has been commonly argued that

if such conflicts of interest materialise and if the market does not anticipate them they would result in those VC-IPOs having a poorer long-term performance as investors' expectations will be systematically upset in the aftermarket. However, Espenlaub et al (1999) using a sample of UK IPOs over the period 1992-2000, Gompers and Lerner (1999[a]) using a sample of VC-IPOs for the period 1972-1992, and Hamao, Ritter and Packer (2000) using a sample of Japanese IPOs over the period 1989-1994 have investigated this matter and none find evidence for such a problem.

Hamao et al have, however, pointed out the fact that for this group of VC-IPOs where the lead underwriter is also the parent of the lead-VC, VC backing does not reduce the required level of underpricing; indeed their results suggest that investors may demand more underpricing to be compensated for potential conflicts of interest. Similarly, Espenlaub et al show that IPOs' initial returns in the UK between 1992 and 1995 are higher when the sponsor and the VC are affiliated. They point out the fact, however, that the earlier finding is offset by an approximately equal reduction in initial return when the VC is affiliated to an issuing house that may or may not act as the sponsor of the issue. Moreover, the authors show some evidence that the number of VC-IPOs where the VC and the sponsor are affiliated is very low, suggesting that VC-IPOs may deliberately choose an unrelated sponsor to avoid conflicts of interest. Finally, Gompers and Lerner (1999[a]) also find in the US that the market requires greater discounts in order to be compensated for potential adverse selection. The authors further note that investment bank-affiliated venture firms address the potential conflict by investing in and subsequently underwriting less information-sensitive issues. Indeed, they point out that IPOs backed by venture capitalists affiliated with the underwriters have larger offerings, higher offering share prices, higher book-to-market ratios, more reputable venture investors, higher equity ownerships by venture capitalists, and are larger. They also note that this type of firms happens as well to be a type in which venture capitalists affiliated to investment banks like to invest. When examining which firms go public with an underwriter who is an investment banker, conditional on the firm having received investment by an investment banker affiliated venture fund, it is found that the only variable that motivates the decision to underwrite is the firm size.

Still with the issue of VC affiliation, Wang et al (2002) find in Singapore using a sample of 64 VC-IPOs over the period 1987-1999 important differences between finance-affiliated and independent VC-IPOs. Specifically, they find that independent VCs invest in earlier stages and place a greater emphasis on high-tech investments. They argue that the latter could be due to the greater need for independent VCs to achieve high returns so as to attract fundings. Still further, they suggest that the compensation of general partners in independent VCs favour risk taking and investment in early stage, high tech companies. Moreover, they argue that contrary to the staff of finance-affiliated VCs who may be behaving like credit analysts, the staff of independent VCs are more likely to have the technical and industrial background necessary to understand early stage companies and evaluate business plans. Reflecting the higher risk taken by independent VCs, Wang et al show that the syndication of investments is more important when the Lead-VC is independent. Furthermore, the authors show that independent VCs tend to hold more board seats and explain this finding by the fact that their staff is more experienced and better placed to provide non-financial services so that they should be expected to be more likely to be involved in management. Comparing the underpricing of independent VC-IPOs and VC-IPOs backed by finance–affiliated VCs reveals that the latter bear larger underpricing. Wang et al suggest that this finding may be evidence for the better certification ability of independent VCs but they also argue that it may reflect the marketing efforts of finance-affiliated VCs or their underwriter associates.

1.3 IPO long-term performance

This is the second IPO stylised fact addressed in the thesis. As with IPO underpricing, this section goes from general to specific. The first part is reviewing a number of theories that attempt to explain IPO long-run performance as well as some methodological issues that arise when analysing it. The second part looks specifically at the role of VC in the context of IPO long-run stock market performance, and provides a review of the empirical evidence on the presence of VCs and the performance of the firms they back.

Evidence seems to suggest that the initial overperformance of IPO firms does not persist in the aftermarket. In fact, Ritter (1991) in the US find IPOs to underperform the market over a period of three years. Moreover, he reveals evidence on the tendency for those firms with the highest adjusted initial returns to have the worst aftermarket performance, with this phenomenon being stronger in the case of small issues. Further lights are given on differences between companies' performance. For instance, Ritter find established companies not to underperform whereas younger firms, with higher market-to-book ratios, have a particularly poor aftermarket performance. Another interesting result is the fact that those firms issuing during high volume years tend to have the worst level of long-term performance.

The evidence on the long-term underperformance of IPOs is not constrained to the US, similar patterns have been found in several studies around the world (see Loughran, Ritter and Rydqvist, 1994). This constitutes a major blow to the efficient market theory according to which risk-adjusted stock price performance should not be predictable. However, in recent years the robustness of previous findings has been questioned and the sensitivity of observed results to the procedure employed highlighted.

1.3.1 Some explanations for the IPO long-term underperformance

Miller (1977) developed the Heterogeneous Expectation Hypothesis where he assumes the existence of short-selling constraints as well as the heterogeneity of investors' expectations regarding firms' valuation. Therefore, according to this hypothesis one would expect that only the most optimistic investors buy an IPO. However, the divergence of opinions should decrease over time with this leading to a falling price as the marginal investor's opinion converge towards the mean valuation.

Another hypothesis that could explain IPO long-run underperformance is De Bondt and Thaler (1985) "fads" hypothesis[9]. The authors report evidence for the US that investors overreact to unexpected extreme events. They find this overreaction to lead to very high or low returns over a period of time, and subsequent return reversal when investors start correcting their beliefs. In line with the fads hypothesis, Shiller (1990)

[9] Temporarily overvaluation caused by over optimism on the part of investors.

develops an 'impresario' hypothesis where underwriters underprice to generate publicity for IPOs and take advantage of fads. A consequence of Shiller's hypothesis is that firms with high initial returns should subsequently experience a poor stock market performance. In a similar vein is the argument by Aggarwal and Rivoli (1990) that the high initial return, because it is followed by some periods of underperformance, could be due in part to some fads in the IPO market. Yet another related hypothesis is Ritter (1991)'s windows of opportunity hypothesis. The author finds a negative relationship between long-run performance and volume of issue in the US and argues that this phenomenon could be due to firms taking advantage of periods when investors are particularly optimistic about IPOs' growth prospects.

It has been shown that IPOs are preceded by temporary improvements in operating performance and higher earnings announcements (see Mikkelson and Shah (1994), Jain and Kini (1994), and Teoh, Welch and Wong (1998[a])). These in turn may well fuel investors' overreaction. Actually, Loughran and Ritter (1995) suggest that investors may overweight recent improvements in the performance of issuing firms and underweight the long-term mean reverting tendencies in operating performance. The subsequent long-run underperformance could then be evidence for some corrections in investors' beliefs about the firms' prospects. Purnanandam and Swaminathan (2001) find that IPOs that are priced high relative to public market comparable tend to perform worse in the long run.

Aggarwal and Rivoli (1990) advocate a number of reasons why IPOs could be good candidates for fads. Firstly, they point out the fact that fads are more likely when it is difficult to estimate the intrinsic value of a security. This is very much the case for IPOs where there are sometimes very little track records on the performance of a firm. Secondly, they argue that noise trading is particularly problematic for those securities that have a lot of uncertainty attached to them. The latter is building on their first point and therefore still applies very much to IPOs. Thirdly, and because of the first two points, they suggest that IPOs' investors are expected to be by nature more speculative, and that a market with more speculative investors should lead to higher level of price volatility and larger deviations from intrinsic values. Finally, using a similar argument as in Miller (1977), the authors postulate that the marginal buyers in initial trading should be expected

to be overoptimistic because of the divergence between the estimates of the IPOs' true values and the supply of securities.

Using a sample of IPOs over the period 1977-1987, Aggarwal and Rivoli find significant positive early abnormal returns and significantly negative subsequent one-year abnormal performance. This evidence is robust across different time periods, prices, size and class of underwriters. The authors argue that their results show evidence that fads, in the IPOs market, play a role in explaining the first day price return, and the subsequent return reversal. They even cast serious doubts on the evidence of underpricing in the IPOs market and point out the fact that gains from early price appreciation are more than lost in subsequent one-year price declines.

Underwriters' reputation has also been linked to IPO performance: Carter et al (1998), Nanda et al (1995) and Michaely and Shaw (1994) have documented a significant and positive relationship between long-term performance of IPOs and the reputation of the underwriter. Carter et al (1998) argue that this may be due to the fact that underwriters in order to protect their reputation attempt to market the best performing IPOs. To put further weight on their say Carter et al refer to the findings of Chemmanur and Fulghieri (1994) who argue that investors use the investment banks' past performance, as measured by the quality of the firms in which they previously sold equity, to assess their credibility.

Schultz (2001) argues that more IPOs follow successful IPOs so that the last group of IPOs would underperform and be a relatively large fraction of the sample. According to the author if underperformance is being measured weighting each IPO equally, the high volume periods would carry a larger weights with this leading in turn the observed underperformance. Ritter and Welch (2002) show, however, that when each time period is weighted equally underperformance is still observed. Also, Loughran et al (1994) and Baker and Wurgler (2000) despite using time series regressions still find IPOs to underperform.

Finally, we note that a number of papers have investigated whether flipping by institutions can predict IPO performance. Interestingly, Krigman et al (1999) and Houge et al (2001) find evidence that institutions do succeed in identifying IPOs that are overvalued when trading starts.

1.3.2 IPO underperformance and methodological issues

The evidence of IPOs long-term underperformance has, however, been recently challenged by a number of authors. Their findings suggest that the previous evidence of long-term underperformance might not have been due to a market anomaly, but rather to historical accidents or methodological issues.

Brav and Gompers (1997), using a sample of US IPOs for the period 1972-1992, show that IPOs do not underperform when their performance is benchmarked against non-issuing firms with similar sizes and book-to-market ratios. In fact, when such a benchmark is used it becomes apparent that underperformance extend beyond the IPO market. Indeed, Brav and Gompers point out that IPOs tend to be small and high growth, with this style category being the worst performing one.

Furthermore, Fama (1998) highlights the fact that estimating the abnormal returns of an event firm based on a non-event firm or portfolio with similar characteristics, known to be related to average returns (such as size, and B/M ratios), will never perfectly control for all relevant cross-firm variation in average returns due to expected returns or sample specific patterns in average returns. Moreover, the author recalls that asset pricing models, such as the CAPM and the Fama & French three factors model, have limitations and do not fully explain average returns. As a conclusion to his review of the models available for computing abnormal returns Fama argues that bad-models are unavoidable and constitute a serious problem especially in tests of long-run returns.

Barber and Lyon (1997) provide a thorough analysis of the empirical power and specification of test statistics used in event studies to detect long-run abnormal performance. First they argue that Buy-and-Hold Abnormal Returns (BHARs) should be used instead of Cumulative Abnormal Returns (CARs). Two reasons are advocated for

the latter. The first reason is that CARs are found to be a biased predictor of BHARs. The difference between CARs and BHARs come from the effect of compounding present in BHARs but absent in CARs. If the return of individual security is more volatile than the return on the benchmark, it can be shown that CAR will be greater than BHAR, if the latter is less than or equal to zero. As BHAR becomes increasingly positive the difference between CAR and BHAR will decrease until it eventually becomes negative. The second reason advocated by the authors is that CARs in their view do not correspond to the value of investing in a sample of firms relative to a benchmark while it is exactly what event studies propose to test. We note, however, that Fama (1998) and Mitchell and Stafford (2000) argue in favour of the use of CAR because it eliminates the compounding effect of a single year's poor performance.

Moreover, Barber and Lyon identify three factors that contribute to create biases in test statistics of long-run abnormal returns when these are calculated using a reference portfolio. The first factor is the new listing bias. They point out that firms not included in the sample at the time of an event have an effect on the benchmark but not on the sample. Given the evidences on the underperformance of IPOs one would expect, therefore, long-run abnormal returns to be positively biased.

The second factor is the rebalancing bias. Because of the negative correlation between successive returns, the rebalancing of stocks for the computation of an equal weights benchmark lead to inflated returns for the latter and results in a negative bias when calculating long-run abnormal returns.

Finally, the third factor is the skewness bias. The observed positive skewness in long-run abnormal returns leads to a positive correlation between sample means and standard deviations which ultimately results in a negative bias in test statistics. It is true that asymptotically the normality of the sample mean is guaranteed using the Central Limit Theorem. However, the adequacy of this approximation depends on the rate of convergence of the sample at hand, which is negatively related to both the degree of cross-sectional dependency and non-normality (Cowan and Sergeant (1997)).

These factors affect CARs and BHARs differently. CARs are found to be more affected by the new listing bias, and as a result the associated test statistics for these

abnormal returns are generally positively biased. In contrast, BHARs are more affected by the rebalancing and skewness biases, so that the associated test statistics are negatively biased. To overcome those problems Lyon, Barber, and Tsai (1999) propose the use of two different methods.

The first one is based on BHAR with a carefully constructed reference portfolio. Because of the non-normality of BHARs, inference are based on a bootstrapped skewness adjusted *t-statistic* or the empirically generated distribution of mean long-run abnormal stock returns from pseudo portfolios (where the benchmark for one IPO is a seasoned firm with similar size and book-to-market characteristics). Lyon et al argue that this approach has the advantage of representing accurately investors' experience. They recognise, however, that this method is sensitive to the poor specification of asset pricing models due to the compounding effect, and the presence of cross-sectional dependence among firms (see Collins and Dent (1984); Sefcik and Thompson (1986); and Bernard (1987)).

Cross-sectional correlation is an issue when testing IPO long-term performance because IPOs tend to cluster in time and industry. For this reason, the performance of each observation can hardly be assumed independent. By over-estimating the number of independent observations, we also under-estimate the mean standard deviation of our sample, and in turn over-estimate the significance of our results. Lyon et al propose a way to take cross-sectional dependence into account when testing for the significance of the mean BHAR, but although their method alleviate some of the resulting misspecification it does not eliminate it.

The second method proposed by Lyon et al (1999) relies on the calculation of calendar-time portfolio abnormal returns. The advantage of this approach is that it controls well for cross-sectional dependence, and is generally less sensitive to a poorly specified asset pricing model. Its disadvantage, according to the authors, is that it yields an abnormal return measure that does not precisely reflect investor experience.

Other disadvantages of the method based on calendar-time portfolio abnormal returns are that the changing composition of portfolios may generate some problems of heteroskedasticity, as the variance in each portfolio is related to the number of firms

included. Furthermore, and as pointed out by Loughran and Ritter (2000), this method treats periods of high and low activity equally and as a result may be less likely to uncover abnormal performance. Indeed, as pointed out earlier the underperformance of IPOs has been shown to be concentrated around periods of high activity. An additional problem occurs when calendar time portfolios are used in conjunction with an asset pricing model such as the Fama-French three factors model, because it fails to take into account the parameter shift problem. Indeed, the regression assumes that the factor loadings are constant through time, and as a result does not control for the industry clustering that occurs over time, with different industries having different factor loadings.

It has to be noted that Mitchell and Stafford (2000), who advocate the use of the calendar-time portfolio approach, have shown how to control for several of its drawbacks. For instance, when the average abnormal performance is calculated in a regression setting using calendar-time portfolio excess returns as the dependant variable, the author advocate to deal with heteroskedasticity the use of a parametric bootstrap procedure for the calculation of finite-sample critical values. When average abnormal returns are calculated for each calendar-time portfolio, Mitchell and Stafford propose to deal with heteroskedasticity by standardising calendar-time abnormal returns by estimates of the portfolios' standard deviation. The authors also note that standardising returns in this way effectively gives more weight to periods of heavy event activity than periods of low event activity because the portfolio residual variance is decreasing in portfolio size, all else equal. Still further, to deal with the parameter shift problem Mitchell and Stafford suggest to use a test based on the computation of average abnormal returns for each calendar-time portfolio. Indeed, this allows the researcher to change the benchmark as portfolio firms' characteristics change.

Gompers and Lerner (2001), using a sample of 3,600 US IPOs over the period 1935-1972, find evidence that the performance of public offerings depends critically on the method of measurement used. When expressing the abnormal performance in terms of event time buy and hold returns they find evidence of substantial underperformance. When cumulative abnormal returns are used instead the underperformance disappears. Moreover, Gompers and Lerner show that when conducting a calendar time analysis IPOs

are found to return at least as much as the market. Further evidence of the latter are found when regressing the annual returns of portfolios of IPOs on the Fama and French three factors model, and the market alone. For both regressions the intercepts are insignificant or even significantly positive.

Brav (2000) constructs a density function for a sample average of long-horizon abnormal return under the null hypothesis of no abnormal performance. His density function is built using a Bayesian approach so that it incorporates the researcher prior beliefs regarding the model parameters. With his density function Brav argues that he can control both for the firm specific residual standard variations, that induce non-normality, and the cross-sectional correlation, as these are reflected in the researchers' posterior beliefs. Using his Bayesian approach, a characteristic-based model (with size and B/M portfolios), and 1,521 US IPOs over the period 1975-1984, Brav accepts under all shrinkage scenarios the null hypothesis of no abnormal performance for five-years BHARs.

Espenlaub, Gregory and Tonks (2000) have recently re-examined the evidence on the long-run performance of IPOs in the UK using 588 IPOs over the period 1985-1992. They find that the evidence on IPO underperformance is sensitive to the method used. For instance, they show the calendar time approach to yield weaker evidence of underperformance than the event time approach.

Degeorge and Derrien (2001) have examined the evidence on the long-term performance of IPOs in France. They use a number of different benchmarks: various indices, and the size and B/M portfolios *à la* Brav and Gompers (1997). On average they find no sign of abnormal performance.

Finally, Ritter and Welch (2002) argue that the evidence on the disappearance of the IPO underperformance due to the novel measurement techniques has to be taken with caution. They point out that findings can be very sensitive to the sample period. Furthermore, some authors have argued that firms' sizes and book-to-market ratios are

not proxies for risk omitted from standard asset pricing models (such as the CAPM) but instead reflect mispricing and violations of market efficiency that could be exploited by investors. We do not wish, however, to argue whether book-to-market and size reflect market risk measures or investor sentiment. Rather, given evidence that an acceptable model of risk-adjusted performance against which one can measure IPO performance has yet to be proposed, we follow Ritter and Welch (2002) who advise to regard multifactor models or benchmark of matching firms as testing similarity to certain public firms, rather than as tests of IPO mispricing.[10]

1.3.3 Venture Capitalists and the long-term stock market performance of IPOs

It is principally the article of Brav and Gompers (1997) that has triggered the recent interest in analysing the association between the presence of VCs and the long-term performance of the firms they back. The authors have investigated the long-run performance of venture and non-venture backed IPOs over a five-year window in the US, using samples of venture and non-venture backed IPOs taken respectively over the periods 1975-1992 and 1972-1992. They find evidence that VC-IPOs performed better than their non-VC counterparts. Moreover, Brav and Gompers point out that in their sample of IPOs the phenomenon of underperformance is concentrated on small low book-to-market non-VC-IPOs. Furthermore, the authors highlight the fact that this phenomenon is not exclusive to the IPO market since small low book-to-market non-issuing firms are found to experience a poor long-term performance as well. The authors give a number of reasons for the underperformance of small, low book-to-market non-VC-IPOs. For instance, the authors argue that small growth companies may have been hit by unexpected shocks. Also, they suggest that investor sentiment may help to explain the underperformance of this group of firms. Indeed, they argue that the shares of small non-VC-IPOs are more likely to be held by individuals who are arguably more inclined to fads and who may lack complete information.

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[10] We also note that other explanations have been given for the evidence on the ability of size and book-to-market to explain returns. For instance, it has been referred to as a chance result by some authors (Black (1993), Mackinlay (1995)). Still further, Daniel and Titman (1997) explain the value premium in terms of investors' preferences rather than risk.

A number of reasons (many of them pointed out in Brav and Gompers (1997)) can be advocated to explain why VC-IPOs could perform better in the aftermarket than their non-VC counterparts. VCs are believed to add value to the firms they back and should therefore be associated with better quality firms. They select the best project, they monitor performance, they ease access to capital, and give management support. As a matter of fact, Jain and Kini (1995) have found the post-IPO operating performance of VC-IPOs to be superior to that of non-VC-IPOs. Moreover, Jain and Kini (1995) have shown the improvement in the operating performance of VC-IPOs to be positively related to the quality of VC monitoring. If the added value brought in by VCs is not fully anticipated by the market those firms may have a positive abnormal performance on the long-term. Indeed, if investors are systematically positively surprised in the aftermarket by the performance of VC-IPOs, they should correct their beliefs upward, with the latter leading to the outperformance of VC-IPOs.

Furthermore, we shown that it has been suggested that the IPO market may suffer from a problem of "fads" (see Aggarwal and Rivoli, 1990), i.e. temporarily overvaluation caused by over optimism on the part of investors, with this leading to the underperformance of IPOs in the aftermarket as investors correct their beliefs downward. It is believed that VC-IPOs should suffer less from fads because the shares of VC-IPOs have been found in the US to be held more often by institutional investors (see Megginson and Weiss, 1991), who should be less inclined to fads than individuals (see Field, 1996). Also, VC-IPOs have been shown to be followed by high quality underwriters (see Megginson and Weiss, 1991), who should be careful to ensure that they do not back IPOs that have had their valuation hyped. Consistent with this idea, we shown earlier that the reputation and quality of the underwriter have been found to be positively related with the long-run performance of IPOs (see Carter et al (1998), Nanda et al (1995) and Michaely and Shaw (1994)).

Still further, it has been argued that VCs being repeated players in the IPO market may themselves be particularly careful not to undermine their reputation by backing overvalued stocks that would underperform. Some evidence seems indeed to suggest that VCs are concerned not to damage their reputation amongst investors. For instance, Lin and Smith (1998) show that reputable venture capitalists refrain from selling their equity

holdings of the firms they back unless the issue is expected to be significantly underpriced. There are, however, some authors who have found VCs to behave opportunistically. For instance, Gompers and Lerner (1999[a]) find evidence that seasoned venture capitalists are successful at timing distributions of shares to limited partners when share prices are temporarily overpriced. Lerner (1994[b]) shows that seasoned venture capitalists are particularly proficient at taking company public near market peaks. Gompers (1996) gives some evidence that younger VCs underprice more and take public earlier their portfolio firms, in the hope that such "grandstanding" might help them establish their reputation, and raise new capital, more quickly.

Finally, we recall, however, from the previous section on underpricing that not all theories agree with the better performance of VC-IPOs. Specifically, Amit et al (1990) predict that the best ventures will be self-funded, while average ventures may be funded by venture capitalists because of the same pricing for all "lemons" in the VC market. Therefore, the authors do not expect the quality of VC-backed IPOs to be the best. Thus Wang et al (2003) argue that if this hypothesis is true VC-IPOs should be expected to face poorer post-IPO operational performance. Still further, the authors suggest that as the information asymmetry is more severe for early stage ventures when investors' products and services have not yet been proven, the effect of adverse selection should be more severe in firms supported by VCs from the early stage. In turn, the post-IPO operational performance of IPOs which received early VC support should be worst. Wang et al (2003) using a sample of IPOs from Singapore do find the post-IPO performance of VC-IPOs to be inferior to that of non-VC-IPOs. Still further, they show some evidence that IPOs with longer VC support performed significantly worse. In terms of market performance, however, no significant difference is found between VC and non-VC-IPOs.

In addition to comparing the stock market performance of VC and non-VC-IPOs, other areas that have been investigated include the problem of conflict of interest between sponsors and investors outlined earlier, and the association between the monitoring quality of VCs and the long-term performance of the firms they back.

Hamao, Ritter and Packer (2000) in Japan, Gompers and Lerner (1999[a]) in the US, and Espenlaub et al (1999) in the UK find no evidence of worse long-term stock market performance for those IPOs with a potential conflict of interest between sponsors and investors. In fact, Gompers and Lerner (1999[a]) find those IPOs with the greatest potential for a conflict of interest -those in which all the underwriters or the book manager were investors- to have the best long-term performance and a lower likelihood to go into liquidation. Still with this issue of conflict of interest, Hamao et al show that the earnings forecasts for firms backed by venture capitalists affiliated to the lead underwriter are higher than the realised earnings in only 49% of the cases. Therefore, the lead underwriters do not appear to have generated overly optimistic forecasts to market the issue more aggressively.

Gompers and Lerner (1999[a]) also point out a positive and significant relationship between the sale of venture capitalists' equity holdings during the offering and the subsequent long-term performance of IPOs. This suggesting that VCs do not try to abuse the market by selling shares of overpriced stocks, which would maximise short-term gains. Still further, Gompers and Lerner document a negative relationship between the likelihood of liquidation and the sale of equity holdings. However, Espenlaub et al (1999) in the UK find some counter evidence, with the proportion of shareholding sold at the time of an IPO being negatively related to the IPO long-term performance. Moreover, Gompers and Lerner (1999[a]) show the performance of VC-IPOs to be positively related to the reputation of VCs. A similar finding is made by Espenlaub et al (1999) who also find the number of VCs backing the firm (level of syndication) to be positively related with the long-term performance of IPO firms. Barry et al (1990) suggest that a large number of VC backing the firm signal favourable prospects and increases the incentives of the Lead-VC to monitor the issuing firm in order to protect its reputation vis-à-vis other VCs. Espenlaub et al do not find, however, the mere presence of a VC to be associated with better long-term performers. Hamao, et al (2000) in Japan also find, contrary to the US evidence, VC-IPOs to perform neither better nor worse than non-VC-IPOs. They find some evidence, however, that VC-IPOs backed by independent or foreign Lead-VC performed better. Wang et al (2002) also find in Singapore IPOs

backed by an independent VC to perform better over the long-term than IPOs backed by a finance-affiliated VC.

Finally, the evidence on the stock price performance of buy-outs is limited, and concerns principally reverse LBOs (see Degeorge and Zeckhauser (1993); Mian and Rosenfeld (1993); Holthausen and Larcker (1996)). This performance has typically been found to be positive or at least non-negative. Jelic et al (2003), however, recently compared the performance of non-reverse and reverse MBO in the UK, with the latter exhibiting worse long-term performance than the former. Furthermore, the authors show no evidence that on the long-term VC-MBOs performed better than non-VC-MBOs. Finally, they find only weak evidence that the long-term performance of VC-MBOs backed by prestigious VCs was better than that of VC-MBOs backed by less prestigious VCs.

1.4 IPO performance around lock-up Expiry

This is the last IPO issue covered in the thesis. The existence and effect of lock-up agreements, as well as the price reaction around lock-up expiry have only very recently attracted academic interest. As a mater of fact only a few papers on the subject have been published so far. For this reason, this sub-chapter will be short relative to the previous two on underpricing and long-run performance, which have both received extensive academic coverage. The first part of this section is concerned with the determinants of the lock-up choice. The second part reviews the evidence on the abnormal stock price performance and volume of trading at and around lock-up expiry. Finally, we end the section with a review of the different hypotheses that try to make sense of those abnormal phenomena.

1.4.1 The role of lock-ups

It has been argued that firms may want to lock-up more shares for a longer period of time to signal their quality to the market (see Courteau (1995), Brav and Gompers (2003)) so as to get a higher offer price or better price in a subsequent seasoned offering. A further rationale for the locking-in of management shareholding is the alignment of

their interests with those of shareholders in order to reduce agency costs (see Brau et al, 1999). Brav and Gompers (2003) argue that those firms that suffer from the greatest potential for insiders to take advantage of shareholders would need longer lock-ups so as to signal their commitment to the firm and induce investors to buy into the offering. Generally, this includes firms with a lot of information asymmetry and those that do not benefit from the certification of reputable underwriters and VCs. Yet another possible explanation for the lock-up provision is the attempt by investment banks to reap additional compensation from the issuing firm. If insiders exit prior to the end of the lock-up expiry date a block trade would have to be made through the underwriter or a Seasoned Equity Offering (SEO) would have to be performed. In both cases the underwriter would earn additional fees either as a market maker for the block transaction or by underwriting the SEO. According to the underwriter market power hypothesis, more reputable underwriters should be able to negotiate longer lock-up periods. Also, it is expected that the probability of doing a SEO with the same underwriter as in the IPO should be greater during the lock-up period.

In line with the commitment story, Brav and Gompers (2003) find support for the hypothesis that lock-ups are a commitment device used to overcome moral hazard problems subsequent to the IPO. Profitable firms, firms with high book-to-market ratio, firms with higher quality underwriters, and firms with VC backing have shorter lock-ups. Similarly, Brau et al (1999) in the US find small and young firms to have longer lock-ups than larger older firms. Moreover, Brav and Gompers (2003) shows that early sales by insiders are more likely for firms with low incentives for moral hazard. These include firms with VC backing, reputable underwriters, and firms that experienced higher post-IPO returns. In contrast, the authors find little evidence that longer lock-ups are associated with higher offering prices or a greater likelihood of SEOs. Also, they find in line with Ellis, Michaely and O'Hara (2000) that underwriters could only make a low average market-maker fee from earlier insider sales. Still further, they find the probability of retaining the same underwriter as in the IPO for the SEO to be unrelated to whether the SEO is within the lock-up period or not.

1.4.2 Empirical evidence on the stock price performance and volume of trading around lock-up expiry

Contrary to the efficient markets hypothesis, a number of studies, most of which were conducted in the US, have reported significant negative adjusted returns on the day of and period of time just surrounding the lock-up expiration. For instance, Brav and Gompers (2003) looking at IPOs from 1988 to 1996 on three major US stock exchanges find a significant –2% decline around lock-up expiry. In parallel to this decline they also show an increase in the volume of transactions from around 5% just before lock-up expiry to approximately 35% in the period just following expiry. Moreover, they report a pick in the abnormal volume of trades of 56% during the post-expiry period. Finally, Brav and Gompers show that proxies for greater sales of shares at expiration are significantly and negatively related to the price drop. The proxies used are the percentage of shares being locked-up, and the presence of VCs. It is argued that at the lock-up expiry many VCs are required to distribute their shares of issuing firms to their shareholders who then tend to sell them automatically. Gompers and Lerner (1998) shows that VCs may prefer to distribute shares rather than sell them and pay the proceeds to investors. Indeed, distributing shares enables VCs to overcome SEC's restrictions on corporate insiders' sales. Furthermore, the authors point out that tax motivations may also provide an incentive to distribute shares, since it gives limited partners the flexibility to decide when to sell the shares and be subject to capital gain taxes. Still further, Gompers and Lerner point out that if the selling of shares leads to a large negative effect on prices VCs may prefer to distribute shares so as to show good stated returns on their funds. Finally, they explain how VCs' compensation may be affected by the distribution policy.

A similar picture to that given by Brav and Gompers (2003) is given by Field and Hanka (2001) who look at a sample of US IPOs between 1988 and 1997. Firstly, the authors show an abnormal negative return of –0.9% on the unlock day, as well as significant and negative cumulative abnormal returns for the three and five days window around the unlock day of respectively –1.5% and –1.9%. They report that in parallel to the observed price drop the volume of transactions increased substantially to 80% above average on the day just following the expiry date before to fall to 40% above average and

remain at this level for the following 49 trading days. The authors find the hardest price hit to be experienced by VC-IPOs, with these IPOs also facing the largest increase in the volume of transactions. Their cross-sectional results show that for the VC-backed sample the fraction of the post-IPO shares locked-up and the three-day abnormal trading volume are negatively and significantly related to the three-day abnormal return.

Ofek and Richardson (2000) also analyse US IPOs but over the period 1996 to 1998. They report a price drop of –1.15% on the expiry date as well as an increase in the volume of transactions of 61%. Whereas the volume of transactions subsequently subsides, price reversal does not occur. Still in the US Bradley et al (2000) find over the period 1988-1997 average abnormal returns of –0.74% on the expiry date and –1.39% on the three day window around the expiry date. A cross-sectional analysis shows these results to be mostly due to VC-IPOs, with high tech-VC-IPOs suffering the largest loss. For the VC-backed sample, post-IPO performance and volume of trades are the most significant determinants of expiry returns.

Espenlaub et al (2001) investigate the price response to the expiry of lock-up agreements in the UK for the period 1992 to 1998. The authors find evidence of negative but insignificant average abnormal return on the expiry date (-0.71%). They also report that high tech firms may have experienced the greatest loss in value at expiry. However, their result lacks statistical significance.

Finally, Garfinkle et al (2002) look at the US IPO market between 1997 and 1999, and provide an interesting coverage of the movement of IPO prices from the offer price through the lock-up expiry and until the end of IPOs' first year of trading. As in previous studies the authors find IPOs to be underpriced, a spike in the volume of trades on the lock-up day, and an average volume of trades that remained high thereafter. Interestingly, the authors point out that prices remained flat for several weeks after the IPO. However, Garfinkle et al report that abnormal returns became very negative in the weeks just prior to the unlock date, suggesting that the market might have partially anticipated the negative price effect from the end of the lock-up period. The authors also find a large negative abnormal return on the unlock date. Moreover, they show that after the end of the lock-up period abnormal returns tended to be negative through the end of the 12-month period after the IPO. Thus, the authors point out that those investors who

bought shares in the open market and held them until the end of the IPO first year of trading experienced a substantial negative excess return. Moreover, they highlight the fact that even those investors who bought shares at the offer price would have not retain their short-term gains if they had hold the allocated shares for a year.

1.4.3 Possible explanations for the anomalous stock price movement and volume of trading at lock-up expiry

Jensen and Meckling (1976), Shleifer and Vishny (1986) amongst others have shown that large-block shareholders that are often willing to incur monitoring costs can play an important role in increasing the firm's value, so that their unanticipated dissolution could explain a sudden price drop. We note, however, that the date of expiry of the lock-up agreement is known in advance as well as the number of shares subject to the lock-up so that in an efficient market investors should have incorporated all this information into prices before the expiry date and one would not expect the market to be systematically wrong when it comes to its assessment of the selling behaviour of locked-up investors.

In summary, amongst the different possible explanations proposed for the lock-up expiry price movements three are often retained. The first claims that the price drop may be due to worse than expected news about insider sales. The second asserts that the negative return may be due to downward sloping demand curve with costly arbitrage. If the demand for shares is not totally elastic, increasing supply would decrease the price. In an efficient market, however, the decrease in price should be expected since the date of the lock-up expiry as well as the number of shares locked are known at the time of the IPO. As a result there should be no price decline at the time of the lock-up expiration. However, as pointed out by Brav and Gompers (2003), arbitraging the observed abnormal return may be risky and costly. The authors point out that despite observing a negative average abnormal return, 40% of all returns on the event day were positive, highlighting the risk of selling stocks short. Furthermore, they find that transaction costs eliminate the abnormal return. Still further, Brav and Gompers point out that borrowing shares before the expiry of the lock-up to set up a short position may not be easily done given the low volume of shares floated. Finally, Brav and Gompers (2003) find that price drops are

lower for firms that are more informationally transparent. They link this result to the earlier described commitment hypothesis where it is argued that lock-ups are entered to overcome moral hazard problems subsequent to the IPO.

Chapter 2: Do the Characteristics of Venture Capitalists Involvement Matter? Evidence from the Underpricing and Long-term Performance of French IPOs

2.1 Introduction

It has been argued that investors may be ready to pay a higher price and require less underpricing for the shares of VC-IPOs because of the monitoring and certification ability of VCs. It has also been suggested that the presence of VCs might signal better long-term performance for the IPOs they back. VCs screen investment projects and select the best ones. They are believed to add value through their monitoring and management support. They are expected to ease access to capital for portfolio firms. Also, it has been suggested that their relationships with institutional investors and reputable underwriters might reduce the risk of fads and subsequent underperformance of the IPOs they back. However, the evidence on the association between the presence of VCs and the underpricing of VC-IPOs is mixed. Moreover, certain situations have been identified in theory where, instead of certifying the information, the presence of VCs could rather signal potential abuses. In the long-term the quality of VC monitoring as well as reputational concerns seem to matter; the evidence on the mere presence of a VC is however mixed.

In order to shed more light on the impact of VCs on the firms they back, we propose in this chapter a comparative analysis of the underpricing and long-term performance of VC and non-VC-IPOs on the French *Second* and *Nouveau Marché* between 1996 and 2000. The first distinguishing feature of the analysis is that, in addition to investigating the influence on the underpricing and long-term performance of VC-IPOs of existing proxies for the quality and intensity of VC monitoring and certification ability, we also distinguish between the type of VC-funding received. The three types of VC-IPOs we look at are ventures that received funding for a management buy-out and buy-in and those that received what is more traditionally regarded as venture

capital, i.e. investments in Early and Development stages. Distinguishing these three types of funding is potentially important since not only is the purpose of the funding different but also the way VCs select and monitor portfolio firms in each type varies. We also show that substantial differences exist between the involvement of VCs in each of the different stages, as is evidenced by their control and cash flow rights, their level of specialisation and syndication, and finally their affiliation at IPO time. Our second important contribution resides in the fact that we investigate for the first time the impact of VCs specialisation on the underpricing and long-run performance of IPO firms. If major differences exist between each type of funding, it is reasonable to believe that a VC who decides to specialise in an investment stage and face the greater systematic risk that comes with lower diversification will do so only when it has some specific skills to select and monitor firms in that stage and, as a result, reduce its risk. For this reason, VC specialisation may signal better quality firms. Finally, given the relatively large number of VCs affiliated to banks on the French market, we also address the issue of potential conflicts of interests between sponsors with an affiliated VC and investors.

Firstly, where a potential conflict of interest between sponsors and investors exists we find VC-IPOs to have larger degrees of underpricing. This seems to suggest that investors fear the opportunistic behaviour of affiliated sponsors. We do not find, however, evidence that those IPOs performed worse over the long-term as could have been the case if affiliated sponsors had taken advantage of investors. It could also be that the evidence of larger underpricing, coupled with normal excess performance in the long-run, is evidence that the market anticipated the conflict of interest problem and, as a result, priced the IPOs correctly. Secondly, we show that controlling for conflicts of interest and other cross-sectional determinants of IPO underpricing, MBO/MBI-VC-IPOs have lower degrees of underpricing, possibly suggesting that the monitoring and certification ability of VCs coupled with the ownership transfer to managers matters. This type of VC backing happens as well to score high in terms of proxies for better VC monitoring and certification ability. Despite scoring high in terms of monitoring proxies, Early-stage-VC-IPOs are not found to be associated with significantly lower degrees of underpricing. We suggest that the positive effect on investors' sentiment of monitoring quality may have been offset by the negative adverse selection effect described in Amit et

al (1990) and Wang et al (2003). According to the adverse selection hypothesis, best ventures will be self funded but average ventures may be funded by venture capitalists because of the same pricing for all "lemons" in the VC market. Because information asymmetry is more severe for Early-stage ventures when investors' products and services have not yet been proven, the effect of adverse selection should be more severe in firms supported by VCs from the Early-stage. We do not find Development-VC-IPOs to be associated with less underpricing. We also note that this type of VC-IPOs scores relatively low in terms of proxies for VC monitoring. Finally, we do not find VC-IPOs to differ significantly in terms of long-run performance depending on the type of funding received, nor do we find significant differences between VC-IPOs as a whole and non-VC-IPOs. However, and as expected, we show that more specialised VCs are associated with IPOs that have a better long-run performance. We argue that the deeper knowledge on a specific investment stage by more specialised VCs may enable them to select better quality firms and monitor them effectively, with this resulting in better stock market long-run performance.

This chapter is organised as followed. Section 2 exposes the motivation for as well as the hypotheses of the chapter. Section 3 describes the construction of the sample, analyses some of its characteristics and presents the institutional setting of this study. Sections 4 and 5 are concerned with the detailed analysis of our hypotheses. Finally, Section 6 concludes the chapter.

2.2 Hypotheses

The evidence on the impact of VCs in reducing the underpricing of VC-IPOs is mixed. Indeed, a number of studies are in contradiction to this claim (see Hamao et al (2000), Ljungqvist (1999), Frankze (2001), Francis and Hasan (2001), Lee and Wahal (2004), Jelic et al (2003)). In the long-term the quality of VC monitoring as well as reputational concerns seem to matter (see Gompers and Lerner (1999[a]), Hamao et al (2000), Espenlaub et al (1999), Wang et al (2002), Jelic et al (2003)), the evidence on the mere presence of a VC is mixed however. In order to shed more light on the impact of VCs on the firms they back, we propose in this chapter a comparative analysis of the

underpricing and long-term performance of VC and non-VC-IPOs on the French *Second* and *Nouveau Marché* over the period 1996 to 2000.

In line with the literature, we first test the hypothesis that if investors value the monitoring activities of VCs as well as their certification abilities:

H1: VC-IPOs are less underpriced than their non-VC counterparts.

The second hypothesis concerns the relationship between VCs and the long-term stock market performance of the firms they back. Specifically, if VCs add value to portfolio firms and minimise problems of asymmetric information and fads:

H2: VC-IPOs perform better in the long-term than their non-VC counterparts.

One of the distinguishing feature of this chapter rests on the fact that we separate the different types of funding received by VC-IPOs. For instance, we recognise that in Europe in general and in France in particular, VCs often invest in management buy-outs and buy-ins (henceforth MBO/MBI), as well as the more "traditional" Early and Development stages. For instance, in France in 2000 buy-outs gathered the highest share of all investments. They represented 38% of all the funds invested by venture capital firms, against 35.5% for operations of Development capital, and 22% for Early-stage investments (see Rapport sur l'activité du capital investissement en France, 2000). Each investment stage relates to different financing needs. Typically, Early-stage funding is the provision of VC funding for young firms that do not generate a profit yet to help them start their business. Development capital is the provision of VC financing for firms that break even or trade profitably, to help them expand their activity. MBO is the provision of funding to help current managers to acquire the business. MBI is the provision of funding to help external managers to acquire the business. We discuss below in greater length the differences between each type of funding as well as their specificities. Because those VC investments are all different from one another, we argue that a separate analysis may reveal some important insights into the virtue of VC backing.

As already mentioned (see Chapter 1), in MBO/MBI the added value is not expected to come only from the presence of VCs. This type of funding is associated with important managerial equity stakes that are expected to enhance entrepreneurial actions.

Still further, theorists have suggested that the large leverage that often accompanies those operations contributes to improve significantly and durably the performance of the firms (see Jensen, 1986). In the US, Muscarella and Vetsuypens (1990), Smith (1990), and Kaplan (1989), amongst others, have shown some evidence that, following a LBO, firms improve their profitability, reduce their costs, and increase cash flows. In the UK, Wright, Thompson, and Robbie (1992), based on a survey of 182 MBOs, show that two-third of the firms experienced clear improvements in profitability. We note also that some differences have been pointed out between MBO and MBI. Robbie and Wright (1996) and Wright, Wilson, and Robbie (1996) point out that the performance of MBIs has generally been less strong. One reason advocated for such a difference is the less detailed knowledge by outside managers of the business. This is believed to have made more difficult the enhancement of short-term profitability by managers and investors. In this study, however, we do not distinguish between MBO and MBI investments, firstly because both types of funding share similarities and secondly because only a few MBI were identified in our sample (3 VC-IPOs received some MBI financing, i.e. 8% of all MBO/MBI-VC-IPOs). Finally, Desbriere and Schatt (2002) point out that French LBOs are far less indebted than in the US[1]. It is has been shown, however, that the change in management shareholding has a greater effect on the emphasis on efficiency goals and productivity as well as on excess return on capital invested than does the change in debt (see Phan and Hill (1995), and Thompson et al. (1992)). As a result, performance enhancements in France are still expected but these should come primarily from the transfer of ownership to managers and VCs. We note, however, that Desbriere and Schatt (2002) find, contrary to the Anglo-Saxon evidence, no reason to believe that MBOs in France improve the performance of acquired firms. They also find that MBOs of family business –where the departure of the founder is often an important risk factor- to underperform MBOs of group subsidiaries.

Another reason for motivating the separate analysis of MBO/MBI-VC-IPOs is the fact that the evidence on the stock price performance of buy-outs is limited, and concerns

[1] As a matter of fact we did not find, in unreported results, any significant differences between the leverage at IPO time of our sample of French MBO/MBI-VC-IPOs floated on the *Nouveau* and *Second Marché* between 1996 and 2000 and the other IPOs of our sample floated on those markets over the same period of time, with the average leverage at IPO time being of approximately 60%.

principally reverse LBOs (see Degeorge and Zeckhauser (1993); Mian and Rosenfeld (1993); Holthausen and Larcker (1996)). This performance has typically been found to be positive or at least non-negative. Jelic et al (2003), however, have recently compared the performance of non-reverse and reverse MBOs in the UK, with the latter exhibiting lower underpricing and worse long-term performance than the former. Furthermore, the authors show VC-backed MBOs to have been more underpriced than their non-VC-backed counterparts, when initial returns are computed on a value-weighted basis. They show no evidence that on the long-term VC-MBOs performed better than non-VC-MBOs. Finally, they find only weak evidence that the long-term performance of VC-MBOs backed by prestigious VCs was better than that of VC-MBOs backed by less prestigious VCs. It is interesting to note that in France, all our MBO/MBI-VC-IPOs are non-reverse deals[2], 31% are divestments from groups, and 69% transfers of ownership. Note that given the evidence from Desbriere and Schatt (2002) that MBOs of family business underperform MBOs of group subsidiaries, we further partition our MBO/MBIs into those that went through a transfer of ownership and those that were divested from a group. Because there is no evidence that the underpricing or long-term performance of the two sub-groups are significantly different from one another (and because our sample of divestments from groups MBO/MBIs is very small) results are not reported.

If MBO/MBI-VC investments are different from other VC investments, there exists also substantial differences between Early and Development stages. Firstly, as mentioned, each investment stage relates to different financing needs. Secondly, the selection process of portfolio firms has very much to do with their stage of development. Amit et al (1990) argue that in a setting with asymmetric information about entrepreneurs' skill level the best ventures will be self funded, but average ventures may be funded by venture capitalists because of the same pricing for all "lemons" in the VC market. Building on the adverse selection hypothesis of Amit at al, Wang et al (2003) argue that as the information asymmetry is more severe for Early-stage ventures when investors' products and services have not yet been proven, the effect of adverse selection

[2] We checked this point thoroughly by carefully reading IPO prospectuses and the *COB*'s notices on all the firms listed since the markets were created. We also investigated firms' websites and contacted some companies directly. Finally, Desbrieres (1993 to 2001) publishes every year since 1993 a report on MBO activities in France where he describes briefly the most significant deals that took place. Based on those reports it does not appear either that our MBO/MBI-VC-IPOs are reverse deals.

should be more severe in firms supported by VCs from the Early-stage. In line with the latter, Elango et al (1995) find that there is more information available to investors in late-stage deals so that the ability to carry out due diligence may well differ between different stages (Wright and Robbie (1998)). Moreover, Elango et al (1995) and Fried and Hisrich (1991) note that, for Later-stage investments, VCs appear to be more concerned by the market acceptance of a product, whereas during Early-stage investments they seem to be more interested in investment built upon proprietary products, product uniqueness, and high growth markets.

Thirdly, the monitoring and counselling needs of portfolio firms also depend on the investment stage. It has been shown that very young organisations require more non-financial resources (such as business assistance) and that VC investing at Early-stage place more emphasis on evaluating and recruiting management than their Later-stage counterparts (see Rosenstein et al (1993), Sapienza and Timmons (1989), Elango et al (1995)). We note, however, that the evidence on the association between the level of VC involvement and the stage of funding is mixed. Some authors find heavier VC involvement in Early-stage ventures (Gomez-Mejia et al (1990), Gorman and Sahlman (1989), and Sapienza (1992)) while other find the level of involvement to depend on the general style the VC wishes to adopt (MacMillan et al (1989), Elango et al (1995)). However, we would expect Early-stage-VC backers to require on average more control over portfolio firms than Development-VCs since the firms they invest in are very risky. In turn, with more control, Early-stage-VCs should be better able to impact significantly on portfolio firms and certify information quality. We would also anticipate that MBO/MBI-VC-backers have large degrees of control in the firms they back since they often contribute, to a large extent, to the overall funding of the project. In line with those expectations, we present some evidence that Early-stage and MBO/MBI-VCs have more cash flow and control rights in the firms they back.

The above discussion highlights the fact that important differences exist in the purpose of funding but also the way VCs select and monitor portfolio firms at every stage. As a result, a separate analysis by type of funding may provide an interesting alternative examination of the virtue of VC backing. Moreover, we explained that the ability of VCs to select, monitor and certify the information quality of portfolio firms

may change with the stage of funding provided. Those differences suggest that it may be worthwhile refining our earlier hypotheses on the impact of VC backing to account for the different types of VC backing provided.

If investors value the effective monitoring and certification ability of MBO/MBI-VCs as well as the ownership transfer to managers, we would expect that:

H3: MBO/MBI-VC-IPOs have less underpricing than other IPOs.

If the ownership transfer to managers along with the effective monitoring of MBO/MBI-VCs add value to the firm, we would expect that:

H4: MBO/MBI-VC-IPOs perform better in the long-term than other IPOs.

Early-stage-VCs are also expected to be able to impact significantly on the firms they back and certify their information quality. However, Early-stage-VCs may be more likely to face potential adverse selection problems at the investment time. Therefore, it is not clear that the presence of Early-stage-VCs will be associated with less underpricing.

If investors fear the potential adverse selection problems faced by Early-stage-VCs, this may well counterbalance the positive impact of good monitoring on investor sentiment. As a result we would expect that:

H5: Early-stage-VC-IPOs do not face lower underpricing.

If adverse selection is a problem we would expect in the long-term that:

H6: Early-stage-VC-IPOs do not outperform other IPOs.

In contrast, if investors do not fear adverse selection problems and value the good monitoring and certification ability of Early-stage-VCs we would anticipate that:

H7: Early-stage-VC-IPOs face lower underpricing.

If adverse selection problems do not materialise and Early-stage-VCs' good monitoring add value to the firms they back we would anticipate that:

H8: Early-stage-VC-IPOs outperform on the long-run.

Contrary to Early-stage-VCs, Development-VCs are less likely to face adverse selection problems. However, they are not expected to have large degrees of control over the firms' affairs. If investors infer that low degrees of control affect the ability of Development-VCs to monitor and certify portfolio firms, we would expect that:

H9: Development-VC-IPOs do not face lower underpricing.

If Development-VCs are limited in their ability to add value to the firms they back because of their lower degrees of control, we would expect:

H10: Development-VC-IPOs do not outperform other IPOs over the long-term.

In contrast, if investors value the ability of Development-VCs to select superior quality firms, we would expect that:

H11: Development-VC-IPOs face lower underpricing.

If Development-VCs do select best quality firms:

H12: Development-VC-IPOs perform better over the long-run.

As an alternative angle on the problem, we also investigate the impact of VC specialisation on the underpricing and long-run performance of the firms they back. Because of the important differences that exist between different types of funding, a number of VCs choose to specialise in one particular stage. It is not unreasonable to believe that a VC would decide to specialise in an investment stage and face the greater systematic risk that comes with lower diversification when it is confident it has some

specific skills (henceforth specialist skills) to select and monitor firms in that stage and as a result reduce its risk. For this reason, the specialisation of the Lead-VC in the investment provided may signal better quality firms.

We took our Lead-VC to be the VC that was on the board[3] prior to the IPO. If more than one VC was on the board or if no VC was on the board we chose the VC that had the highest shareholding amongst the other VCs. This definition of the Lead-VC is slightly different to that used by, for instance, Barry et al (1990), Ljungqvist (1999) and Franzke (2001) where the Lead-VC is the VC with the highest shareholding at the time of the IPO. However, when a Lead-VC is in the board it also usually has the highest shareholding amongst other VCs. Then, we defined a Lead-VC as being specialised in the funding provided (with it being Early-stage, Development-stage or MBO/MBI) when 50% or more of its funds were invested in this type of funding at the time of investment. Manigart et al (2002), for instance, uses the same measure to distinguish between Specialised and Non-specialised VCs. For some VCs we enquired directly what their specialisation was (if any). However, for most of them we used a directory of venture capitalists to infer their specialisation[4, 5].

The Lead-VC, because of its large equity stake sometimes accompanied by a board position, is better placed to impact on the decisions of the firm and has significant incentives to do so. As a result, the other VC partners may also expect more from the Lead-VC in terms of monitoring and counselling. In turn, the Lead-VC is likely to be the VC that is the most involved in the portfolio firm. If the Lead-VC is specialised in the investment stage provided we believe that it may have been able to make better investment decisions and monitor the firm more effectively. Moreover, by conserving a

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[3] Note that there are two types of board representation in France, some "Societés Anonymes" (Limited liability firms) have a "Conseil d'Administration" (most common type of board representation) that is responsible for the management and administration of the firm, and others have a "Conseil de Surveillance" (Second type of board representation) that overlooks the work of the "Directoire" (the body in charge of the management of the firm) and gives its authorisation for the most important decisions.

[4] Hugot J. J. (2000), 'Guide des sociétés de capital investissement', Les Editions du Management

[5] Because the directory we use was published in 2000 the figures reported for the allocation of funds by each VC in any particular type of funding might not have been a correct indicator of the specialisation of those VCs at the time of investment. However, the directory also provides the investment history of each one of our Lead-VCs, and an examination of the latter suggests that none went through significant changes in their investment strategy that could have affected our classification.

Lead position amongst other VCs up to the time of the IPO, which is a very publicised event, the Specialist Lead-VC signals its commitment to its assessment of the firm's quality. Indeed, if the firm proves to perform poorly it is likely that it would be the VC that would suffer the most in terms of reputational capital loss, given its Lead position.

Finally, we also compute a weighted average (based on the equity holdings of each VC investor) of the specialisation of all VC investors, where VCs specialised in the investment provided received a value of one and others zero. For the latter measure, if we cannot determine the specialisation of a VC investor we do not use it in these averages[6].

Therefore, if investors anticipate the better quality and lower uncertainty of Specialist VC IPOs:

H13: Specialist VC-IPOs have less underpricing than other IPOs.

If Specialist VCs signal better IPOs we would expect that:

H14: Specialist VC-IPOs perform better in the long-term than other IPOs.

Finally, we examine the impact of potential conflicts of interest between sponsors and investors. As explained, under such circumstances the sponsor may have an incentive to use the private information it gets from its venture capitalist to time the issue and set a high offer price that would make the exit of the VC at the time of the offer more valuable and/or reduce the dilution of its equity holdings. This can potentially be an important problem in France given the large proportion of VCs that are affiliated to a bank. In unreported results we actually found that 53% of all the VC IPOs floated on the *Second* and *Nouveau Marché* between 1996 and 2000 had their Lead-VC affiliated to a bank. Still further, in 43% of the cases one of the sponsors of the issue (found to be in 97% of the cases the Lead sponsor) is affiliated with one of the VC investors. The frequency of potential conflicts of interest is therefore quite high and underline the importance of considering such problems.

If potential conflicts of interests are anticipated by the market:

H15: VC-IPOs where a sponsor is affiliated with one of the VC investor have larger first day returns than other IPOs.

If potential conflicts of interest between sponsors and investors materialise:

H16: VC-IPOs where a sponsor is affiliated with one of the VC investor have a poor long-term performance compared to other IPOs.

2.3 Data, descriptive statistics, and institutional setting

We found in the listings of the Commission des Opérations de Bourse (*COB*, the body in charge mainly of overlooking financial information on the French stock market) and *Euronext* (the company in charge of managing the French stock market) a total of 369 introductions on the *Second* and on the *Nouveau Marché* from 1996 to 2000.

The *Second Marché*, created in 1983, is the market for mature medium size companies, which have established a know-how in their sector of activity and offer attractive growth prospects. Companies on this market have to make at least 10% of their capital available to the public. They also have to present in their IPO prospectus certified accounts over two years. All the major sectors of activity are represented in the *Second Marché*.

The *Nouveau Marché*, created in 1996, is the market for high growth firms that have to finance a project for their development. Firms to be able to float their shares on this market need to have at least 1.5 million Euro in net worth. They have to make available to the public at least 20% of their capital, which must account for at least 100 000 shares and 5 million Euro. At least 50% of the offer to the public must come from the creation of new shares. There is no need to have an accounting history to be introduced on the *Nouveau Marché*, and therefore young firms are numerous in this market. However, a business plan for the three years that follow the IPO needs to be

[6] For most of those VCs where the investment data was available in our directory of VC firms, we did not find in their investment history any significant shift in investment pattern that could have affected our classification. However, when a doubt subsisted we contacted the VC firm directly.

presented in the IPO prospectus. Because of its characteristics the *Nouveau Marché* is particularly attractive for high-tech and bio-tech firms.

For both markets the *COB* attests that the relevance and consistency of the information disclosed in the IPO prospectus were checked.[7]

We removed from our sample a number of companies, such as those that were transferred from another market or had simultaneously an IPO in a foreign market, non-French companies, a holding company that invests in quoted firms, and two banks that issued very specific types of securities. We were then left with 312 firms, 142 from the *Nouveau Marché* and 170 from the *Second Marché*. Table 1 tells us that 1998 was a year of high IPO activity especially on the *Second Marché*. On the *Nouveau Marché* although the IPO activity was relatively high in 1998, the year 2000 was the most active year in our sample. In contrast, on the *Second Marché* the year 2000 was pretty flat.

Table 1: Pattern of issuance of IPOs over time and by markets

Years	Total IPOs	%	Total IPOs SM [1]	%	Total IPOs NM [2]	%
2000	56	18%	12	7%	44	31%
1999	55	18%	26	15%	29	20%
1998	102	33%	65	38%	37	26%
1997	54	17%	37	22%	17	12%
1996	45	14%	30	18%	15	11%
Total	312	100%	170	100%	142	100%

[1] *Second Marché*; [2] *Nouveau Marché*

We identified VC-IPOs in our sample by looking at the names of the main shareholders prior to the IPO in each one of the issuing firms and comparing them with the names listed on three directories of venture capital firms[8]. Also, when the name of a shareholder was not listed in our directories and we were not sure that it was not a VC, we got in touch with the shareholder or investigated its web site. Furthermore, we contacted the issuing firms that we identified as being VC-backed and the institutions that we thought were venture capitalists so as to understand the motivation for the participation of the VC, i.e. the investment stage for which they provided funding, this

[7] For a detailed presentation of the regulations of the *Second* and of the *Nouveau Marché* see: Article P.1.1.31, Book II, Specific rules applicable to the French regulated markets http://www.amf-france.org/styles/default/documents/general/4890_1.pdf.

[8] Association Fançaise des Investisseurs en Capital (AFIC), Annuaire 2001
Hugot J. J. (2000),'Guide des sociétés de capital investissement', Les Editions du Management
CDC PME (2001), 'Le capital investissement régional', Groupe Caisse des Dépôts

last step also provided an opportunity to check the accuracy of our identification process. We have been able to identify 148 VC-IPOs, 69 from the *Second Marché* and 79 from the *Nouveau Marché*. From those 148 VC-IPOs, 53 received initial funding at an Early-stage, 47 to finance their Development/Expansion, and 39 for operations of Management Buy-out (MBO) and Buy-in (MBI). 9 companies (or 6% of VC-IPOs) did not fall in any of the three categories described, and concerned very different and specific types of investments such as cash-out, bridge financing, and turnaround financing[9]. Because little could be said about the specific underpricing and long-run performance of those 9 firms, we chose for the sake of clarity to report only results for the comparative analysis between non-VC-IPOs and VC-IPOs that received any of the three main types of funding identified, namely: Early-stage investments, Development-stage investments, and MBO/MBI investments.

Table 1 presents a detailed description of the distribution of VC and non-VC-IPOs on the *Second* and *Nouveau Marchés*. More VC-IPOs come from the *Nouveau Marché* than from the *Second Marché*. In contrast, non-VC-IPOs are more concentrated on the *Second Marché*. A *chi-square test* for different population distributions actually rejects, at the 1% significance level, the null hypothesis that the distribution of VC and non-VC-IPOs between markets is the same. It could have been expected that firms on the *Nouveau Marché* be more likely to rely on venture capital investments to finance their development, because they have more risk and little trading history.

Further analysis, presented in Table 2, shows that the difference between the distributions of VC and non-VC-IPOs in the *Second* and *Nouveau Marchés* stems from the very high concentration of Early-stage-VC-IPOs in the *Nouveau Marché* –as one would have expected-. No significant difference can be found between the distribution of non-VC-IPOs and those of MBO/MBI-VC-IPOs and Development-VC-IPOs. Furthermore, we note that those IPOs where the Lead-VC is specialised in the stage of funding provided are more often floated on the *Nouveau Marché*, the converse is true for VC-IPOs of non-specialised Lead-VC. The difference between the distributions of the

[9] Cash-out investments are VC interventions designed to enable managers to sell part of their equity holdings prior to the IPO. Bridge financing is the provision of finance in the period of transition between being privately owned to being publicly quoted. Turnaround finance is the provision of finance for firms that experienced trading difficulties and aims at re-establishing prosperity.

two groups is significant at the 1% level. The difference between the two groups can be traced back to the fact that Early-stage-VC-IPOs often have a Specialist Lead-VC (see Table 4).

In line with the evidence on the distribution of VC and non-VC-IPOs between markets, we find that Early-stage-VC-IPOs are significantly younger than non-VC-IPOs and the other VC-IPOs of our sample. No significant difference is found between the age of non-VC-IPOs and that of MBO/MBI and Development-VC-IPOs. Also, the IPOs of Specialist Lead-VCs differ neither from the other VC-IPOs nor from non-VC-IPOs in terms of their age at IPO time.

Table 2 also looks at differences between VC and non-VC-IPOs in terms of size; in terms of offer proceeds; and in terms of growth options. Furthermore, Table 2 compares non-VC and VC-IPOs in terms of the market momentum at IPO time. Market momentum is Derrien and Womack (2003) 3-month weighted average of the MIDCAC (the index of French mid-capitalisation). The weighted index is calculated as follows: they use the Buy and Hold Return on the MIDCAC for the three months prior to the IPO, and give a weight of 3/6 to the earliest month, 2/6 for the second month, and 1/6 to the latest month. In cold market times it is sometimes very difficult to sell stocks at a reasonable price, in hot market times however all issuers want to take advantage of the "windows of opportunities". Looking at differences between the market momentum at the IPO time of VC and non-VC-IPOs could give some insights into the timing abilities of VCs.

Finally, Megginson and Weiss (1991) suggest that VCs should attract higher quality underwriters and auditors since the presence of a VC should reduce their cost of due diligence (i.e. the cost of personally certifying the issue) and protect their own reputational capital. Therefore, we also investigate differences in the association of VC and non-VC-IPOs with reputable sponsors. To decide on which firms to take as our most reputable sponsors, we ranked the sponsors according to the number of IPOs that they had backed over the period of our study as well as the amount of IPO proceeds that they underwrote. Because activity (the proportion of IPOs backed by a sponsor/market share of underwitten IPO proceeds over the period of our study) and reputation may not be related we cross-checked with professionals (sponsors, financial analysts, and bankers)

Table 2: Characteristics of VC and non-VC-IPOs at IPO time

		Market Momentum	Age	Book-to-market	Offer Proceeds M Euro	Market Value M Euro	Reputable Sponsor	NM	SM
			aaa	*a,bb*	*aaa,bbb,cc,ddd,ee*	*aa,bb,cc*		*aaa,bbb,ccc*	
Non-VC-IPOs	Mean	1.51%	18.90	31.96%	11.71	70.84	94	63	101
	St.dev./Per.	3.45%	20.65	24.83%	19.41	96.81	34%	38%	62%
	Count	164							
					aaa	*aa*		*aaa*	
VC-IPOs	Mean	1.76%	18.22	33.20%	21.04	102.05	79	75	64
	St.dev./Per.	3.84%	20.90	22.92%	20.89	123.26	57%	54%	46%
	Count	139							
			aaa,bbb,ccc	*a,ccc,dd*	*bbb,fff*			*bbb,ddd,eee*	
Early-stage-VC-IPO	Mean	1.61%	8.40	25.48%	22.87	105.73	28	46	7
	St.dev./Per.	4.02%	8.60	20.15%	20.02	153.97	53%	87%	13%
	Count	53							
			bbb	*bb,ccc*	*cc,ggg*	*bb*		*ddd*	
MBO/MBI-VC-IPOs	Mean	1.88%	24.21	41.41%	27.95	114.54	20	15	24
	St.dev./Per.	3.24%	22.01	27.72%	27.64	120.75	51%	38%	62%
	Count	39							
			ccc	*dd*	*fff,ggg*			*eee*	
Development-VC-IPOs	Mean	1.82%	24.32	35.10%	13.22	87.54	31	14	33
	St.dev./Per.	4.08%	25.43	18.77%	10.91	79.83	66%	30%	70%
	Count	47							
					ddd	*cc*		*ccc*	
Specialist VC-IPOs	Mean	1.73%	18.08	32.94%	23.33	107.74	43	47	33
	St.dev./Per.	3.95%	21.68	24.60%	22.57	136.10	54%	59%	41%
	Count	80							
					ee				
Non-specialist VC-IPOs	Mean	1.79%	18.41	33.56%	17.92	94.34	36	28	31
	St.dev./Per.	3.70%	19.98	20.62%	18.10	103.99	61%	47%	53%
		59							

In Table 2 we perform two-sided *t-test* on the difference of two means (assuming unequal variances when the results from an *F-test* are conclusive), and *chi-square* test on the difference between two populations' distributions. Two cells of the same column that have identical letters at the top of the cells are statistically significantly different from each other. The significance level is related to the number of letters in any of the two cells. *One letter*, *two letters*, *three letters* represent respectively 10%, 5% and 1% significance level. For instance, looking at the column 'Age', we see that non-VC-IPOs are significantly older than Early-stage-VC-IPOs at the 1% level (*aaa*).

Market momentum: a weighted average of the market's run-up in the three months just prior to the IPO. Specifically, we compute the Buy and Hold Return on the MIDCAC for the three months prior to the IPO, and give a weight of 3/6 to the earliest month, 2/6 for the second month, and 1/6 to the latest month. Age: the age of the firm at the time of the IPO in years. Book-to-Market: the book-to-market ratio of IPO firms, with the market value being calculated at the first closing price and the book value being the first book value after the IPO. Market Value: the size of the IPO estimated at the first closing price in M Euro. Offer proceeds: the number of shares in the offer multiplied by the offer price in M Euro. Reputable Sponsors: we identified 5 reputable sponsors over the period of our study. These include Groupe Banque Populaire (including Portzamparc), Groupe Oddo-Pinatton, Groupe Crédit Agricole (including Cheuvreux), Groupe Crédit Lyonnais, Groupe CIC (EIFB). NM: *Nouveau Marché*. SM: *Second Marché*.

that our list of most reputable sponsors (sponsors with a greater degree of activity) was sensible. Armed with our two measures of activity and our discussions with professionals, we selected five sponsors as 'highly reputable' ones. The five sponsors that were selected are namely: Groupe Banque Populaire (including Portzamparc), Groupe Oddo-Pinatton, Groupe Crédit Agricole (including Cheuvreux), Groupe Crédit Lyonnais, Groupe CIC (including EIFB).

From Table 2 there is no evidence that VC-IPOs were issued during significantly "hotter" market periods. We neither find significant differences between the book-to-market ratios of VC and non-VC-IPOs. MBO/MBI-VC-IPOs, however, appear to have had significantly larger ratios than non-VC-IPOs. Early-stage-IPOs are the VC-IPOs with the lowest book-to-market ratios, as could have been expected, and the difference with non-VC-IPOs just achieve significance at the 10% level on a two-sided test. Except for Development-VC-IPOs, Table 2 reveals that all other sub-groups of VC-IPOs have had significantly larger offer proceeds than non-VC-IPOs. An obvious explanation for Early-stage-VC-IPOs is that they are more concentrated within the *Nouveau Marché* where more stringent requirements with regards to the size of the offer applies. Furthermore, VC-IPOs are shown to have had a significantly larger average market valuation than non-VC-IPOs. MBO/MBI-VC-IPOs are those VC-IPOs that had the highest market valuation on the first closing price. Early-stage-VC-IPOs in addition to having low book-to-market ratios have also large market valuations, two characteristics of growth firms. Finally, we do not find evidence that VCs (or any sub-groups of them) were more likely to be associated with reputable sponsors.

To deepen further our comparative analysis of VC and non-VC-IPOs, we also examined differences in the industrial distribution of each group. Table 3 shows that a large proportion of IPOs over the 1996-2000 period came from the IT, Internet and Software sector, with Early-stage-VC-IPOs having the largest leverage in this industry. For non-VC-IPOs and the Later-stage-VC-IPOs of our sample we note that traditional sectors are important as well.

Table 3: Industrial Classification of VC and non-VC-IPOs

	Biomedical	IT, Software, and Internet	Media and Entertainment	Technology	Telecom	Traditional
Non-VC-IPOs	8 (5%)	46 (28%)	21 (13%)	34 (21%)	0 (0%)	55 (33%)
VC-IPOs	11 (8%)	48 (35%)	16 (12%)	22 (16%)	4 (3%)	38 (27%)
Early-stage-VC-IPO	5 (9%)	27 (51%)	6 (11%)	5 (9%)	3 (6%)	7 (13%)
MBO/MBI-VC-IPOs	4 (10%)	12 (31%)	2 (5%)	9 (23%)	0 (0%)	12 (31%)
Development-VC-IPOs	2 (4%)	9 (19%)	8 (17%)	8 (17%)	1 (2%)	19 (40%)
Specialist VC-IPOs	6 (7%)	29 (36%)	10 (12%)	14 (17%)	3 (4%)	18 (23%)
Non-specialist VC-IPOs	5 (8%)	19 (32%)	6 (10%)	8 (14%)	1 (2%)	20 (34%)

Table 4 presents a number of descriptive statistics on the characteristics of VC backing at the time of the IPO. Many of those descriptive statistics corresponds to some measure of monitoring quality and certification ability. Amongst the different measures of monitoring quality and certification ability that we look at are the number of board seats held by VCs and the level of VC shareholding.

We bear in mind, however, the discussion in Chapter 1 where it was said that VCs put in place some clauses that enable them to increase their control over the firm when performance goes badly. However, those firms that make it up to the IPO stage are likely to be the best ones from the VC's portfolio because the rewards are the highest in reputation and pecuniary terms for both founders and VCs (see Gompers (1995), Gompers and Lerner (1997), and Gompers and Lerner (1999[b])).

Therefore, we believe that, on average, larger cash flow and control rights should signal better monitoring quality. We are not the first one making such assumptions. For instance, Barry et al (1990), and Gompers and Lerner (1998), see the fraction of the issuing firm's shares owned by the VC and its presence in the board as signals that it has more incentives to monitor and participate in management.

In order to comment the findings of Table 4 we proceed as follows: first, we look at all VC-IPOs together (column 1), then we compare VC-IPOs according to the stage when they received funding (columns 2 to 4), finally (column 5 and 6) we distinguish between Specialist Lead-VC-IPOs and IPOs backed by Non-specialist VCs.

Table 4 tells us that 55% of our VC-IPOs have at least one VC in the board. This is small and suggests that VCs may fear to face a liability in case the firm performs poorly[10]. Moreover, the average number of VCs in the board is 0.88, and the average percentage of board seats held by VCs only 14%.[11]

Under certain circumstances where firms want to change their status or create new shares for the IPO, a general extraordinary meeting with the shareholders has to take place. In such circumstances, for managers to be able to implement their plans they need to obtain two-third of the votes. Where VCs have, as a group, more than one-third of the voting rights it could be that in order to protect their reputation they block decisions to go for an IPO unless they are satisfied that they can certify the information provided to investors. More generally, a blocking minority interest also says something about the ability of VCs to impact on the decisions of the firm they back and therefore monitor actively their portfolio firms. In approximately a third of the cases (35%) VCs have a blocking minority interest in their investee firm and a general extraordinary meeting took place before the IPO. Furthermore, we note that the average shareholding of the Lead-VC is equal to 16%, and the average total VC shareholding to 30%. Typically, the total VCs' stake is shared amongst 3 VCs. The large equity stake held by VCs is much higher than their share of board seats and suggests that even though VCs may try to avoid problems of liability by not often seeking a position in the board, they still have major incentives to be actively involved in the firms they back.

In 58% of instances the Lead-VC is specialised in the investment stage provided (i.e. has 50% or more of its funds committed to the investment stage provided). We also compute a weighted average (based on the equity holdings of each VC investor) of the

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[10] One may be tempted to argue that members of the "Conseil de Surveillance" bear less legal liability than their counterparts on the "Conseil d'Administration". However, this argument can be strongly criticised on the ground that members of the "Conseil de Surveillance" are always involved when decisions are important or taken during difficult times, so that they also bear a legal liability.

[11] As just mentioned this situation is likely to be due to the legal liability that may be incurred by board members. Thus, Charterhouse –a VC firm- that backed Nasa Electronique and had a seat on its board was in the 90s condemned to pay the firm's liabilities (400 millions FFR) after it went bankrupt, when it held only 5% of its equity capital (Cass. com. 3 Janvier 1995, Bull.Joly 1995, p. 266, note Couret). This decision was interpreted by French VCs as a signal that they should be careful before becoming too formally involved in the management of portfolio firms, especially given that they often are the most credit worthy shareholder (Mougenot, 2000).

specialisation of all VC investors. The mean-weighted average specialisation of VCs in our sample of VC-IPOs is 56%.

Furthermore, we investigate the reputation of the Lead-VC backer. We chose the age of the VC as a proxy for their reputation because age can credibly signal the seriousness and competency of the VC. Indeed, age is evidence that the VC has successfully managed operations in the past, since one could argue that it would not have otherwise remained in business. Age has been used to proxy for the reputation and experience of VCs in a number of other studies (see for instance: Espenlaub et al (1999), Gompers and Lerner (1999[a])). We look at the age[12] of the Lead-VC at the time of the IPO as well as a weighted average (based on the equity holdings of each VC investor) of the age of all VC investors in the firm at the time of the IPO. For the latter measure, if we cannot determine the age of a VC investor we do not use it in these averages. The average age for the Lead-VC and the weighted average of the age all VC investors are both approximately equal to 14 years.

It is interesting to note that VCs in France are shown to be selling a relatively large proportion of their shares at the time of the IPO. The average percentage of the total VC shareholding sold at the time of the IPO is equal to 22%, and the average percentage of the Lead-VC's shareholding sold at the time of the offering is equal to 20%. The percentage of equity stake sold at the time of the IPO tells us about the extent to which VCs see the IPO as a mean of immediate exit. Megginson and Weiss (1991) suggest that the retention by VCs of a significant holding in the issuing firms puts more weight on the credibility of the certification by VCs of the information provided. This is because the lower the shareholding sold at the time of the IPO, the lower the short-term incentives to certify falsely. We note, however, that Ljungqvist (1999) proposes an alternative expectation with regard to the effect of VC selling intensity on underpricing. Specifically, the author argues that the greater the selling intensity of the VC, the more

[12] We could distinguish between five different types of structures that conducted venture capital investments in our sample. These are: the Société de Développement Régional (SDR), the Société Anonyme (SA), the Société de Capital Risque (SCR), the Fonds Commun de Placement à Risque (FCPR), and the Fonds Commun de Placement Innovation (FCPI). The SCR, the SDR and the SA are one entity, and therefore the date of creation of those companies is the date when they were incorporated. For the FCPR and the FCPI, which are divided into the fund(s) that consists of the actual shares of investors and a company that manages the fund(s), it is sensible to take as the date of creation the date when the fund management company was incorporated.

Table 4: (Part I) Characteristics of VC backing at IPO time

	VC-IPOs Average/Count Median/% (Stdev)	MBO MBI	Early-stage	Development	Specialist VC-IPO	Non-specialist VC-IPO
Count	139	39	53	47	80	59
Position in the board	76 55%	*aa* 25 64%	*bb* 33 62%	*aa,bb* 18 38%	48 60%	28 47%
Board seats held by VCs	0.88 1 (103.88%)	*aaa* 1.03 *aaa* 1 (101.27%)	*bbb* 1.17 *bbb* 1 (123.62%)	*aaa,bbb* 0.43 *aaa,bbb* 0 (58.03%)	*cc* 1.04 *cc* 1 (114.1%)	*cc* 0.66 *cc* 0 (84.3%)
Share of board seats held by VCs	13.80% 12.5% (15.49%)	*aaa* 16.14% *aaa* 16.67% (14.75%)	*bbb* 18.22% *bbb* 16.67% (18.24%)	*aaa,bbb* 6.86% *aaa,bbb* 0% (9.37%)	*ccc* 17% *cc* 16.67% (17.1%)	*ccc* 10% *cc* 0 (12.1%)
Number of VCs involved	3.08 3 (2.09)	*a* 3.33 *aa* 3 (2.14)	*bb* 3.36 *bb* 3 (2.22)	*a,bb* 2.55 *aa,bb* 2 (1.80)	3.15 3 (2.06)	2.98 3 (2.14)
Blocking minority	48 35%	*a,bbb* 23 59%	*a,ccc* 22 42%	*bbb,ccc* 3 6%	31 39%	17 29%
Lead-VC shareholding before IPO	16.16% 12.80% (12.96%)	*aaa,bbb* 23.61% *aaa,bbb* 19.83% (16.12%)	*aaa,ccc* 15.76% *aaa,ccc* 13.6% (12.33%)	*bbb,ccc* 10.44% *bbb,ccc* 9.14% (6.07%)	17.50% *d* 14.61% (13.22%)	14.34% *d* 10.72% (12.47%)
Total VC shareholding before IPO	29.75% 25% (21.07%)	*aa,bbb* 42.22% *aa,bbb* 42.66% (21.88%)	*aa,ccc* 32.04% *aa,ccc* 28.32% (21.38%)	*bbb,ccc* 16.81% *bbb,ccc* 15.12% (10.53%)	*d* 32.44% *d* 27.95% (22.37%)	*d* 26.11% *d* 21% (18.75%)
Average Age of Lead-VC	14.08 13 (882%)	13.61% 13.5 (815.31%)	14.27 12 (911.72%)	14.23 13.5 (917.5%)	13.66 12 (868.8%)	14.75 14 (907.1%)
Average Age of all VCs (year)	14.36 13.10 (719.82%)	14.21 12.18 (672.21%)	14.14 13.35 (701.67%)	14.75 14 (789.02%)	13.92 12.83 (691.2%)	14.99 13.50 (760.68%)
Specialist Lead-VC	80 58%	*a* 24 62%	*bbb* 37 70%	*a,bbb* 19 40%	–	–
Average Specialization	55.58% 59.29% (39.27%)	*a* 56.39% *a,b* 58.46% (36.52%)	*bbb* 67.42% *b,ccc* 78.57% (36.27%)	*a,bbb* 41.55% *a,ccc* 44.67% (40.93%)	–	–
Lead-VC equity stake sold	20.40% 10% (26.09%)	*aa* 24.48% *aaa* 15% (27.24%)	*aa,bb* 12.94% *aaa,bbb* 0% (20.74%)	*bb* 25.41% *bbb* 15.70% (28.96%)	21% 10% (26.9%)	20% 10% (25.1%)
Total VC equity stake sold	21.85% 11.87% (26.22%)	*aa* 26.11% *aaa* 15% (26.96%)	*aa,bb* 14.91% *aaa,bb* 4.21% (22.40%)	*bb* 26.13% *bb* 16.33% (28.39%)	22% 10.05% (27.2%)	22% 13% (25%)
Total VC shareholding after IPO	19.40% 16.04% (14.95%)	*aaa* 26.64% *aaa* 23.75% (16.55%)	*bbb* 21.55% *bbb* 18.74% (14.72%)	*aaa,bbb* 10.99% *aaa,bbb* 8.42% (8.80%)	21% 16.38% (15.5%)	17% 14.72% (14.1%)

Table 4: (Part II) Characteristics of VC backing at IPO time

	VC-IPOs Average/Count Median/% (Stdev)	MBO MBI	Early-stage	Development	Specialist VC-IPO	Non-specialist VC-IPO
Lead-VC shareholding after IPO	10.53%	*a,bbb* 14.72%	*a,ccc* 10.71%	*bbb,ccc* 6.83%	11%	10%
	8.1% (8.91%)	*a,bbb* 11.15% (10.99%)	*a,ccc* 8.73% (8.74%)	*bbb,ccc* 6% (4.83%)	8.65% (8.7%)	6.78% (9.2%)
Conflict	64 46%	19 49%	21 40%	24 51%	38 48%	26 44%
Captive Lead-VC	*70 74%*	*bbb 12 55%*	*27 75%*	*bbb 31 86%*	*44 73%*	*26 76%*
Semi-captive Lead-VC	*24 26%*	*10 45%*	*9 25%*	*5 14%*	*16 27%*	*8 24%*
Affiliated Lead-VC	94 68%	*aa* 22 56%	36 68%	*aa* 36 77%	*bb* 60 75%	*bb* 34 58%
Independent Lead-VC	39 28%	14 36%	16 30%	9 19%	18 23%	21 36%
Foreign Lead-VC	6 4%	3 8%	1 2%	2 4%	2 3%	4 7%
VC Lock-up	67 48%	*aa* 16 41%	*aa,bbb* 35 66%	*bbb* 16 34%	40 50%	27 46%

In Table 4 we perform two-sided *t-test* on the difference of two means (assuming unequal variances when the results from an *F-test* are conclusive), two-sided *Mann-Whitney U test* on the difference of two medians, and finally *chi-square test* on the difference between two populations' distributions. Two cells of the same row that have identical letters at the top (or in the middle) of the cells are statistically significantly different from each other (at the median level). The significance level is related to the number of letters in any of the two cells. *One letter, two letters, three letters* represent respectively 10%, 5% and 1% significance level. For instance, looking at the row 'Board seats held by VCs', we see that MBO/MBI-IPOs hold significantly more board seats than Development-VC-IPOs at the 1% level (*aaa*), looking both at the means and medians of our samples.

important its stake in the IPO and as a result the greater the efforts it is expected to deploy in trying to reduce its wealth losses. Therefore, according to this theory, VC selling intensity is expected to be negatively, rather than positively, related to the magnitude of IPO underpricing. As a result of this selling process and the creation of new shares, the total VCs' shareholding in the aftermath of the IPO is equal to 19%, and the shareholding of the Lead-VC to 11%. Although much reduced, the equity stakes of VCs after the IPO remains significant.

We also investigate the likelihood of potential conflicts of interests between sponsors and investors. In 46% of the cases one of the sponsors of the issue (found in unreported results to be in 97% of the cases the Lead sponsor) is affiliated with one of the VC investors. The frequency of potential conflicts of interest is high and can be explained by the fact that firms are often being backed by VCs affiliated to banks. In 68% of the cases the Lead-VC is affiliated to a company with it being in most cases a bank (83% of instances in unreported results).

Still with this issue of VC affiliation in mind, it could be argued that for bank affiliates, VC investments can be seen an extension of the services provided to a potentially profitable market segment and as a mean to bind clients (Bruno, 1996). Also, VCs affiliated to an industrial company may exist primarily as a mean to get a window on technology, obtain technology licenses or product marketing rights, or secure international business opportunities (Siegel et al (1988), Manigart and Struyf (1997)). Therefore it seems that affiliated VCs may have other goals than solely maximising returns when investing. Actually, Manigart al (2002) argue that captive VCs may have greater tolerance for lower returns than independent VCs, providing that other goals are being met. Indeed, independent VCs invest the money of investors whose major objective is to ensure return on investment. Moreover, rationalisation of the number of VCs in which investors invest, as well as the greater transparency of the returns being earned by VCs (Robbie et al, 1999) mean that the latter need to demonstrate above-average returns if they want to raise new funds. Wang et al (2002) find evidence in Singapore that IPOs backed by an independent VC perform better over the long-term than IPOs backed by a finance-affiliated VC. We note, however, that it has also been suggested that affiliated VCs may have more reputational capital at stake making them screen companies more carefully and to ensure that the IPO price is conservative (see Espenlaub et al, 1999).

The distinction between Independent and captive VCs is blurred in our sample with some affiliated VCs raising funds from outside investors. Therefore, we distinguish in Table 4 between three types of VCs: captive VCs, semi-captive VCs, and independent VCs. Captive VCs being VCs that are affiliates of a bank, an insurance company or an industrial company and which receive most of their funds (i.e. more than 50% of their funds) from the parent company. Semi-captive VCs are affiliated VCs that raise most of their funds (i.e. more than 50% of their funds) from outside investors. Note that a few VC IPOs had as their Lead-VC a foreign VC firm (i.e. non-France based venture capitalists). Irrespective of their affiliation, we classified the VC-IPOs backed by such VC firms as "foreign backed VC-IPOs". 6 VC-IPOs (or 4% of all VC-IPOs) were classified as such. Table 4 tells us that most of our affiliated Lead-VCs are captive (74%). An independent Lead-VC is backing an IPO in 28% of the cases.

Table 4 also looks at the likelihood for VCs of entering a lock-up agreement. When VCs decide to lock-up their shares they may provide a strong signal to investors that they do not intent to benefit from their inside information to earn short-term gains. In 67 VC-IPOs (or 48% of all VC-IPOs), VCs chose to enter a lock-up clause.[13]

The separate analysis of each one of the three different types of VC involvement enable us to identify major differences between the characteristics of VC backing prior and just after the IPO depending on the VC funding received. First of all, in respectively 62% and 64% of instances Early-stage and MBO/MBI-VC-IPOs have at least one VC with a board position. For Development-VC-IPOs this happens in only 38% of cases. Those differences in the likelihood of having a VC in the board are significant at the 5% level. Moreover, we note that MBO/MBI-VC-IPOs and Early-stage-VC-IPOs have an average number of VCs in their board (respectively 1 and 1.17) that is statistically significantly greater, at the 1% significance level, than that of Development-VC-IPOs (0.4). Still further, we notice that the average percentage of board seats held by VCs in investee firms is statistically significantly greater, at the 1% significance level, for MBO/MBI and Early-stage-VC-IPOs (respectively 16% and 18%) than for Development-VC-IPOs (7%). Furthermore, we find that MBO/MBI-VC-IPOs see the involvement of significantly more VCs (3.3) than Development-VC-IPOs (2.6) at the 10% level. This is true as well for Early-stage-VC-IPOs (3.4) but the difference with Development-VC-IPOs is significant in this case at the 5% level.

In respectively 42% and 59% of cases VCs have a blocking minority interest in Early-stage and MBO/MBI-VC-IPOs. For Development-VC-IPOs this is the case in only 6% of instances. These differences are significant at the 1% level. The Lead-VC in Development-VC-IPOs holds 10% of the capital of the firm prior to the IPO, 16% in Early-stage-VC-IPOs, and 24% in MBO/MBI-VC-IPOs. The shareholding of the Lead-VC in MBO/MBI-VC-IPOs is significantly greater than in Early-stage and Development-VC-IPOs at the 1% level. We also find the shareholding of the Lead-VC to be significantly greater for Early-stage-VC-IPOs than for Development-VC-IPOs at the 1% level. The evidence regarding the total shareholding of VCs prior to the IPO resembles that for the Lead-VC. For MBO/MBI-VC-IPOs, VCs hold 42% of investee firms' total

[13] Note that, in addition, in 6 cases VCs were explicitly required to enter a lock-up agreement.

shares prior to the IPO, 32% for Early-stage-VC-IPOs, and 17% for Development-VC-IPOs. The difference between the total VCs' shareholding of MBO/MBI-VC-IPOs and Development and Early-stage-VC-IPOs is significant respectively at the 1% and 5% significance level. Still further, the difference between Early-stage-VC-IPOs and Development-stage-VC-IPOs is significant at the 1% level. The fact that the evidence on cash flow rights resembles that for control rights comes as no surprise given that the two go together.

The fact that Early-stage and MBO/MBI-VC backers have more control as well as cash flow rights compared to Development-VCs is not surprising and was anticipated earlier in this chapter when discussing our different hypotheses. Early-stage venture capital investments are very risky, and this justifies the close monitoring and control by VCs of their investment. For MBO/MBI the reason for the greater control and interest of VCs in the firm has to do with the fact that they often contribute to a large extent to the overall funding of the project.

Moreover, we note that in respectively 62% and 70% of instances MBO/MBI-VC-IPOs and Early-stage-VC-IPOs have their Lead-VC that is specialised in the investment stage provided. This is only the case in 40% of instances for Development-VC-IPOs. The difference is significant at the 1% significance level in both cases. Similar results are found when looking at the weighted average specialisation by type of funding received. Early-stage-VC-IPOs (67%) and MBO/MBI-VC-IPOs (56%) have significantly larger degrees of average specialisation than Development-VC-IPOs (42%), at the 1% and 10% levels respectively. We do not find any significant differences in the age of the Lead-VC or weighted average of the age of all VC investors at the IPO time conditional on the initial investment stage provided. For all stages the age of the Lead-VC and the weighted average of the age of all VC investors is approximately 14 years at the IPO time.

VCs in Early-stage-VC-IPOs sell on average significantly less of their shareholding at the IPO time (all VCs= 15%, Lead-VC= 13%) than VCs in Development and MBO/MBI-VC-IPOs (Development-VCs / Lead-VC = 26% / 25%, and MBO/MBI-VCs / Lead-VC= 26% / 24%). Institutional characteristics could explain those differences. Over the period of the study on the *Nouveau Marché* –where most Early-

stage-VC-IPOs come from- anybody who became a shareholder in a firm in the year preceding its IPO might not have been able to sell his/her shares for a year after the IPO (this has now been extended to the *Second Marché*). Also, *Euronext* wants to ensure that on the *Nouveau Marché* managing shareholders remain interested in the performance of their firm after the IPO, so that the latter maybe subject to selling constrains at the time of the IPO, and always face share lock-up periods after the IPO[14]. Finally, it is forbidden on the *Nouveau Marché* for managing shareholders to sell the shares of a company that is less than two years old[15].

Despite those differences in the selling decisions of VCs at the time of the IPO, we still find VCs of MBO/MBI-VC-IPOs to have a greater shareholding in their investee firms in the aftermath of the IPO (total VCs / Lead-VC = 27% / 15%) than for Early-stage (total VCs / Lead-VC = 22% / 11%) and Development deals (total VCs / Lead-VC = 11% / 7%).

It is interesting to note that conflicts of interests are more common for Development-VC-IPOs (51% of instances) and MBO/MBI-VC-IPOs (49% of cases) than for Early-stage-VC-IPOs (40% of instances). The differences are however not significant. As a mater of fact 77% of our Development-VC-IPOs have a Lead-VC affiliated to a company. This is the case for 68% and 56% of Early-stage and MBO/MBI-VC-IPOs. The difference in the likelihood of being backed by an affiliated Lead-VC is significant at the 5% level for Development and MBO/MBI-VC-IPOs. The Lead-VC in MBO/MBI-IPOs is not only less likely to be affiliated but when it is affiliated it is also less likely to be captive (55% of the time) than in Development (86% of the time, difference significant at 1% level) and Early-stage-IPOs (75% of the time, but difference is insignificant).

We find that Early-stage-VC-IPOs were significantly more likely than MBO/MBI and Development-VC-IPOs to have their VCs locked-up for a period of time after the IPO. This finding is probably partly related to the fact that managing directors of

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[14] Article P.1.1.31, Book II, Specific rules applicable to the French regulated http://www.amf-france.org/styles/default/documents/general/4890_1.pdf.

[15] See Article 2, instruction NM 3-02: holding period and disclosure requirements applicable to managing shareholders http://www.bourse-de-paris.fr/fr/index_fs.htm?nc=2&ni=1&nom=marche.

Nouveau Marché IPOs are required to lock-up some of their shares for a period of time after the IPO.

Finally, we note that in Table 4 that most of the findings described above are robust to looking at the median figures.

We repeat this comparative analysis distinguishing between Specialist Lead-VC-IPOs and their Non-specialist counterparts. Interestingly, we find VCs in IPOs with a Specialist Lead-VC to have significantly more board seats (1.04) as well as a greater share of board seats (17%) than VCs in Non-specialist Lead-VC-IPOs (0.66 and 10% respectively).

Furthermore, VCs in Specialists Lead-VC-IPOs are found to own significantly more shares prior to the IPO (32%) than VCs in Non-specialist Lead IPOs (26%). The significance of the difference, however, vanishes after the IPO. Given the approximately equal percentage of shares sold at the IPO time between the two groups, the explanation for the loss of significance in the difference between the shareholding of VCs after the IPO as to be traced back to the creation of new shares. In Table 2 we found the offer proceeds to be greater for Specialists Lead-VC-IPOs than the Non-specialists Lead-VC ones, even thought the difference was insignificant.

2.4 Results for the impact of VCs on the underpricing of the firms they back

We conduct our analysis using all non-VC-IPOs and those VC-IPOs that received Early-stage, Development-stage, and MBO/MBI funding. For 11 firms (4% of our total sample) we did not find the data necessary to carry out the analysis. 8 were non-VC-IPOs and 3 VC-IPOs, leaving 292 IPOs for our analysis 136 VC-IPOs and 156 non-VC-IPOs. First day returns are computed as follows :

$$R_1 = \frac{(P_1 - P_0)}{P_0} \qquad (1)$$

where P_1 and P_0 are respectively the closing price at the end of the first trading day, and the offer price. The data on offer prices and closing prices come from *Euronext*'s notices and stock price database. We also report the adjusted first day return where the benchmark used is the MIDCAC Index, the Index of French mid-capitalisation.

$$Adj.\ R_1 = R_1 - R_{MIDCAC} \quad (2)$$

To test the significance of our (adjusted) first day returns we use test statistics based on the Johnson's *t-test* adjusted for skewness, since the underlying distributions of our samples suffer from a problem of positive skewness (see Table 5). Given the evidence from Sutton (1992) that a bootstrapped application of the Johnson's *t-test* should be preferred when the population skewness is severe and the sample size small, we compute the critical values for this test using a bootstrap re-sampling technique described in Appendix I. For the same reason, we not only use a parametric *t-test* for difference in means but also a non-parametric bootstrap test for comparison of means (see Appendix II). We note, however, that inferences do not change whether parametric or non-parametric tests are used for difference of means. Finally, tests of difference in medians are performed using the *Mann-Whitney U test*.

2.4.1 Preliminary evidence on the underpricing of VC and non-VC-IPOs

Table 5 tells us that the average IPO underpricing and adjusted first day return in France over the period 1996-2000 are equal to 16%, with those figures being strongly significant. The average IPO underpricing falls within the range of previous studies conducted in the French market. For instance, Faugeron-Crouzet and Ginglinger (2001) find in France between 1983 to 1994 an average underpricing of 19%, Derrien and Womack (2003) over the period 1992-1998 find the average IPO underpricing to be equal to 13%.

We also note from Table 5 that the average underpricing and adjusted first day return increased slightly every year. However, we could not uncover any strong and significant differences between the average levels of underpricing and adjusted first day return every year.

Contrary to our expectations (**H1**) we find the average underpricing of VC-IPOs (20.27%) to be significantly larger than that of non-VC-IPOs (12.15%), with this difference being significant at the 5% level. When distinguishing between the different types of initial funding provided we find, as expected (**H3**), the underpricing of MBO/MBI-VC-IPOs (13%) to be lower than that of other IPOs (16%). However, the difference is insignificant. The underpricing of Early-stage and Development-IPOs is

found to be substantially greater than that of other IPOs (Early-stage-VC-IPOs=24% - others=14%, Development-VC-IPOs=22% - others=15%). The differences are not significant however. Therefore, those findings seem to be giving some support to **H5** and

Table 5: Analysis of (adjusted) First Day returns across a number of criteria

		First Day Return	Other IPOs First Day Return	Difference	Adj. First Day Return	Other IPOs Adj. First Day Return	Difference
All IPOs	Mean	15.96%			15.92%		
	Median	7.39%			7.07%		
	St.dev.	30.06%			29.98%		
	Count	292			292		
1996	Mean	12.84%	16.45%		12.99%	16.42%	
	Median	10%	6.72%		9.83%	6.78%	
	St.dev.	16.88%	31.74%		16.75%	31.67%	
	Count	42	250		42	250	
1997	Mean	13.93%	16.34%		14.02%	16.32%	
	Median	10%	6.16%		10.09%	6.45%	
	St.dev.	17.36%	2.06%		17.24%	32.00%	
	Count	50	242		50	242	
1998	Mean	15.37%	16.21%		15.30%	16.24%	
	Median	8.73%	6.71%		8.28%	6.99%	
	St.dev.	24.09%	32.73%		23.96%	32.66%	
	Count	98	194		98	194	
1999	Mean	17.79%	15.56%		17.76%	15.56%	
	Median	4.97%	8.33%		4.87%	8.58%	
	St.dev.	35.68%	28.87%		35.57%	28.79%	
	Count	49	243		49	243	
2000	Mean	19.59%	15.12%		19.50%	15.13%	
	Median	2.42%	9.3%		3.39%	9.05%	
	St.dev.	47.58%	24.64%		47.58%	24.52%	
	Count	53	239		53	239	
VC-IPOs	Mean	20.27%	12.15%	**	20.16%	12.23%	**
	Median	9.32%	6.4%		8.58%	6.64%	
	St.dev.	38.51%	19.36%		38.45%	19.25%	
	Count	136	156		136	156	
Early Funding	Mean	24.42%	14.13%		24.20%	14.17%	
	Median	8.33%	6.76%		7.63%	6.87%	
	St.dev.	51.95%	22.7%		51.94%	22.59%	
	Count	51	241		51	241	
Development Funding	Mean	21.68%	14.83%		21.53%	14.85%	
	Median	10%	6.67%		10.16%	6.84%	
	St.dev.	33.94%	29.21%		33.84%	29.14%	
	Count	47	245		47	245	
MBO/MBI Funding	Mean	12.95%	16.38%		13.04%	16.35%	
	Median	8.92%	7.02%		8.71%	7.07%	
	St.dev.	15.79%	31.65%		15.76%	31.56%	
	Count	38	254		38	254	
Conflict Sponsor & Investor	Mean	23.95%	13.77%	*	23.90%	13.77%	*
	Median	12.6%	6.32%	*	12.48%	6.51%	*
	St.dev.	43.66%	24.88%		43.56%	24.80%	
	Count	62	230		62	230	
Specialist Lead-VC	Mean	20.82%	14.18%		20.68%	14.22%	
	Median	6.25%	7.5%		6.42%	7.63%	
	St.dev.	41.84%	24.41%		41.82%	24.30%	
	Count	77	215		77	215	

**,* respectively 5% and 10% two-sided significance level for tests on the difference between the means of two populations and the *Mann-Whitney U test* for difference in medians. Note that we use parametric *t-test* for difference in means (assuming unequal variances when the results of an *F-test* are conclusive) but also a non-parametric bootstrap test (see Appendix II), with inferences being similar in both cases.

H9 while rejecting **H7** and **H11**. The good monitoring of Early-stage-VCs seems be counterbalanced by fears of adverse selection and investors appear to infer that the low degree of control by Development-VC limit their ability to monitor and certify portfolio firms.

In addition, the specialisation of the Lead-VC (21%) do not appear to be associated with less underpricing than other IPOs (14%), and therefore **H13** is not supported.

Finally, in line with our expectations (**H15**), VC-IPOs with a potential conflict of interest between sponsors and investors (24%) appear to have significantly (at the 10% level) greater degrees of underpricing than other IPOs (14%). This is so not only at the mean level but also when comparing the median first day return of VC-IPOs with a conflict of interest (13%) against that of other IPOs (6%). This finding suggests that investors fear a greater risk of adverse selection for those shares. Given the large number of potential conflicts of interest on the French market, the latter result may well help explaining part of the unexpected findings reported earlier.

We note that our findings are robust to looking at the adjusted first day returns. In the second part of our analysis we re-investigate the evidence on the presence of VCs and the underpricing of the firms they back controlling for cross-sectional determinants of the magnitude of underpricing.

2.4.2 Cross-sectional analysis of the underpricing of VC and non-VC-IPOs

2.4.2.1 Methodology

2.4.2.1.1 Control variables

In order to measure the influence of VCs on the underpricing of the firms they back, researchers typically use a regression framework where they include a number of control variables so as to isolate the marginal influence of VCs. The choice of control variables has been motivated by both the theories that have attempted to model the first day return anomaly, and empirical tests.

We first control for some general characteristics of issuing firms that are commonly used as explanatory variables in models of IPO underpricing. The first variable is the age of issuing firms. Young firms should be expected to face greater degrees of information asymmetry and therefore larger first day returns.

We also control for the size of offer proceeds. Larger offerings have been generally found to be less underpriced than smaller ones. A rationale for this finding has been that large offerings are generally made by large firms for which the information asymmetry is lower, with problems of information asymmetry believed to explain underpricing. It has also been argued that the larger the offer the greater is the amount of information available on the issuing firm, as well as the number of financial analysts following the IPO. We note in unreported findings, however, that IPOs on the *Nouveau Marché* –where more information asymmetry is expected- have a significantly larger average value of offer proceeds. Institutional characteristics could partly explain this finding. As already mentioned *Nouveau Marché* IPOs are required to make at least 20% of their capital available to the public, while the requirement for *Second Marché* IPOs is of only 10%. Moreover, it could well be argued that larger underpricing is needed to attract sufficient demand from investors when offers are large. As a result, we do not have any prior expectation on the relationship between this variable and the underpricing of our IPO firms.

It is commonly argued that the information asymmetry of an offer should increase as a company develops more complex projects for which the likelihood of success is uncertain. The book-to-market ratio has very often been used to proxy for such growth options. We expect a negative sign on the coefficient of this variable.

Finally, theory and empirical evidence suggest that reputable underwriters can reduce the magnitude of the first day return of the firms they back because of their certification ability. Therefore, we expect a negative sign on the coefficient of this variable. The way our five reputable sponsors were selected was described earlier.

In addition to those general variables we also control for some specific characteristics of our sample that could explain first day return. Given that our study spans the "internet (high tech) bubble" period we include in our model a dummy signalling firms in the IT, Software, and Internet sectors and expect a positive sign on the

coefficient of this variable, reflecting investor's euphoria[16]. In addition to controlling for the industry affiliation of issuing firms we also investigate the impact of market affiliation. Because the *Nouveau Marché* gathers many young high growth firms, we would expect more uncertainty and information asymmetries in this market and therefore more underpricing. We note, however, that we already control for differences in age, industry affiliation and growth options so that the remaining marginal impact of a market dummy may be insignificant.

Furthermore, researchers have pointed out important factors that help explaining the French IPO undepricing phenomenon. Firstly, Derrien and Womack (2003) have derived two ex-ante measures of market sentiment that prove to be very good indicators of the magnitude of the first day return on both the *Second* and the *Nouveau Marché*. In cold market times it is sometimes very difficult to sell stock at a reasonable price, in hot market times however all issuers want to take advantage of the "windows of opportunities". The first measure used by Derrien and Womack is the 3-month weighted average of the MIDCAC described earlier. We expect period of high market run-up to be associated with larger first day returns. The second measure is the market volatility at the time of an IPO. This is defined as the standard deviation of the daily return on the MIDCAC in the month just prior to the IPO. We expect months of greater volatility, or uncertainty, to be associated with more underpricing.

Secondly, Derrien and Womack (2003) also show that the selling mechanism is an important variable to consider when modelling French underpricing. The two main selling mechanism over the period of our study are namely: the Placement Garanti -a book-building procedure that can be followed by a fixed price procedure (Offre à Prix Ferme) or another bookbuilding procedure (Offre à Prix Ouvert)- and the Offre à Prix Minimal –an auction mechanism, sometimes transformed into an OPF when demand is too high-. In our models we signal IPOs that had a Placement Garanti with a dummy variable. Only a few IPOs (9 firms) did not have a Placement Garanti or an Offre à Prix Minimal, but had an OPF instead. Contrary to the OPF, the Placement and the OPM allow for some kind of information extraction about the IPO price. Given evidence from

[16] Note that in unreported results we explicitly controlled for other industrial affiliations, using dummy variables, but did not find any of these variables to have a significant influence on IPO underpricing.

Derrien and Womack (2003) that the Placement, OPF, and OPM control differently for market momentum we inter-act our market momentum variable with a dummy variable for each one of the different listing procedures. As in Derrien and Womack (2003) we find the coefficient on the OPM interaction dummy to be significantly lower than the coefficient on the Placement dummy, highlighting the greater ability of the OPM procedure to incorporate information about market momentum into prices. The same analysis was performed on the market volatility variable, but no significant difference between the listing procedures was found.

Finally, Faugeron-Crouzet and Ginglinger (2001) show that for the period 1983 to 1994 on the *Second Marché* those issuing firms that suffered the largest degree of underpricing subsequently returned to the market. They link their results to the signalling hypothesis, where issuers signal their quality by deciding deliberately to underprice and recoup the underpricing cost by selling shares at a higher price in subsequent equity offerings. For this reason, we also control for firms that had a seasoned offering in the three years that follows the IPO, and expect a positive relation with the level of underpricing.

Share allocation-type of explanation for underpricing has gained a lot of interest in recent years. Moreover, we have just explained that the selling mechanism plays an important role in explaining underpricing in France. For those reasons, it is important to control for the price revision occurring in OPM and Placement IPOs. Benveniste and Spindt (1989) argue that truthful revelation of positive information requires favouring investors with preferential allocation of underpriced shares. This hypothesis (also known as the Dynamic Information Acquisition Hypothesis) has, to our knowledge, never been investigated in France but the international empirical evidence for it is strong. To take this issue into account we compute two measures of price revisions, one for Placement offerings and one for OPM offerings. The first one is the percentage difference between the offer price and the mean of the price range. The second one is the percentage revision from the minimum offer price to the final one.

Ljungqvist (1999) shows that it is important to control for the incentives of old shareholders to reduce underpricing before drawing any conclusion on the certification ability of VCs. The dilution of old shareholders is defined as the ratio of new shares

created to the amount of old shareholders' shareholding prior to the IPO. The level of participation in the IPO is measured by the percentage of old shareholders' shares sold to new investors. Habib and Ljungqvist (2001) argue that the level of first day return may depend on the motivations of old shareholders to reduce it, and that dilution and participation of old shareholders proxy for such motivations. With regard to the participation of old shareholders, it could also be argued, in line with Brav and Gompers (2003), that firms that are selling a greater proportion of secondary shares in the IPO suffer less information asymmetry so that less underpricing may be required. Empirically, Habib and Ljungqvist (2001) and Ljungqvist and Wilhelm (2003) show that the underpricing is more severe when current stakeholders have less at stake in the level of the offer price.

Finally, an IPO issue that has only recently attracted academic interest is that of lock-up agreements. It has been argued (see Brav and Gompers (2003)) that issuing firms may be able to reduce information asymmetry by signalling their quality via lock-up agreements. Because there is no evidence on the ability of this variable to explain French underpricing we decided to also control for it in our modelling exercise. Specifically, we control for managing directors' discretionary lock-up agreements. These are lock-up agreements entered by managing directors above those required by *Euronext*[17]. Managing directors are defined as all the non-financier shareholders with a board position. Managing directors by locking-up their shares signal their commitment to the firm's value and address fears that they may use their informational advantage to abuse investors.

When testing our hypotheses we first use all the above explanatory variables. However, we ultimately want to select the best explanatory model with the fewest number of variables. To achieve this end we use a backward variable elimination procedure with removal criteria p-value>0.2. By reducing the number of variables in our models we also address concerns that collinearity (see Table 7) may adversely affect the accuracy of our coefficient estimates.

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[17] Note that *Euronext* imposes mandatory managing directors' lock-up agreements on the *Nouveau Marché*. For this reason, we distinguished between the discretionary lock-ups of managing directors on the *Second* and *Nouveau Marché*. However, no significant difference was uncovered and results are not reported.

2.4.2.1.2 Descriptive statistics

Table 6 gives some descriptive statistics on our control variables. In line with our expectations we find firms on the *Nouveau Marché* and IT, Software, and Internet firms to have greater first day returns. Reputable sponsors do not appear to have significantly lower first day returns, nor are managing shareholders' discretionary lock-up agreements associated with significantly lower underpricing. There is no significant difference between the level of underpricing of IPOs who chose the Placement method and those who chose the OPM method, nor is there any significant difference between the level of underpricing of firms who came back to the market in the three years that followed the IPO and those who did not.

Table 6: Descriptive statistics on the variables of our regressions for the First Day Return of IPOs

PANEL A: Continuous variables	**Mean**	**Median**	**Standard Deviation**
Age of IPO (year)	18.35	12	2081.21%
Offer Proceeds (m Euro)	15.84	7.98	207.3%
Book-to-market ratio	36.59%	31.12%	27.28%
Market momentum	1.69%	1.45%	3.67%
Market Volatility	0.79%	0.69%	0.46%
Price revision for Placement	3.55%	4.21%	8.92%
Price revision for OPM	6.99%	5.85%	7.09%
Old shareholders' dilution	24.17%	16.67%	31.11%
Old shareholders' participation	6.78%	7.25%	11.11%
PANEL B: Binary variables	**Count**	**First Day Return**	**Test of difference in Means**
Market			
Second Marché	158	12.15%	*
Nouveau Marché	134	20.39%	
IT, Software, and Internet sector	91	26.45%	
Other Industries	201	11.17%	**
Seasoned Equity Offerings	57	14.59%	
No-Seasoned Equity Offering	235	16.25%	
Lock-up NM & SM	73	13.39%	
No discretionary lock-up	221	16.52%	
Placement	203	11.23%	
OPM	80	11.29%	
Sponsor			
High Reputation	167	14.84%	
Low Reputation	125	17.39%	

**,* 1% and 5% significance level for tests on the difference between the means of two populations. Note that we use parametric *t-test* for difference in means (assuming unequal variances when the results of an *F-test* are conclusive) but also a non-parametric bootstrap test (see Appendix II), with inferences being similar in both cases.

2.4.2.1.3 Model specification

We use the following linear regression model to examine the marginal impact of VCs on the underpricing of IPO firms:

$$R_{1,i} = X_i\beta + \varepsilon_i \tag{3}$$

Market movements are controlled for in the model with the earlier described measures of market sentiment. All our regressions use heteroskedasticity-consistent covariance matrix estimators. Finally, because our error terms are non-normal we also show p-values computed using a bootstrapping technique described in Appendix III.

2.4.2.2 Results

Table 8 presents our multivariate models testing the impact of VCs on the underpricing of the firms they back. Regarding the control variables we find, as expected, in all regressions positive and significant coefficients on the market momentum variables (at the 1% level), and that IT, Software and Internet firms are associated with significantly more underpricing (at the 1% level). There is also some evidence that larger offer proceeds are associated with more underpricing[18]. Controlling for the price revision and market momentum variables, we find the coefficient on the Placement dummy to be negative and significant (at the 10% level at least). The coefficient on the price revision for Placement offering is positive –in line with expectations- and significant (at the 1% level using parametric p-values, and 10% level at least when bootstrapped p-values are used instead). There is also some evidence, although weak, that young firms suffered greater underpricing. As expected our proxies for the incentives of old shareholders to reduce underpricing are negatively and significantly related to the magnitude of first day

[18] As pointed out earlier IPOs on the *Nouveau Marché* –where more information asymmetry is expected- have a significantly larger average value of offer proceeds. For this reason, in unreported results, we investigated whether the positive relationship between offer proceeds and first day return holds on the *Nouveau* and *Second Marchés* separately. Interestingly we found that large offers are associated with more underpricing on both markets. It could be that the greater underpricing is needed to attract sufficient demand from investors when offers are large.

Table 7: Correlation matrix of control variables

	Log Age	Old shareholders' dilution	IT, Software, and Internet firms	Log B/M	Log Offer proceeds	Lock-up NM & SM	Market	Old shareholders' participation	Placement	Price Revision OPM	Price Revision Placement	Seasoned Equity Offering	Market Momentum	Sponsors' Reputation
Old shareholders' dilution	-0.12													
IT, Software, and Internet firms	-0.24	0.16												
Log B/M	0.26	0.09	-0.16											
Log Offer proceeds	-0.08	0.12	0.22	-0.03										
Lock-up NM & SM	-0.02	0.02	0.08	0.09	0.05									
Market	0.49	-0.38	-0.40	0.21	-0.27	0.02								
Old shareholders' participation	0.28	-0.25	-0.12	-0.04	0.14	-0.05	0.25							
Placement	-0.19	0.21	0.30	0.02	0.50	0.09	-0.59	-0.10						
Price Revision OPM	0.20	-0.13	-0.17	-0.08	-0.32	-0.05	0.34	0.17	-0.60					
Price Revision Placement	-0.12	0.08	0.07	-0.02	0.12	-0.06	-0.20	-0.04	0.20	-0.13				
Seasoned Equity Offering	-0.07	0.07	0.06	-0.05	-0.02	0.08	-0.17	-0.14	0.10	-0.06	-0.01			
Market Momentum	-0.03	0.00	-0.12	0.08	-0.01	-0.01	0.07	0.08	-0.03	0.13	0.18	-0.08		
Sponsors' Reputation	0.10	-0.11	-0.02	0.01	-0.18	-0.08	0.12	0.01	-0.14	0.05	-0.03	0.02	-0.03	
Market Volatility	-0.07	0.01	0.16	-0.09	0.23	0.09	-0.20	-0.08	0.20	-0.12	-0.08	-0.09	-0.23	-0.04

Table 8: Models for the Underpricing of IPOs

The table reports regression coefficients of First day return (292 IPOs are used for this analysis) on various independent variables. The following general linear model is used throughout this analysis: $R_i = X_i\beta + \varepsilon_i$. In brackets are parametric p-values for two-sided tests, in captions are bootstrapped p-values for two sided tests. Finally, in bold are coefficients significant at the 10% level on a one-sided test at least.

Part (I)	Expected Signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept		**-0.556**	-0.518	**-0.607**	**-0.655**	**-0.575**	**-0.621**	**-0.566**
		[0.09] {0.08}	[0.11] **{0.10}**	**[0.06] {0.05}**	**[0.07] {0.07}**	**[0.08] {0.09}**	**[0.06] {0.06}**	**[0.08] {0.05}**
Placement	-	**-0.092**	**-0.093**	**-0.100**	**-0.086**	**-0.089**	**-0.087**	**-0.089**
		[0.04] {0.06}	**[0.03] {0.06}**	**[0.02] {0.05}**	**[0.02] {0.00}**	**[0.02] {0.00}**	**[0.02] {0.01}**	**[0.02] {0.00}**
Price Revision Placement	+	**0.707**	**0.694**	**0.693**	**0.698**	**0.721**	**0.675**	**0.719**
		[0.01] {0.04}	**[0.01] {0.03}**	**[0.01] {0.02}**	**[0.01] {0.01}**	**[0.01] {0.08}**	**[0.01] {0.03}**	**[0.01] {0.02}**
Price Revision OPM	+	-0.098	-0.082	-0.119				
		[0.69] {0.72}	[0.75] {0.81}	[0.66] {0.68}				
Market Volatility	+	2.889	2.886	2.306				
		[0.53] {0.47}	[0.52] {0.47}	[0.61] {0.54}				
OPM*Market Momentum	+	**1.525**	**1.515**	**1.733**	**1.599**	**1.477**	**1.506**	**1.533**
		[0.00] {0.00}	**[0.01] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**
Placement*Market Momentum	+	**3.142**	**3.152**	**3.078**	**2.999**	**2.967**	**3.029**	**3.106**
		[0.00] {0.00}	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**
OPF*Market Momentum	+	**3.068**	**3.006**	**3.773**	**3.579**	**3.598**	**2.984**	**2.322**
		[0.00] {0.00}	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.01] {0.00}**
Log Age	-	-0.022	-0.024	-0.022	**-0.026**	-0.024	**-0.022**	**-0.023**
		[0.29] {0.28}	[0.27] {0.24}	[0.27] {0.25}	**[0.16] {0.13}**	[0.22] {0.27}	**[0.19] {0.19}**	**[0.17] {0.18}**
Log Offer proceeds	?	**0.042**	**0.041**	**0.047**	**0.052**	**0.047**	**0.049**	**0.046**
		[0.05] {0.04}	**[0.06] {0.05}**	**[0.03] {0.02}**	**[0.03] {0.02}**	**[0.04] {0.07}**	**[0.03] {0.03}**	**[0.04] {0.05}**
Log B/M	-	-0.034	-0.031	-0.027				
		[0.21] **{0.19}**	[0.22] {0.21}	[0.27] {0.25}				
Market	-	0.002	-0.004	-0.014				
		[0.97] {0.98}	[0.92] {0.97}	[0.73] {0.77}				
IT, Software, and Internet firms	+	**0.156**	**0.159**	**0.163**	**0.163**	**0.159**	**0.153**	**0.162**
		[0.00] {0.00}	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**	**[0.00] {0.00}**
Sponsors' Reputation	-	-0.007	-0.014	-0.016				
		[0.82] {0.78}	[0.66] {0.60}	[0.61] {0.57}				
Lock-up NM & SM	-	-0.031	-0.033	-0.032				
		[0.41] {0.48}	[0.38] {0.44}	[0.40] {0.43}				
Seasoned Equity Offering	+	-0.004	-0.006	-0.015				
		[0.92] {0.94}	[0.86] {0.88}	[0.68] {0.69}				
Old shareholders' dilution	-	**-0.067**	**-0.059**	**-0.055**	**-0.059**	**-0.064**	**-0.067**	**-0.067**
		[0.02] {0.01}	**[0.04] {0.03}**	**[0.05] {0.04}**	**[0.04] {0.02}**	**[0.05] {0.05}**	**[0.03] {0.02}**	**[0.04] {0.02}**
Old shareholders' participation	-	**-0.113**	**-0.098**	**-0.085**	**-0.090**	**-0.104**	**-0.108**	**-0.109**
		[0.04] {0.03}	**[0.06] {0.05}**	**[0.10] {0.08}**	**[0.09] {0.04}**	**[0.09] {0.03}**	**[0.06] {0.03}**	**[0.06] {0.05}**
VC	-	0.043						
		[0.22] {0.23}						
Conflict between Sponsors and Investors	+		**0.089**	**0.087**	**0.101**	**0.087**	**0.099**	**0.103**
			[0.05] {0.02}	**[0.14] {0.09}**	**[0.04] {0.01}**	**[0.09] {0.15}**	**[0.05] {0.03}**	**[0.10] {0.08}**

Part (II)	Expected Signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
VC-IPO with no conflict	-		0.004 [0.93] {0.88}					
Early-stage-VC-IPO	-			-0.004 [0.94] {0.89}				-0.075 [0.46] {0.47}
Development-VC-IPO	-			0.058 [0.38] {0.41}				
MBO/MBI-VC-IPO	-			**-0.067 [0.16] {0.15}**	**-0.091 [0.03] {0.02}**			
Blocking minority Late stage funding	-					**-0.077 [0.06] {0.05}**		
Blocking minority Early-stage funding	?					0.081 [0.46] {0.60}		
VC in Board Late stage funding	-						**-0.080 [0.05] {0.03}**	
VC in Board Early-stage funding	?						0.051 [0.49] {0.36}	
Late stage funding	-							0.088 [0.14] {0.12}
VC syndication Late stage funding	-							**-0.035 [0.00] {0.00}**
VC syndication Early-stage funding	?							0.023 [0.45] {0.41}
Adjusted R-squared		0.23	0.24	0.24	0.26	0.26	0.26	0.26
F-statistic		5.84	5.76	5.46	9.38	8.71	8.74	7.82
Prob. For F-statistic		0.00	0.00	0.00	0.00	0.00	0.00	0.00

Placement, OPM, OPF: dummy variables that signal such offerings. Price Revision Placement: the percentage difference between the offer price and the mean of the price range. Price Revision OPM: the percentage revision from the minimum offer price to the final one. Market volatility: the standard deviation of the MIDCAC in the month just prior to an IPO. Market momentum: a weighted average of the market's run-up in the three months just prior to the IPO. Specifically, we compute the Buy and Hold Return on the MIDCAC for the three months prior to the IPO, and give a weight of 3/6 to the earliest month, 2/6 for the second month, and 1/6 to the latest month. Log Age: the log value of the age of the firm at the time of the IPO in years. Log Offer proceeds: the log value of the number of shares in the offer multiplied by the offer price in Euro. Log B/M: the log value of the book-to-market ratio of IPO firms, with the market value being calculated at the offer price and the book value being the first book value after the IPO. Market: a dummy variable coding one when a firm is from the *Second Marché*. IT, Software, and Internet firms: a dummy variable coding one when the firm is from the IT, Software, and Internet sector. Sponsors' Reputation: dummy variable coding one when a sponsor is one of the 5 most reputable sponsors over the period of our study. These include Groupe Banque Populaire (including Portzamparc), Groupe Oddo-Pinatton, Groupe Crédit Agricole (including Cheuvreux), Groupe Crédit Lyonnais, Groupe CIC (EIFB). Lock-up NM & SM: a dummy coding one when directors entered a discretionary lock-up agreement. Seasoned Equity Offering: dummy variable coding one when the firm came back to the market in the three years that followed the IPO. Old shareholders' dilution: the ratio of new shares created to the amount of old shareholders' shareholding prior to the IPO. Old shareholders' participation: the percentage of old shareholders' shares sold to new investors. VC: a dummy variable coding one when an IPO is VC-backed. Conflicts between Sponsors and Investors: dummy variable coding one when one of the sponsors is affiliated with one of the VC backers. Early-stage-VC-IPO, Development-VC-IPO, MBO/MBI-VC-IPO: dummy variables coding one when VC-IPOs received venture capital funding for each investment type. Late stage funding: Development and MBO/MBI funded VC-IPOs. Blocking minority Late/Early-stage funding: a dummy variable coding one when VC-IPOs funded by VCs at a Late/Early-stage have VCs holding a blocking minority interest. VC in Board Late/Early-stage funding: a dummy variable coding one when VC-IPOs funded by VCs at a Late/Early-stage have at least one VC in the board. VC syndication Late/Early-stage funding: the number of VC backers involved in Late/Early-stage funded VC-IPOs.

returns. Finally, we note that the coefficient on the market dummy is always insignificant. However, this is not too surprising since some of the other variables included in our models already control for many of the institutional differences that exist between the two markets. For instance, we recall from section 2.3 that firms have to make relatively larger offers and create more shares on the *Nouveau Marché*. Moreover, we explained that there are constraints on shareholders' selling at IPO time on this market. Still further, because there are lower restrictions on the accounting history of firms on the *Nouveau Marché* those firms tend to be younger and come principally from the high tech sector. The variables for the age of IPO firms, the size of offer proceeds, the dilution and participation of old shareholders as well as the dummy variable for IT, Software and Internet stocks capture those institutional differences and have all been found to be related to IPO underpricing.

In model 1 we test our first hypothesis regarding the impact of VCs on the underpricing of the firms they back. We find, contrary to expectations (**H1**), a positive relation between the presence of a VC and the magnitude of underpricing. The coefficient fails to achieve significance however.

Model 2 suggests that the larger underpricing of VC-IPOs is due to this group of VC-IPOs with a potential conflict of interest between sponsors and investors (coefficient significant at the 5% level using both bootstrapped and parametric p-values). Thus, in line with the previous univariate analysis, we find support for the claim that investors may require some compensation for the greater risk of adverse selection steaming from these potential conflicts of interest (**H15**).

In model 3, controlling for potential conflicts of interests, we test our hypotheses regarding the impact of different types of VC backing using dummy variables for each type of funding. In effect, we investigate the marginal impact of each type of VC funding relative to non-VC-IPOs. We find no evidence that Early-stage and Development-VC-IPOs had significantly less underpricing, and therefore accept **H5** and **H9** but reject **H7** and **H11**. Therefore, despite scoring high in terms of monitoring proxies Early-stage-VC-IPOs are not found to be associated with significantly lower degrees of underpricing. Amit et al (1990) adverse selection hypothesis provides an explanation for this result. According to the author in a setting with asymmetric information about entrepreneurs'

skill level best ventures will be self funded, but average ventures may be funded by venture capitalists because of the same pricing for all "lemons" in the VC market. Wang et al (2003) argue that if this hypothesis is true VC-IPOs should be expected to face greater degrees of underpricing rather than lower ones due to their lower quality and higher risk. Still further, the authors suggest that as the information asymmetry is more severe for Early-stage ventures when investors' products and services have not yet been proven, the effect of adverse selection should be more severe in firms supported by VCs from the Early-stage. As a result, the positive effect of good monitoring is offset by the negative adverse selection effect. The insignificant coefficient of the dummy for Development-VC-IPOs is not too surprising given that this type of VC backing scored low in terms of monitoring proxies.

Still in model 3, we find in line with expectations (**H3**), and after controlling for conflicts of interest, that the coefficient on the MBO/MBI-VC-IPO dummy is negative and significant at the 10% level on a one-sided test. In model 4 where a backward variable elimination procedure is used (with removal criteria $p>0.2$), we find the significance of the coefficient on the MBO/MBI dummy to become stronger (at the 5% level). Therefore, the good monitoring and certification ability of VCs coupled with the ownership transfer to managers matter and lead to less underpicing relative to all IPOs when there is no potential conflict of interest, and less underpicing relative to VC-IPOs with potential conflict of interest when such conflicts are present in MBO/MBI-VC-IPOs[19]. We recall that MBO/MBI-VC-IPOs were found to score high in terms of the proxies for the quality of VC involvement. MBO/MBI-VC-IPOs often have a VC in the board with VCs holding a relatively large number of board seats. Still further those VC-IPOs are backed by relatively more VCs with them holding larger shareholding than in other VC-IPOs. The Lead-VC of MBO/MBI-VC-IPOs are relatively more likely to be specialised in the investment provided and to be independent.

An interesting implication of our results is that monitoring quality and certification ability seem to matter but only when adverse selection problems are low. In model 5 to 7 we build on this implication and show that although unconditionally

[19] In 50% of the cases MBO/MBI-VC-IPOs had a conflict of interest. Also, we note that the coefficients in model 4 for the conflict of interest dummy and the MBO/MBI-VC-IPO dummy are not significantly different from each other (in absolute terms).

insignificant a number of proxies for better VC monitoring and certification ability become significant when conditioning on the stage when VC-IPOs received funding. In model 5 and 6 we show that when conditioning on the stage when the funding was received the level of cash flow and control rights as proxied by a blocking minority interest hold by VCs and the presence in the board of VC backers become significant for late stage investments (MBO/MBI and Development investments) while they remain insignificant for early-stage ones. Also, model 7 shows a negative and significant relationship between the level of VC syndication and underpricing when conditioning on the stage of funding received. We note in unreported results, however, that in contradiction to **H13** and as in the univariate analysis the specialisation of VC backers is not found to be significantly related to the level of underpricing conditional or not on the stage of funding received. The same is true for VCs' age and affiliation, as well as the presence of VCs' lock-ups.

Finally, we examined the leverage and influence of our observations using *leverage values* and the *Cook's D* statistic. The *leverage* of a given data point gives a measure of how extreme a predictor variable is for this observation. *Leverage* depends only on the independent variables not the dependent one. A point with high *leverage* may or may not be influential. Similarly, a point with low *leverage* may or may not be influential. Looking at residuals may not reveal influential points, especially if *leverage* is high, since outliers will tend to drag the fitted line towards them and therefore may end-up having small residuals. A direct measure of the influence of an observation is given by the *Cook's D* statistic, which measures the sum squared deviations between the observed fitted values and the hypothetical fitted values we would get if the observation was deleted. Even though no worrisome case[20] was identified we removed a number of observations with relatively large *Cook's D*. Indeed, it is important to bear in mind that *Cook's D* can be "fooled" by multiple outliers. The omission of these variables does not change significantly our findings, and therefore only results for the whole sample are reported.

[20] A worrisome case would be one where the *Cook's D* statistic is greater than one (see Jobson (1991)), and the *leverage value* possibly high (greater than $4/n$, where n is the number of observations).

2.5 Results for the impact of VCs on the long-term performance of the firms they back

Stock prices for this analysis were collected until December 2002 and long-term returns computed over a three-year period. Therefore, IPOs floated in 2000 are not included in this analysis. For 10 firms (4% of our total sample) we did not find the data necessary to carry out our analysis, leaving 239 IPOs amongst which 102 are VC-backed.

Bearing in mind our earlier discussion of the different methodological issues related to the computation of IPOs' excess return, we use Buy-and–Hold Abnormal Returns (BHARs) as our measure of long-term IPO performance as advocated by Lyon et al (1999) and as in the studies of VC backing by Gompers and Lerner (1999[a]), Hamao, Packer and Ritter (2000), Wang et al (2002), and Wang et al (2003). We compute BHARs over a three-year period and use a style benchmark consisting of portfolios of non-IPO firms with book-to-market and size similar to our IPOs. One difference between our measure of abnormal return and that of Lyon et al (1999) is that we adjust for possible changes in the characteristics of IPOs and each matching portfolio firm[21]. Therefore, we compare the performance of a strategy that invest in an IPO over three years starting from the 10th day after the issue[22] against one that invests every year in a portfolio of seasoned firms with similar book-to-market ratio and size to the IPO. Controlling for book-to-market and size is important since these two factors have been shown to be related to returns (see Fama and French (1992), Brav and Gompers (1997)).

Our book-to-market (B/M) and size portfolios are made out of 237 seasoned firms traded on the French stock exchange that did not have their IPO for less than three years before their inclusion in the benchmark[23]. To form our book-to-market and size

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[21] See for instance, Ikenberry, Lakonishok, and Vermaelen (1995), Brav and Gompers (1997), and Derrien and Degeorges (2001) for a similar approach. Actually, we found, in unreported results, evidence that controlling for the changing characteristics of IPOs and benchmark firms do make a difference in our sample of French IPOs. Indeed, the book-to-market and size characteristics of some firms sometimes change drastically over our three-year period.

[22] Derrien and Degeorges (2001) in France also start computing returns from the 10th day after the IPO. This is to ignore short-term effects resulting from the underpricing of the issue and the price support activities of underwriters.

[23] Firms with negative book-to-market ratios are also excluded. Moreover, we note that Seasoned Equity Offerings have been found to perform abnormally (see Loughran and Ritter (1995) amongst others). Less than 10% of our benchmark firms had SEOs over the period of our study, and their impact on the excess performance of our IPO firms is negligible.

portfolios we follow Gompers and Lerner (2001). First, we rank companies every month according to their market value and divide them into four groups with an approximately equal number of firms. In parallel, at the end of June[24] every year *t* benchmark firms are ranked based on their book-to-market ratio at the end of December of year *t-1*. The 4 monthly size breakpoints are then intersected with the 4 annual B/M breakpoints to form 16 size and book-to-market portfolios. Every year each IPO is matched to its corresponding portfolio so as to allow for the possible time-varying characteristics of each IPO and each matching portfolio firm. Note that the first book value used to match IPO firms with benchmark firms is their first book value after the IPO[25]. The first market value used is that at the end of the 9th trading day following the IPO.

Our returns include dividend payments, and the returns of IPO firms that delisted before three years after their introduction are computed up to the time of delisting. Finally, all the stock data used in this analysis comes from *Datastream*. The accounting data comes from annual reports. Therefore, the Buy and Hold (raw) Return for each IPO is computed as follows:

$$BHR_{IPO} = \prod_{t=t_s}^{t_e}(1+R_t)-1 \tag{4}$$

where t_s and t_e are respectively the start and end date for the computation of returns. R is the simple daily return including any dividend payments.

The BHR for book-to-market and size portfolios:

$$BHR_b = \sum_{i=1}^{n_1}\frac{\prod_{t=t_s}^{t_1}(1+R_{i,t})}{n_1}\times\sum_{j=1}^{n_2}\frac{\prod_{t=t_1+1}^{t_2}(1+R_{j,t})}{n_2}\times\sum_{k=1}^{n_3}\frac{\prod_{t=t_2+1}^{t_e}(1+R_{k,t})}{n_3}-1 \tag{5}$$

where t_1 and t_2 highlight the yearly re-matching of issuing firms with their benchmarks; i, j, and k the possibly different firms included in the three yearly

[24] Although it is preferable to fix the fiscal yearend at the end of a quarter in order to simplify the computation of some quarterly obligations (such as social expenses), there is no obligation in France regarding the choice of the fiscal yearend. However, most companies choose the last day of December as their fiscal yearend. Moreover, companies generally publish their accounts within 3 to 4 months after the fiscal yearend. Therefore, the minimum 6 months gap between fiscal yearend and the B/M ranking is conservative and ensure that the accounting variables for our benchmark firms were known before the returns that they explain.

[25] As in Brav and Gompers (1997), Gompers and Lerner (1999[a]), and Gompers and Lerner (2001) amongst others.

benchmark portfolios. Finally, n_1, n_2 and n_3 refer to the possibly changing number of firms included in each one of the three yearly portfolios.

The excess (abnormal or adjusted) return for each issuing firm is therefore:

$$BHAR_{IPO} = BHR_{IPO} - BHR_b \quad (6)$$

As an alternative benchmark we also use the MIDCAC Index, which is the Index for French mid-capitalisation firms.

Our test for the significance of mean BHAR is based on a bootstrapped application of the Johnson *t-test* adjusted for skewness[26] (see Appendix I), given evidence that our IPOs' long-term returns are positively skewed (see Table 8 and 9). Because non-normality is important, we also test difference in mean BHARs using not only a parametric *t-test* but also a bootstrapped application of a *t-test* (see Appendix II). We note, however, that inferences do not change whether one uses parametric or non-parametric tests for difference in means. Finally, we investigate difference in medians using the *Mann-Whitney U test*.

2.5.1 Preliminary evidence on the long-term performance of VC and non-VC-IPOs

We do not find, in Table 9, evidence that French IPOs floated between 1996 and 1999 underperformed over three years a benchmark of firms with comparable sizes and book-to-market ratios (average BHAR= +1%). The same is true with respect to the MIDCAC Index (BHAR=-4%). Derrien and Degeorges (2001) make a similar finding for French IPOs floated between 1991 and 1998. Moreover, the average non-adjusted performance is positive (+35%). We note, however, that the median IPO BHAR is largely negative whether one uses the book-to-market and size benchmark or the MIDCAC Index (-47% and –56% respectively). Still further, the non-adjusted median IPO return is also found to be negative (-17%). The difference between the performance of the mean and median IPO highlights the important skewness in the distribution of BHARs.

[26] We note, however, that our test statistic does not take into account the likely cross-sectional correlation in the BHAR of IPO firms, and should therefore be interpreted with caution.

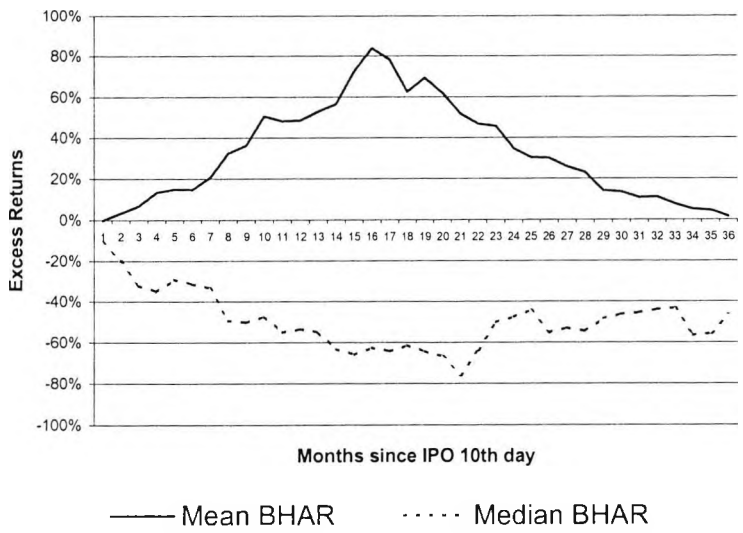
Table 9: Long-term performance of IPOs vs Benchmark

	Raw IPO Return	Style Benchmark	MIDCAC Index	Style Ad. IPO Return	IPO Return Ad. By MIDCAC Return
3-year BHR (Equally weighted)	35.09%	34.20%	38.94%	0.88%	-3.85%
Mean	-16.88%	24.83%	32.46%	-46.78%	-55.98%
Median	159.52%	41.66%	28.31%	162.35%	159.53%
St.dev.	239	239	239	239	239
Count					

In the following analysis, returns are adjusted with the style benchmark only. Our main findings do not change when the MIDCAC Index is used instead.

Figure 1 shows a plot of the mean and median excess performance of IPOs. Interestingly, we note that the performance of the average IPO has been extremely good up to the 16th month of flotation and collapsed thereafter. An almost reverse pattern is true for the median IPO, which however never recovered completely from its initial poor performance.

Figure 1: Style Adjusted Buy-and-Hold Returns



Variations in the style-adjusted performance of our IPOs depending on the year of flotation are important (see Table 10). Years of higher IPO activity do not appear to have been associated with worse long-term performers. On the contrary, IPOs floated in 1998 -the year of highest IPO activity- have had the best adjusted long-term performance

(24%). In contrast, IPOs floated in 1996 -the year of lowest IPO activity- appear to have had the worst adjusted performance (-56%). On a non-adjusted basis 1996 is no longer the year with the lowest IPO performance (26%), but instead it is the year 1999 (24%). Moreover, year 1997 is now the best performing year (48%) whereas on an adjusted basis the average performance of year 1997 was the second worst. In fact the poor adjusted performance of year 1996 and 1997 can be traced back to the good performance of their benchmark. In contrast, the very good adjusted performance of year 1998 and 1999 has very much to do with the poor performance of their benchmark. This is especially the case for year 1999.

When it comes to our variables of interest, in line with **H2**, Table 10 shows that VC-IPOs outperformed their benchmark (+12%) as well as non-VC-IPOs (-8%). The same is true when looking at the unadjusted performance (41% and 31% respectively). However, differences fail to achieve significance. The same can be said for Early-stage (11%, other IPOs=-0.7%) and Development (19%, other IPOs=-3%) VC-IPOs. The average performance of MBO/MBI-VC-IPOs is similar to that of their benchmark (excess performance=5%) and their abnormal performance only slightly better than the excess return of other IPOs (0.3%). Therefore, there is no significant evidence in support of **H4**, **H8** and **H12**.

VC-IPOs with potential conflicts of interest appear to have out-performed their benchmark (30%), significantly so at the 10% level on a one-sided test, as well as out-performed other IPOs (-8%), even if the difference fails to be significant. This evidence is true as well when looking at raw returns (62% and 27% respectively). Therefore, findings clearly do not corroborate the concerns (**H16**) that affiliated sponsors may abuse investors.

Finally, and in line with expectations (**H14**), the IPOs of Specialist Lead-VCs have significantly (at the 10% level) outperformed (42%) their benchmark as well as other IPOs (-11%). The medians of the two sub-groups are, however, only marginally different. This highlights the fact that the good average performance of our Specialist Lead-VC-IPOs is driven by only a few good performers. However, on a non-adjusted basis the IPOs of Specialist Lead-VCs (76%) are still found to substantially out-perform

other IPOs (23%), and this time at the median level as well (2% and –21% respectively)[27].

Table 10: Long-term excess performance for all IPOs, VC and non-VC-IPOs

		Raw IPOs Return	IPOs Style Ad. Bench	Other IPOs Raw Return	Other IPOs Style Ad. Bench	Difference in Adjusted Performance
1996	Mean	26.26%	***-55.64%	36.91%	12.59%	***
	Median	-23.19%	-85.88%	-15.08%	-42.49%	***
	St.dev.	127.41%	117.39%	165.62%	168.06%	
	Count	41	41	198	198	
1997	Mean	47.77%	-16.50%	31.73%	5.49%	
	Median	-7.60%	-67.43%	-20.69%	-44.23%	*
	St.dev.	180.86%	180.24%	153.74%	157.48%	
	Count	50	50	189	189	
1998	Mean	38.13%	*23.99%	33.08%	-14.36	*
	Median	-20.69%	-34.73%	-16.36%	-52.59%	**
	St.dev.	172.36%	176.20%	151.05%	151.24%	
	Count	95	95	144	144	
1999	Mean	24.49%	19.59%	38.10%	-4.45%	
	Median	-14.97%	-12.48%	-21.04%	-48.49%	**
	St.dev.	138.25%	138.43%	165.30%	168.51%	
	Count	53	53	186	186	
VC-IPOs	Mean	41.00%	12.21%	30.68%	-7.55%	
	Median	-12.21%	-42.92%	-20.56%	-48.22%	
	St.dev.	169.78%	173.39%	151.92%	153.73%	
	Count	102	102	137	137	
Early Funding	Mean	38.43%	11.21%	34.57%	-0.71%	
	Median	-22.55%	-50.29%	-16.88%	-46.69%	
	St.dev.	184.56%	186.25%	155.79%	158.79%	
	Count	32	32	207	207	
Development Funding	Mean	53.49%	18.65%	31.49%	-2.58%	
	Median	7.99%	-27.85%	-21.84%	-48.07%	
	St.dev.	166.67%	174.42%	158.28%	160.13%	
	Count	39	39	200	200	
MBO/MBI Funding	Mean	27.94%	5.14%	36.15%	0.25%	
	Median	-26.18%	-46.05%	-15.64%	-46.89%	
	St.dev.	162.11%	163.48%	159.51%	162.57%	
	Count	31	31	208	208	
Conflict Sponsor & Investor	Mean	62.32%	*30.04%	26.95%	-7.83%	
	Median	7.99%	-27.85%	-22.67%	-47.84%	
	St.dev.	197.76%	205.91%	145.83%	146.42%	
	Count	55	55	184	184	
Specialist Lead-VC	Mean	75.60%	**42.05%	22.98%	-11.42%	*
	Median	1.74%	-44.23%	-21.26%	-47.19%	
	St.dev.	207.47%	215.42%	140.55%	141.16%	
	Count	55	55	184	184	

Note that statistical inferences are performed on mean BHAR and difference in mean BHARs only. ***,**,* 5% two-sided significance level and 10% significance level for respectively one and two-sided tests on one population mean using a bootstrapped application of the Johnson's *t-test* adjusted for skewness. ***,**,* respectively 1%, 5% and 10% significance levels for two-sided tests on the difference between the means of two populations, and difference between medians using the *Mann-Whitney U test*. Note that we use parametric *t-test* for difference in means (assuming unequal variances when the results of an *F-test* are conclusive) but also a non-parametric bootstrap test (see Appendix II), with inferences being similar in both cases.

Over all we note that we sometimes find even large average excess returns and differences in average excess returns to be insignificantly different from zero. This is due

[27] The difference in mean unadjusted returns is significant at the 10% level on a two-sided test, while the difference in median unadjusted returns is significant at the 10% level on a one-sided test.

to the high variation in the cross section of IPO returns over our sample period that makes statistical inference difficult.

2.5.2 Cross-sectional analysis of the long-term performance of VC and non-VC-IPOs

2.5.2.1 Methodology

2.5.2.1.1 Control variables

To test our hypotheses further we regress the 3-year excess returns (over matched firms) of our IPOs on a number of control variables so as to isolate the marginal influence of VCs.

We first control for variables that have been commonly used in empirical tests of the determinants of the long-term performance of IPOs. The first two variables are the book-to-market ratio and the market value of issuing firms at the time of the IPO. It has been shown that small low book-to-market firms underperform in the long-term (see Brav and Gompers, 1997). We would therefore expect a positive sign on the coefficient of those variables. However, if this underperformance is not an IPO anomaly our size and book-to-market portfolios should properly adjust for the expected performance of our IPO firms and the coefficient on those variables should be insignificant.

Researchers also often include in their model of IPO long-term performance a variable that captures the reputation of the underwriter. Reputable underwriters because they are expected to reduce information asymmetries should also reduce the risk of fads for the firms they back and therefore the likelihood that they underperform in the long-term. As a mater of fact, Carter et al (1998), Nanda et al (1995), Michaely and Shaw (1994), and in France Degeorge and Derrien (2001) find reputable underwriters to be associated with better long-term performers.

Finally, we would expect young firms to suffer from more information asymmetry and uncertainty, and in turn be more likely to be subject to fads. If this is indeed the case, the valuation of young firms should be corrected in the aftermarket with this leading to their underperformance. For this reason, we include in our model a variable for the age

of IPO firms. We note that contrary to expectations Degeorge and Derrien (2001) find in France the age of IPO firms to be negatively related to the one-year performance of IPO firms.

In addition to those general variables we also control for some specific characteristics of our sample that could explain IPO long-run performance. Firstly, given that our study spans the "internet (high tech) bubble" period we include in our model a dummy signalling IT, Software, and Internet firms[28]. On the one hand those IPOs may have had their valuation hyped at IPO time with this possibly resulting in poor post-IPO performance. On the other hand the market euphoria about those stocks may have continued after the IPO.

Secondly, in line with the idea that some firms may have had their valuation hyped at IPO time, we also include in our model a variable for the first day return of IPO firms. Although the first day return of our IPO firms may be partly reflecting their required underpricing, in the previous analysis we also found it to be strongly positively related with our measure of market momentum. Therefore, the first day return may be telling us something about the degree of investors' euphoria at the time of the IPO. According to the "leaning against the wind" hypothesis, sponsors may be resisting high offer prices merely out of concern that market prices are hard to justify so that setting higher offer prices could trigger lawsuits or damage their reputation if stocks' prices are to drop. Although Loughran and Ritter (2002) using a sample of IPOs from 1990 to 1998 and Lowry (2003) with a sample of IPOs from 1973 to 1996 do not find any evidence for the "leaning against the wind" hypothesis, Loughran and Ritter (2003) do find a reversal between first day return and subsequent performance during the Internet bubble.

Thirdly, because the *Nouveau Marché* gathers many young high growth firms, we would expect more uncertainty and information asymmetries in this market and therefore a greater likelihood of fads and underperformance for those firms than for firms in the *Second Marché*. However, we already control for differences in terms of age, industry affiliation and growth options so that the marginal impact of a market dummy may well be insignificant. Also, Derrien and Womack (2001) find in France between 1995 and

[28] Note that in unreported results we explicitly controlled for other industrial affiliations, using dummy variables, but did not find any of these variables to have a significant influence on the long-run performance of our sample of IPOs.

1998 that, contrarily to expectations, *Second Marché* IPOs underperform *Nouveau Marché* IPOs over a three-year period.

The last variables specific to the sample at hand are year dummies. We recall that the preliminary analysis of the long-term performance of IPOs has shown substantial differences in the performance of IPOs according to the year of floatation.

Finally, we control for the impact of discretionary lock-ups and agency problems on long-run performance. The motivation for including in our model the former variable comes from the fact that it has recently attracted academic interest and that there is not yet any evidence on its ability to explain French IPO long-run performance. If managing directors signal the quality of their firm by entering discretionary lock-up agreements and if the better performance of those firms is not anticipated by the market they should outperform in the long-term.

The reason for including the second variable comes from the realisation in our previous study of French IPO underpricing that the motivations of shareholders do matter. Specifically, we include in our model a variable for entrepreneurs' shareholding after the IPO. Firms where entrepreneurs retain a large shareholding after the IPO should suffer from lower agency costs, and experience better corporate governance. As a result the coefficient of this variable may be positive and significant. Interestingly, we note that the predictions for the post-IPO shareholding of entrepreneurs are somehow in conflict with those for the presence of a VC, since the presence of VCs tends to lower entrepreneurs' equity holdings.

Like in the previous analysis of IPO underpricing we first test our hypotheses using all the above explanatory variables. However, we ultimately want to select the best explanatory model with the fewest number of variables. To this end a backward variable elimination procedure is used with removal criteria $p>0.2$. By reducing the number of variables in our models we also address concerns that collinearity (see Table 11) may adversely affect the accuracy of our coefficient estimates.

Table 11: Correlation matrix of control variables

	IT, Software, and Internet firms	Log B/M	Lock-up NM & SM	Log Age	Log IPO size	Market*	First Day Return	Sponsors' reputation	Year 1996	Year 1998
Log B/M	-0.18									
Lock-up NM & SM	0.00	0.08								
Log Age	-0.17	0.25	0.00							
Log IPO size	0.04	-0.33	0.08	0.06						
Market	-0.29	0.14	0.10	0.47	0.09					
First Day Return	0.17	-0.45	0.02	-0.21	0.36	-0.18				
Sponsors' reputation	0.09	-0.06	0.04	0.06	-0.02	0.10	0.08			
Year 1996	-0.10	0.00	-0.05	-0.02	0.08	0.07	-0.03	0.00		
Year 1998	-0.09	0.02	0.10	-0.01	-0.14	0.04	0.03	0.07	-0.37	
Entrepreneurs' shareholding after	-0.12	-0.22	-0.10	0.10	-0.05	0.35	-0.08	0.01	0.09	-0.02

*Market: a dummy variable coding one when a firm is from the *Second Marché*.

2.5.2.1.2 Descriptive statistics

Descriptive statistics on our control variables are shown in Table 12. We find *Second Marché* IPOs to have performed better on average than *Nouveau Marché* IPOs. However, the difference is not significant. The average BHAR of year 1996 is significantly smaller than that of year 1998 and the other years of our sample. Year 1998's BHAR is not found to be significantly larger than the other years of our sample once year 1996 is excluded. Furthermore, we note that the group of IPOs where entrepreneurs entered a discretionary lock-up performed better than the other IPOs of our sample. The difference is significant at the 10% level on a two-sided test.

Table 12: (Panel A) Descriptive statistics on the variables of our regressions for the Long-term performance of IPOs

PANEL A: Continuous variables	Mean	Median	Standard Deviation
Size of IPO (m Euro)	78.84	43.65	99.63
Age of IPO (year)	19.69	12	21.52
Book-to-market ratio	33.34%	27.95%	24.40%
Entrepreneurs' shareholding after	63.48%	68%	22.25%
First day return	15.39%	8.96%	24.67%

Table 12: (Panel B) Descriptive statistics on the variables of our regressions for the Long-term performance of IPOs

PANEL B: Binary variables	Count	BHAR	Test of difference in Means
Market			
Second Marché	151	10.04%	
Nouveau Marché	88	-9.52%	
IT, Software, and Internet sector	57	28.04%	
Other Industries	182	-4.93%	
Discretionary Lock-up	48	34.82%	*a*
No discretionary lock-up	191	-7.20%	*a*
Year 1996	41	-55.64%	*bbb,cc*
Year 1998	95	23.99%	*bbb*
Other years	103	2.07%	*cc*
Sponsor			
High Reputation	141	7.30%	
Low Reputation	98	-8.34%	

In Table 12 we perform two-sided tests on the difference of two means. Note that we use parametric *t-test* for difference in means (assuming unequal variances when the results of an *F-test* are conclusive) but also a non-parametric bootstrap test (see Appendix II), with inferences being similar in both cases. Two rows of the same cell that have identical letters are statistically significantly different from each other. The significance level is related to the number of letters in any of the two rows. *One letter, two letters, three letters* represent respectively 10%, 5% and 1% significance levels. For instance, the average excess performance of IPOs in year 1996 is significantly different from that of IPOs in year 1998 at the 1% level (*bbb*).

2.5.2.1.3 Model specification

The following linear regression model is used to examine the marginal impact of VCs on the excess performance of the firms they back:

$$BHAR_i = X_i\beta + \varepsilon_i \quad (7)$$

Because the residuals of our regression runs are highly non-normal we test the robustness of our parametric inferences by computing bootstrapped p-values for each coefficient estimate (see Appendix III).

2.5.2.2 Results

Table 13 shows the multivariate regression results for the excess return of IPOs, examining a variety of VC influences. We find in all regression runs that the year 1996 is associated with poorer long-term performers. Also, larger IPOs appear to have performed better than small IPOs. Moreover, in all regression runs we find the coefficient on the first day return variable to be negative and highly significant suggesting that some performance reversal occurred after the IPO. Finally, there is some evidence

Table 13: Models for the Long-term performance of IPOs

The table reports regression coefficients of BHAR (239 IPOs are used for models 1 to 6, 236 are used in model 7 and 8) on various independent variables. The following general linear model is used throughout this analysis: $BHAR_i = X_i\beta + \varepsilon_i$. In brackets are parametric p-values for two-sided tests, in captions are bootstrapped p-values for two sided tests. Finally, in bold are coefficients significant at the 10% level on a one-sided test at least.

Part (I)	Expected Signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Intercept		**-5.149** **[0.02]** **{0.02}**	**-4.964** **[0.03]** **{0.01}**	**-5.405** **[0.02]** **{0.02}**	**-5.092** **[0.02]** **{0.01}**	**-4.198** **[0.04]** **{0.03}**	**-4.073** **[0.05]** **{0.06}**	**-3.047** **[0.09]** **{0.08}**	-2.732 [0.12] **{0.10}**
Log Age	+	0.059 [0.67] {0.72}	0.052 [0.71] {0.75}	0.081 [0.57] {0.57}	0.061 [0.66] {0.71}				
IT, Software, and Internet firms	?	**0.492** **[0.06]** **{0.08}**	**0.495** **[0.06]** **{0.09}**	**0.497** **[0.06]** **{0.06}**	**0.485** **[0.06]** **{0.08}**	0.386 [0.11] {0.15}	0.364 [0.14] {0.20}	0.136 [0.52] {0.42}	
Log IPO size	?	**0.258** **[0.05]** **{0.05}**	**0.249** **[0.06]** **{0.04}**	**0.269** **[0.05]** **{0.04}**	**0.248** **[0.06]** **{0.04}**	**0.208** **[0.08]** **{0.07}**	**0.199** **[0.09]** **{0.10}**	0.158 [0.12] {0.11}	0.160 [0.11] **{0.10}**
Log B/M	?	0.155 [0.39] {0.43}	0.156 [0.39] {0.43}	0.178 [0.33] {0.38}	0.157 [0.38] {0.45}				
Market	+	0.048 [0.86] {0.77}	0.054 [0.84] {0.80}	0.116 [0.67] {0.67}	0.079 [0.77] {0.74}				
First Day Return	-	**-1.257** **[0.01]** **{0.00}**	**-1.245** **[0.01]** **{0.00}**	**-1.249** **[0.01]** **{0.01}**	**-1.157** **[0.02]** **{0.01}**	**-1.342** **[0.00]** **{0.00}**	**-1.325** **[0.00]** **{0.00}**	**-0.933** **[0.02]** **{0.00}**	**-0.915** **[0.02]** **{0.00}**
Year 1996	-	**-0.523** **[0.08]** **{0.06}**	**-0.518** **[0.09]** **{0.04}**	**-0.534** **[0.08]** **{0.04}**	**-0.599** **[0.05]** **{0.02}**	**-0.718** **[0.01]** **{0.00}**	**-0.698** **[0.01]** **{0.00}**	**-0.616** **[0.01]** **{0.00}**	**-0.613** **[0.01]** **{0.00}**
Year 1998	+	**0.304** **[0.19]** **{0.18}**	**0.303** **[0.19]** **{0.18}**	**0.352** **[0.14]** **{0.12}**	0.279 [0.23] {0.21}				
Sponsors' reputation	+	0.139 [0.52] {0.48}	0.123 [0.57] {0.53}	0.107 [0.62] {0.58}	0.124 [0.56] {0.54}				
Lock-up NM & SM	+	0.286 [0.28] {0.33}	0.269 [0.31] {0.35}	0.262 [0.33] {0.38}	0.302 [0.25] {0.29}	**0.351** **[0.17]** **{0.19}**	**0.354** **[0.17]** {0.22}	0.089 [0.69] {0.59}	
Entrepreneurs' shareholding after	+	0.684 [0.29] {0.24}	0.657 [0.32] {0.24}	0.664 [0.35] {0.30}	**0.811** **[0.20]** **{0.15}**	**0.866** **[0.09]** **{0.08}**	**0.898** **[0.09]** **{0.06}**	0.441 [0.32] {0.25}	
VC	+	0.265 [0.34] {0.33}	0.153 [0.64] {0.61}						

Part (II)	Expected Signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Conflict between Sponsors and Investors	-		0.201 [0.53] {0.53}	0.252 [0.44] {0.39}					
Early-stage-VC-IPO	+			0.449 [0.30] {0.29}					
Development-VC-IPO	+			0.056 [0.88] {0.84}					
MBO/MBI-VC-IPO	+			-0.133 [0.77] {0.70}					
Specialist Lead-VC	+				**0.623** **[0.05]** **{0.08}**	**0.704** **[0.01]** **{0.04}**		**0.395** **[0.08]** **{0.09}**	**0.286** **[0.15]** **{0.19}**
Non-specialist Lead-VC	+				-0.092 [0.77] {0.76}				
Weighted average VC specialisation	+						**0.752** **[0.02]** **{0.03}**		
Adjusted R-squared		0.05	0.05	0.05	0.07	0.08	0.07	0.04	0.04
F-statistic		2.09	1.95	1.81	2.36	3.88	3.74	2.28	3.67
Prob. For F-statistic		0.02	0.03	0.03	0.00	0.00	0.00	0.03	0.01

Log Age: the log value of the age of the firm at the time of the IPO in years. IT, Software, and Internet firms: a dummy variable coding one when the firm is from the IT, Software, and Internet sector. Log IPO size: the log value of the size of the IPO estimated at the first closing price in Euro. Log B/M: the log value of the book-to-market ratio of IPO firms, with the market value being calculated at the first closing price and the book value being the first book value after the IPO. Market: a dummy variable coding one when a firm is from the *Second Marché*. First Day Return: the ratio of the difference between the first day closing price and the offer price over the offer price. Year 1996 and Year 1998 are year dummies. Sponsors' Reputation: dummy variable coding one when a sponsor is one of the 5 most reputable sponsors over the period of our study. These include Groupe Banque Populaire (including Portzamparc), Groupe Oddo-Pinatton, Groupe Crédit Agricole (including Cheuvreux), Groupe Crédit Lyonnais, Groupe CIC (EIFB). Lock-up NM & SM: a dummy coding one when directors entered a discretionary lock-up agreement. Entrepreneurs' shareholding after: the shareholding of entrepreneurs after the IPO. VC: a dummy variable coding one when an IPO is VC-backed. Conflicts between Sponsors and Investors: dummy variable coding one when one of the sponsors is affiliated with one of the VC backers. Early-stage-VC-IPO, Development-VC-IPO, MBO/MBI-VC-IPO: dummy variables coding one when VC-IPOs received venture capital funding for each investment type. Specialist Lead-VC: dummy variable coding one when the Lead-VC is specialized in the type of funding provided. A VC is specialised when more than 50% of its funds are invested in a particular type of funding. Non-specialist Lead-VC: a dummy variable coding one when the IPO is VC-backed but the Lead-VC is not specialised in the funding provided. Weighted average VC specialisation: a weighted average (based on the equity holdings of each VC investor) of the specialisation of all VC investors. VCs get a value of one when they invested in an IPO at a stage in which they are specialised. If we cannot determine the specialisation of a VC investor we do not use it in these averages.

that entrepreneurs' shareholding and their discretionary lock-ups are positively and significantly related to the long-term performance of IPOs.

As in the univariate analysis, neither the presence of VCs for all (models 1 and 2) and each stage separately (model 3) nor potential conflicts of interest between sponsors and investors (models 2 and 3) are found to make a significant impact on the excess return of IPO firms.

Moreover, in unreported results, we looked at the marginal impact on our excess return variable of different measures of VCs' cash flow and control rights, their reputation, the level of syndication, the affiliation of the Lead-VC, and whether they had their shares locked-up. None of these variables happened to make any significant impact on the long-term performance of IPOs.

However, in line with **H14** and the previous univariate analysis, the specialisation of the Lead-VC appears to be associated with significantly (at the 5% and 10% level at least using respectively parametric and bootstrapped p-values) better long-term performers (model 4 and 5[29]). The deeper knowledge on a specific investment stage of a Specialist VC might enable the latter to make better investment decisions and monitor its investee firms more effectively, with this leading to the better long-run stock-market performance of those firms. In model 6 we use a weighted average of the specialist skills of VC investors and still find specialisation to be positively related to the after market performance of IPOs. To conclude, it seems that as entrepreneurs' shareholding and therefore their incentives to participate decreases excess performance reduces but when their low shareholding is compensated by the presence of Specialist VC backers.

As with the underpricing of IPOs we examined the leverage and influence of our observations using *leverage values* and the *Cook's D* statistic. Even though no worrisome case was identified we removed a number of observations with relatively large *Cook's D*. We note, in model 7 where model 6 is re-run omitting three observations[30] that the significance of the specialisation variables reduces but is not eliminated, the latter remaining so at the 10% level on a two-sided test. This finding, like the univariate

[29] Model 5 uses a backward variable elimination procedure with removal criteria p>0.2.

[30] These IPOs have BHARs more than four standard deviations away from the mean. They are the Non-specialist VC IPO with the largest BHAR (Dane Elec Memory) as well as the Specialist VC IPOs with the two largest BHARs (Pinguely-Haulotte and Trigano).

analysis performed earlier, highlights the fact that the better long-term performance of IPOs backed by more specialised VCs rests mainly on the out-performance of a few firms. Moreover, the evidence on the managing shareholders' shareholding variable as well as that on the lock-up variable are now largely insignificant. Finally, in model 8 we find that removing the insignificant variables of model 7 (p-value>0.2) does affect the significance of the Specialist VC dummy, which remains so however at the 10% level on a one-sided test.

2.6 Conclusion

In this chapter we proposed a comparative analysis of the underpricing and long-term performance of VC and non-VC-IPOs on the French *Second* and *Nouveau Marché* over the period 1996 to 2000. The distinguishing feature of this chapter was the investigation of the impact of VCs depending on the type of funding provided. Also, and as an additional angle on the problem, we considered whether the specialisation of VC backers makes a difference on the level of underpricing required by the market, and the long-term performance of IPO firms. Finally, we investigated the impact of potential conflicts of interest between sponsors and investors on the magnitude of the first day return and the long-run performance of IPO firms.

Firstly, we found VC-IPOs where a potential conflict of interest between sponsors and investors exists to have had larger degrees of underpricing. This seems to suggest that investors fear the opportunistic behaviour of affiliated sponsors. We did not find, however, evidence that those IPOs had performed worse over the long-term, as could have been the case if affiliated sponsors had taken advantage of investors. It could also be that the evidence of larger underpricing coupled with normal excess performance in the long-run is evidence that the market anticipated the conflict of interest problem and as a result priced the IPOs correctly.

Secondly, we shown that controlling for conflicts of interest not all VC-IPOs face lower degrees of underpricing but only those that received MBO/MBI funding. This possibly suggests that the monitoring and certification of VCs coupled with the ownership transfer to managers matter. We also noted that MBO/MBI-VC-IPOs score high in terms of proxies for the quality of VC involvement. MBO/MBI-VC-IPOs often

have a VC in the board with VCs holding a relatively large number of board seats. Still further those VC-IPOs are backed by relatively more VCs with them holding larger shareholding than in other VC-IPOs. The Lead-VC of MBO/MBI-VC-IPOs are relatively more likely to be specialised in the investment provided and to be independent. Interestingly, we noted that despite scoring high in terms of monitoring proxies Early-stage-VC-IPOs are not found to be associated with significantly lower degrees of underpricing. We suggested that the positive effect of good monitoring might have been offset by the negative adverse selection effect described in Amit et al (1990) and Wang et al (2003). The insignificant coefficient of the dummy for Development-VC-IPOs was not too surprising given that this type of VC backing score low in terms of monitoring proxies.

Finally, we shown some evidence that on the long-run IPO performance is positively related to entrepreneurs' shareholding after the IPO. This is rather bad news for the presence of VCs that tends to reduce the shareholding of entrepreneurs. However, we also found, to counter balance the latter, that the presence of Specialist VC backers is associated with better long-term performance. It could be that the deeper knowledge of more specialised VCs enable the latter to make better investment decisions and monitor the investee firms more effectively. Still further, we noted that the significance of the coefficient for the entrepreneurs' shareholding variable disappears after removing a few outlying observations. If the explanation for the better performance of Specialist VC-IPOs is correct it is not anticipated by the market at the IPO time since those firms were not found to face lower underpricing. Actually, since it is observed it makes sense that the better performance of Specialist VC-IPOs was not anticipated. Indeed, if it were anticipated investors would have priced Specialist VC-IPOs correctly and no excess performance might have been observed.

Chapter 3: Do Venture Capitalists Add Credibility to Prospectus Earnings Forecasts? Evidence From French Initial Public Offerings

3.1 Introduction

The academic literature on venture capital claims that VCs, protective of their reputation, are able to credibly commit themselves to the completeness and accuracy of the information disclosed during IPOs (see Megginson and Weiss (1991)). This in turn should reduce the information asymmetry underlying such offers. However, the empirical evidence on the implications of this claim for the underpricing of IPOs is mixed. And muddying the water still further, certain situations have been identified in theory where, instead of certifying the information, the presence of VCs could actually signal information abuse.

To cast more light on the certification role of VCs, we propose in this chapter a direct investigation of the association between the presence of VCs and the quality of the information disclosed at the time of an IPO, by looking specifically at IPO earnings prospectus forecast error. We hypothesise that if VCs are able to ensure that all relevant information is disclosed, and more specifically that no adverse information is hidden, VC-IPOs' prospectus forecasts, by comparison with non-VC-backed-IPOs, should be more accurate and less optimistic.

We recognise, however, that not all VCs might be in a position to impact significantly on the firms they back. Also, when VCs have a 'lot' of reputational capital at stake they may have more incentive than others to certify the quality of the information disclosed. Therefore we hypothesise that VC-IPOs backed by a relatively more reputable Lead-VC should have less absolute forecast error and less optimistic bias. Also, under certain circumstances where firms want to change their status or create new shares for the IPO, a general extraordinary meeting of the shareholders has to take place. In such circumstances, we also expect those VC-IPOs where VCs have a blocking vote to have

less absolute forecast error and more prudent forecasts. Finally, we look at situations where a sponsor has an affiliated VC backing the IPO. In such instances it has been argued that conflicts of interest between the affiliated sponsor and investors may occur. This is because the sponsor may have incentives to take advantage of new investors so as to obtain a high price for the shares of the firm. This, in turn, would make the exit of its affiliated VC more profitable, and/or reduce the dilution of its equity stake. Therefore, it could be that under such circumstances, managers may experience less pressure to dampen down the optimism of their forecasts, and that, as a result, forecasts also turn out to be less accurate.

Overall, our results seem to provide some support to the idea that VCs care about the information disclosed at the time of an IPO. First of all, we find some evidence that VC-IPOs were less likely than other IPOs to issue a prospectus forecast. This finding suggests that VCs might fear reputational capital losses if inaccurate information disclosure occurs and in turn care about the quality of the information provided to the market.

Secondly, we find that the reputation of VCs and their ability to force the decisions made by the firms they back are associated with more accurate and less optimistic forecasts. Those results remain unchanged after controlling for potential selection bias due to the discretionary nature of prospectus forecasts issuance.

We find the IPO prospectus earnings forecasts of older VCs to be more accurate. However, IPOs backed by Low-Reputation-Lead-VCs are found to issue less accurate earnings forecasts. It could be, of course, that we are picking up not only the smaller reputational concerns of young VCs but also their lesser skills in selecting ventures and monitoring them effectively. This explanation would also suggest that our evidence of better accuracy for IPOs backed by reputable VCs could be due not only to their certification of the information but also to their monitoring ability. Barry et al (1990), for instance, argue that the ability and monitoring skills of VCs should signal better future performance for the firms they back and therefore less uncertainty. Gompers' (1996) "Grandstanding" hypothesis is another possible explanation for the greater inaccuracy of Low-Reputation-Lead-VC-IPOs. According to Gompers, young VCs have incentives to bring their portfolio firms to the market prematurely so as to signal their ability and to

attract investors in follow-on funds. As a result, those IPOs might have more uncertainty attached to them.

When VCs have a blocking minority interest, the prospectus earnings forecasts are more prudent. Looking at the distribution of forecast errors we also find reason to suspect that this might be due to a greater level of earnings management. A more refined analysis of earnings management via the method of accruals did not, however, corroborate these concerns.

Thirdly, we do not find evidence that VC-IPOs, with an affiliated sponsor, try to abuse the market by issuing more optimistic forecasts.

Finally, we note that the evidence that a blocking minority interest hold by VCs is associated with less forecast optimism echoes our previous evidence in Chapter 2 that VCs' degree of control over the firms' affairs matter. Indeed, we recall that investors required lower degrees of underpricing for MBO/MBI-IPOs, a type of VC funding that scores high in terms of cash flow and control rights. In Chapter 2 we also found that Early-stage-VC-IPOs score high in terms of cash flow and control rights, but they were not associated with reduced underpricing. We argued that investors may fear Early-stage-VCs' potential adverse selection problems at the investment time. In unreported findings we tested whether the stage of funding had an impact on the quality of prospectus forecasts and we found no evidence of a significant relationship. Nor did we find evidence that the blocking minority of MBO/MBI-VCs is associated with better quality forecasts than those of Early-stage-VCs. Finally, we investigated the impact on the information disclosed of other characteristics of VC backing (such as the specialisation of the Lead-VC) but could find no significant differences.

This chapter is organised as follows. Section 2 motivates and develops the hypotheses of the chapter. Section 3 describes the construction of the sample, analyses some of its characteristics and presents the institutional setting of this study. Sections 4 and 5 present the empirical tests of the theory and interpretation of the results. Section 6 investigates the impact of possible earnings management. Section 7 investigates the robustness of results to the use of different measures of forecast error. Finally, section 8 concludes the chapter.

3.2 Hypotheses

A substantial body of research tests the claim that the presence of a VC in the shareholding of a firm can certify its quality and reduce the information asymmetry between insiders to and outsiders of the firm. If investors are concerned by the asymmetry of the information on an issuing firm, they may fear that managers will hide some adverse information in order to obtain a better deal for the shares of their company. Specifically Megginson and Weiss (1991) suggest that VCs can credibly commit themselves to the completeness and accuracy of disclosed information, and in turn reduce the information asymmetry as well as the fears of opportunistic behaviour by insiders. This is because, being repeated players in the IPO market, VCs need to retain a favourable access to it. Megginson and Weiss also point out the fact that a trustworthy reputation gained in the IPO market could be used to attract more funds from institutional investors and ensure a better flow of deals from entrepreneurs. Therefore, VCs have an incentive to develop a trustworthy reputation for certifying the information provided at the time of the IPO.

As previously pointed out, however, the empirical evidence so far (see Hamao et al (2000), Ljungqvist (1999), Frankze (2001), Francis and Hasan (2001), Lee and Wahal (2004), Jelic et al (2003)) does not lead to an unqualified acceptance of the certification hypothesis and a number of studies seem to be in contradiction to its predictions.

In order to shed more light on its credibility, we propose in this chapter a direct investigation of the association between the presence of VCs and the quality of the information provided, by comparing VC and non-VC-IPOs' prospectus earnings forecast errors from French data. More precisely we examine the association between the presence of VCs and the magnitude of the absolute earnings forecast error and forecast bias. To our knowledge, no analysis of the impact of VCs on forecast errors has yet been performed. This almost certainly arises from the fact that firms in the US do not issue prospectus forecasts. In France, however, issuing firms often make performance forecasts for the end of the accounting year of the IPO. The quality of prospectus forecasts is potentially a very important issue given the fact that many young firms (especially those that are floated on the *Nouveau Marché*) have little trading history for investors to rely on. We hypothesise, in line with the presumed certification ability of

VCs, that if VCs can ensure that all available and relevant information is disclosed and more specifically that no adverse information is hidden:

H1: VC-IPOs' prospectus earnings forecasts have less absolute error than those of non-VC-IPOs.

H2: VC-IPOs' prospectus earnings forecasts have less optimistic bias than those of non-VC-IPOs.

We recognise, however, that some VCs have more reputational capital to preserve than others and are also in a better position to impact on the decisions made by the issuing firms. It could be argued that the more reputable the VCs, the higher the loss in terms of reputational capital if they were to certify falsely, and in turn the greater incentive to make sure that accurate information disclosure occurs. We investigate this in two steps as follows. Firstly, for each firm we identify the VCs that should fear the most in terms of reputational capital loss in the event that incorrect information disclosure were to occur (henceforth referred to as Lead-VC). We take this VC to be the VC that is on the board prior to the IPO. If more than one VC is on the board (or if no VC is on the board) we choose the VC that has the highest shareholding amongst the other VCs. The underlying idea behind this choice is that such VCs are better placed to impact on the decisions of the firm and are likely to be the ones that are the most involved with them, so that more should be expected from them in terms of certification. This definition of the Lead-VC is slightly different to that used by, for instance, Barry et al (1990), Ljungqvist (1999) and Franzke (2001) where the Lead-VC is the VC with the highest shareholding at the time of the IPO. However, as noted in Chapter 2, when a Lead-VC is in the board, it also usually has the highest shareholding amongst other VCs. Then, as in Chapter 2, we use age as a proxy for VCs' reputation. For each VC-IPO we calculate the number of years the Lead-VC had been in business at the time of the IPO. We order VC-IPOs according to the age of the Lead-VC at the time of the IPO and divide our sample of VC-IPOs into three groups with an approximately equal number of firms. In the first group Lead-VCs are at least 16 years old at the IPO time. This is our group of reputable Lead-

VCs. In the last group Lead-VCs are less than 9 years old at the time of the IPO. This is our group of Low-Reputation-Lead-VCs.

In addition to using a dummy variable to signal Low-and High-Reputation-VCs, we also examine the association between reputation and forecast error using other ways of capturing the different degrees of reputational capital at stake. We use the age of the Lead-VC at the time of the IPO as well as the weighted average (based on the relative equity holdings of each VC investor) of the age of all VC investors in the firm at the IPO time introduced in Chapter 2. For the latter measure, we recall that if the age of a VC investor cannot be determined we do not use it in these averages. We formulate our hypotheses as follows:

H3: VC-IPOs of Reputable-Lead-VCs have less absolute forecast error.

H4: VC-IPOs of reputable Lead-VCs have less optimistic bias.

Under circumstances where firms want to change their status or create new shares for the IPO, an extraordinary meeting of the shareholders has to take place. In such circumstances, for managers to be able to implement their plans they need to obtain two-third of the votes. Where VCs have, as a group, more than one-third of the voting rights it could be that in order to protect their reputation, they block decisions to go for an IPO unless they are satisfied that they can certify the information provided to investors. Therefore, we also look at situations where the VCs prior to the IPO have more than 33.33% of the voting rights and new shares have been created or a change in the status of the firms has taken place.

H5: VC-IPOs where VCs hold a blocking minority interest have less absolute forecast error.

H6: VC-IPOs where VCs hold a blocking minority interest have less optimistic bias.

We also consider situations where a sponsor of the offer has an affiliated VC backing the firm. In such instances it has been argued that potential conflicts of interest between the affiliated sponsor and investors may occur. This is because the sponsor may have incentives to take advantage of new investors so as to get a high price for the shares of the firm. This, in turn, would make the exit of its affiliated VC more profitable, and/or reduce the dilution of its shareholding. Therefore, if sponsors have incentives to take advantage of new investors it could be that they exert fewer pressures on managers to dampen down the optimism of their forecasts or even encourage them to more optimism. As a result forecasts may also turn out to be less accurate. This can potentially be an important problem in France given the large proportion of VCs that are affiliated to a bank. In unreported results we find that 53% of all the VC-IPOs floated on the *Second* and *Nouveau Marché* between 1996 and 2000 had their Lead-VC affiliated to a bank. Still further, for 43% of VC-IPOs one of the sponsors of the issue (found to be in 97% of the cases the Lead sponsor) is affiliated with one of the VC investors. The frequency of potential conflicts of interest is therefore quite high and underline the importance of considering such problems.

H7: Conflicts of interests between sponsors and investors are associated with less accuracy.

H8: Conflicts of interest between sponsors and investors are associated with more optimistic forecasts.

Finally, note that we investigated the impact on the quality of prospectus forecasts of other characteristics of VC backing. These include: the total VC shareholding and Lead-VC shareholding prior and after the IPO as well as VCs' selling intensity at IPO time, a board position held by VCs, the number of VCs backing the firm, the affiliation of the Lead-VC, whether they had their shares locked-up, the type of funding that they received, and the specialisation of the Lead-VC. None of these variables were found to make any significant impact and results are not reported.

3.3 Data, descriptive statistics, and institutional setting

The accounting data used for this analysis comes from IPO prospectuses; IPO notices and listings from *Euronext* and the *COB*; and annual reports.

The sample we use in this analysis consists of the 312 IPOs listed between 1996 and 2000 that were identified earlier in Chapter 2. From these 312 IPOs, 142 come from the *Nouveau Marché* and 170 from the *Second Marché*. Also, 148 IPOs were found to have been VC-backed, 69 from the *Second Marché* and 79 from the *Nouveau Marché*.

Table 1 shows that firms issued a prospectus forecast quite frequently. For 237 companies (or 76% of 312 companies) such an estimate was available, with the figures forecasted ranging from the sales to the net income. Table 1 also shows that every year on each market more than around 60% of IPOs in our sample issue a forecast for the accounting year of the introduction. We also note that for both markets in 2000 and 1999 the likelihood of issuing a prospectus forecast increased, with at least 90% of the issuing firms doing so in our sample. One reason for the recent increase in the proportion of issuing firms providing a prospectus forecast could be the market's increasing demand for the dissemination of performance forecasts (see Rapport Lepetit, 2000). Another reason might be the requirement that individual and institutional investors have equal access to information. The latter implies that the issuing firm makes publicly available any information that might have been communicated to a financial analyst (see Rapport Lepetit, 2000). When the issuing firms include in their prospectus information relative to their prospects, they comply with the requirement of the *COB* because the IPO prospectus is easily accessible to all investors.

Table 1: Pattern of issuance of IPOs and Prospectus Forecasts over time and by markets

Years	IPO				IPO SM [3]				IPO NM [4]			
	Count	*%*	*PF* [2]	*%* [1]	*Count*	*%*	*PF*	*%*	*Count*	*%*	*PF*	*%*
2000	56	18%	52	93%	12	7%	11	92%	44	31%	41	93%
1999	55	18%	50	91%	26	15%	24	92%	29	20%	26	90%
1998	102	33%	66	65%	65	38%	44	68%	37	26%	22	59%
1997	54	17%	36	67%	37	22%	25	68%	17	12%	11	65%
1996	45	14%	33	73%	30	18%	22	73%	15	11%	11	73%
Total	312	100%	237	76%	170	100%	126	74%	142	100%	111	78%

[1] This is the likelihood of issuing a prospectus forecast every year; [2] Prospectus Forecast; [3] *Second Marché*; [4] *Nouveau Marché*.

It is interesting to note that the *COB* has recommended that issuing firms on the *Nouveau Marché* provide some kind of predictive information, which could take the form of quantitative estimates (see Rapport annuel de la *COB*, 1998). Firms on the *Nouveau Marché* are generally young so that, as noted by the *COB* (see Rapport annuel de la *COB*, 1998), their trading history can hardly give an accurate picture of their future performance. Moreover, firms from the *Nouveau Marché* very often come from the high-tech sector where the risk and uncertainty associated with future performance are such that the provision of detailed information may be necessary. For firms on the *Second Marché* no such recommendation has been made. Despite this, from Table 1, it does not seem that the *Nouveau Marché* is much more inclined to issue prospectus forecasts for the accounting year of the IPO. However, as already mentioned (see Chapter 2), on the *Nouveau Marché* firms have to establish a business plan over three years, so that when they issue a prospectus forecast for the accounting year of the IPO issuing firms tend also to include forecasts for the next two years. In contrast, it is much less likely for prospectus forecasts on the *Second Marché* to be so forward-looking.

Table 2 shows the distribution of prospectus forecast for VC and non-VC-IPOs over time and across markets. It appears that the proportion of non-VC-IPOs issuing a forecast exceeds that of VC-IPOs over the whole period and for each year in our sample[1]. This could be due to VCs fearing that they might be sued for false information disclosure when they are on the board and, more generally, that their reputation be damaged should

Table 2: (Part I) Distribution of Prospectus Forecasts amongst VC and non-VC-IPOs over time and by markets

Years	VC-IPO		Non-VC IPO	
	PF	*%*	*PF*	*%*
2000	33	89%	19	100%
1999	22	85%	28	97%
1998	27	54%	39	75%
1997	10	45%	26	81%
1996	8	62%	25	78%
Total	100	68%	***137	84%

[1] A *chi-square test* that the proportion of firms issuing a forecast is the same whether backed or not by a VC rejects the null hypothesis at the 1% level.

Table 2: (Part II) Distribution of Prospectus Forecasts amongst VC and non-VC-IPOs over time and by markets

Years	VC-IPO SM		Non-VC-IPO SM		VC-IPO NM		Non-VC-IPO NM	
	PF	*%*	*PF*	*%*	*PF*	*%*	*PF*	*%*
2000	8	89%	3	100%	25	89%	16	100%
1999	6	86%	18	95%	16	84%	10	100%
1998	18	5%	26	81%	9	53%	13	65%
1997	6	43%	19	83%	4	50%	7	78%
1996	3	50%	19	79%	5	71%	6	75%
Total	41	59%	***85	84%	59	75%	52	83%

*** 1% significance level on a chi-square test for the difference between two populations' distributions.

the forecast prove to be poor. It can also be seen from Table 2 that this finding is robust within each market. We note, however, that when looking separately at the *Nouveau Marché* and *Second Marché*, only the *Second Marché* shows a significant difference between the likelihood of VC and non-VC-IPOs of issuing a forecast (at the 1% level).

In Table 3 we test the robustness of our finding of a lower likelihood of prospectus forecast issuance for VC-IPOs to controlling for a number of additional variables. We use a Logit model, a sample of 300 firms (model 1), and the following control variables: age, offer proceeds, size of tangible assets, leverage at IPO, book-to-market ratio, market of flotation, whether the firm is in the IT, Software, and Internet sectors, the percentage of shares sold by entrepreneurs in the IPO, whether the sponsor is reputable or not[2], year dummies for 2000 and 1999, the number of months between the IPO date and the next fiscal yearend, whether managing shareholders of *Second Marché* IPOs entered a discretionary lock-up agreement, and a dummy signalling the presence of VCs. Controlling for those variables we still find VC-IPOs to be significantly less likely to issue a prospectus forecast than other IPOs (at the 5% level). Four variables are found to have a significant coefficient in our model; these are the offer size, the book-to-market ratio, and the two year dummies. The first two variables have a negative sign, while the two year dummies have a positive sign. Firms that make large offers are likely to be followed by more analysts so that more information should be available to investors. In turn, the issuing firm may find it less necessary to include a forecast in its prospectus. It could have been expected that firms with a lot of growth options be more likely to issue a

[2] This is based on the measure of activity described in Chapter 2 where the IPOs backed by the five most active sponsors over the period of our study get a value of one and the rest zero.

forecast since their past performance may be a poor indicator of the future. We have already commented on the reasons that may explain the increase in the issuance of prospectus forecasts in years 1999 and 2000.

Table 3: Logit model for the probability of issuing a prospectus forecast

300 IPOs are used in model 1, 144 VC-IPOs in models 2 to 5. In brackets are p-values for two-sided tests. Finally, in bold are coefficients with p-value<0.2.

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	**16.346**	**22.063**	**22.114**	**22.184**	**21.905**
	[0.00]	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**
Market	-0.082				
	[0.86]				
Log Offer Proceeds	**-1.158**	**-1.373**	**-1.389**	**-1.388**	**-1.376**
	[0.00]	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**
Log Age	0.024				
	[0.91]				
Log B/M	**-0.529**	**-0.489**	**-0.499**	**-0.484**	**-0.485**
	[0.08]	**[0.18]**	**[0.17]**	**[0.20]**	**[0.19]**
Log Tangible Assets	0.114				
	[0.49]				
Leverage	0.799				
	[0.37]				
Sponsors' reputation	-0.025				
	[0.94]				
IT, Software, and Internet firms	0.147				
	[0.73]				
IPO Lock-up	0.499				
	[0.38]				
Entrepreneurs' participation	-0.518				
	[0.63]				
Time to fiscal yearend	0.039				
	[0.49]				
Year 2000	**3.497**	**3.407**	**3.485**	**3.517**	**3.483**
	[0.00]	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**
Year 1999	**2.444**	**2.585**	**2.624**	**2.618**	**2.628**
	[0.00]	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**
VC	**-0.720**				
	[0.04]				
Conflict between Sponsors and Investors		-0.312			
		[0.49]			
Blocking minority interest			0.077		
			[0.87]		
High-Reputation-Lead-VC				-0.163	
				[0.73]	
Low-Reputation-Lead-VC					0.121
					[0.81]
McFadden R-squared	0.26	0.29	0.29	0.29	0.29
LR statistic	83.02	52.09	51.64	51.73	51.67
Prob. For LR statistic	0.00	0.00	0.00	0.00	0.00

Market: dummy variable coding one when a firm is from the *Second Marché*. Log Offer Proceeds: log value of the number of shares sold in the IPO times the offer price in Euro. Log Age: log value of the age of IPO firms at the time of the IPO. Log B/M: log value of the book-to-market ratio of IPOs with market value estimated at offer price. Log Tangible Assets: log value of the difference between total assets and intangible assets at the time of the IPO in Euro. Leverage: ratio of total debts to total assets at the time of the IPO. Sponsors' Reputation: dummy variable coding one when a sponsor is one of the 5 most reputable sponsors over the period of our study. These include Groupe Banque Populaire (including Portzamparc), Groupe Oddo-Pinatton, Groupe Crédit Agricole (including Cheuvreux), Groupe Crédit Lyonnais, Groupe CIC (EIFB). IT, Software, and Internet firms: dummy variable coding one when firms are from IT, Software, and Internet sectors. IPO Lock-up: dummy variable coding one when the managing shareholders of *Second Marché* IPOs decided to lock-up their shares for a period of time following the IPO. Entrepreneurs' participation: percentage of entrepreneurs' equity sold at the time of the IPO. Time to fiscal yearend: the number of months between the IPO date and the next fiscal yearend. Year 2000 and Year 1999: year dummies. VC: dummy variable coding one when at least one VC is backing the IPO. Conflict between Sponsors and Investors: dummy variable coding one when one of the sponsors is affiliated with one of the VC backers. Blocking minority interest: dummy variable coding one when VCs had prior to the IPO a blocking minority and new shares were created or a change in the status of the firm took place. High-Reputation-Lead-VC: dummy variable coding one when the Lead-VC is at least 16 years old at the IPO time. Low-Reputation-Lead-VC: dummy variable coding one when the Lead-VC is less than 9 years old.

Finally, in models 2 to 5[3] of Table 3 we examine, using a sample of 144 VC-IPOs, whether different characteristics of VC backing are associated with a greater or lower likelihood of issuing a prospectus forecast. The different characteristics that we look at are the ones upon which our hypotheses are based, namely: the reputation of the Lead-VC[4], a blocking minority interest hold by VCs (50 such IPOs were identified), and a conflict of interest between sponsors and investors (63 VC-IPOs). Results suggest that no significant difference exists between those different groups of VC-IPOs.

As expected, Table 2 tells us that more prospectus forecasts for VC-IPOs (59%) come from the *Nouveau Marché*. For non-VC-IPOs most prospectus forecasts (62%) come from the *Second Marché*. Also, Table 2 shows that roughly half of the forecasts on the *Nouveau Marché* are made by VC-IPOs and that approximately two-third of the forecasts on the *Second Marché* are issued by non-VC-IPOs. Finally, Table 2 reveals that our earlier finding of an increase in the proportion of firms issuing a prospectus forecast over the latest two years of our sample applies to both VC and non-VC-IPOs.

We could not start our analysis of the quality of prospectus forecasts made by VC and non-VC-IPOs without giving a brief overview of the liabilities, regarding the quality of the information disclosed, of the different parties involved in the IPO. One should note that it is the issuing firm that is responsible for the information provided in the prospectus, and therefore its president has to attest that all the appropriate due diligence have been performed. Members of the board may be liable as well because they have agreed both on the principle and modalities of the introduction.

The issuing firm shares the responsibility regarding the accuracy of the information provided with the auditors of the firm. Auditors make reports on the accounts of the firms as well as on the forecasts that might have been included in the prospectus.[5]

Sponsors on the *Second Marché* had until September 1 2002 only been legally liable for the analysis that they might have provided to their clients. However, their

[3] For the sake of clarity control variables with coefficients that have a p-value>0.2 are removed.
[4] 45 VC IPOs with a Lead VC that is at least 16 years old at the IPO time are classified in the group of High reputation Lead VC IPOs. 46 VC IPOs with a Lead VC less than 9 years old are classified in the group of Low reputation Lead VC IPOs.

names appearing on the IPO prospectus, one could argue that their reputation was at stake in case the information provided to the market proved to be inaccurate. On the *Nouveau Marché* the situation is different because sponsors have to deliver in the prospectus an attestation to the accuracy of the information. Therefore, in addition to having their reputation at stake in case inaccurate information is delivered, they may also fear to be sued for false information disclosure.

Note that this distinction of practices between the *Nouveau* and the *Second Marché* has been considerably reduced since September 1 2002, with the introduction of the Règlement (Regulation) 2002-05. This regulation requires that sponsors confirm to the *COB* that they did some due diligence on the information content of the prospectus and that the latter did not reveal the inclusion of any inaccurate information or the omission of significant and relevant one.[6, 7]

While the above descriptive statistics relate to the 237 firms found to have issued a prospectus forecast for the year of the IPO, not all those forecasts are used in the forthcoming analysis on the accuracy and bias of prospectus forecasts. We use only forecasts of the net income figure. Depending on the availability, we use the net income figure either with or without the minority interests, but in all instances we match that figure to the appropriate actual net income figure. Three reasons motivated our choice to concentrate on earnings forecasts. Firstly, it is a fact that the net income figure is frequently forecasted. Secondly, it is the dominant variable employed in the literature. Finally, earnings are widely used to estimate share prices so that the quality of the information disclosed should be more important when it comes to the earnings figures.

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[5] For more information on the auditing practice in France see Règlement 2002-05 COB, JO du 7 juillet 2002, and Norme Professionnelle 6-801 : 'Professional Standard relative to the auditing of the information disclosed in IPO prospectuses', http://www.cncc.fr/6%20801/norme%206%20801.htm.

[6] Peltier (Les Echos, September 3 2002) points out that lawsuits against the financial intermediaries of the IPO are unusual in France, even though they are theoretically feasible. Recently the minority shareholders of a company have contacted a Law firm to initiate a lawsuit against the sponsor of an introduction on the *Nouveau Marché* for false information disclosure by the managing shareholders and the sponsor at the time of the offer (see Le Figaro Economie, January 29 2003). Although the Law firm in charge of the latter case does not rule out the possibility of suing as well the president of the company, we are not aware of any lawsuits against an issuing company or board members.

[7] Note that the visa of the *COB* does not imply the "approval of the suitability of the transaction or authentication of the accounting and financial items shown. It has been granted after a review of the relevance and consistency of the information in the light of the transaction offered to investors." http://www.cob.fr/cobgb/frset.asp?rbrq=communique

For 191 firms we found earnings' forecasts for the end of the accounting year just following the IPO and could match the latter with their actual values. In order to minimise the impact of outliers on our results we removed 4 firms where the magnitude of the bias and absolute forecast error were more than almost 6 standard deviations away from the mean, leaving 187 cases which are the subject of our main analysis. Out of these 187 IPOs 79 (42%) are VC-backed.

3.4 The certification of VCs and the accuracy of prospectus forecasts

3.4.1 Preliminary evidence on the Absolute Error of Prospectus Forecasts

We computed the Absolute Forecast Error (AFE) of each firm in our sample as follows:

$$AFE_i = \left| \frac{Forecast_i - Actual_i}{Forecast_i} \right| \quad (1)$$

Table 4 shows the mean, median, and standard deviation of the absolute forecast error for our total sample of IPOs as well as different groupings of IPOs. The mean absolute forecast error in our sample is 46%, in line with other studies of the accuracy of prospectus forecasts[8]. Because absolute forecast errors cannot have a mean value equal to zero (there will always be some variation between forecasts and actual values) we concentrate in this analysis in examining the significance of the difference between the mean of the absolute forecast errors of different groupings of IPOs. Given the non-normality of the data, we not only use a parametric *t-test* for difference in means but also

[8] For instance and excluding studies that use a different metrix than ours for the AFE, Lee et al (2002) find an AFE of 118% for a sample of Australian IPOs, Firth and Smith (1992) for a sample of New Zeland IPOs report an AFE of 328% while Mak (1989) reports an AFE of 100% for the same country. Still further, in Canada Pedwell et al (1994) find an AFE of 88%, in Hong Kong Chan et al (1996) report an AFE of 18% and Chen et al (2001) an AFE of 22% in the same country. In Malaysia Mohamad et al (1994) find an AFE of 28% wile Jelic et al (1998) report an AFE of 55% for the same country. Finally, in the UK Keasey and McGuinness (1991) find an AFE of 11% and in Singapore Firth et al (1995) report and AFE of 10%.

a non-parametric bootstrap test for comparison of means, the details of which are given in Appendix II. We note, however, that inferences do not change whether parametric or non-parametric tests are used. We also examine differences in medians using the *Mann-Whitney U test.*

Contrary to our beliefs (**H1**) that the presence of a VC should certify that all relevant information has been disclosed (and should therefore be associated with lower absolute forecast error), we find that non-VC-IPOs have a significantly lower average AFE (39%) than VC-IPOs (56%), at the 10% significance level (two-sided test). The median AFE for non-VC-IPOs (18%) is also found to be significantly lower than the median VC-IPO AFE (28%) (at the 10% level).

In line with expectations (**H3**) Table 4 shows that those VC-IPOs of reputable Lead-VCs (AFE=32%) are associated with significantly lower degrees of forecast error than other IPOs (49%) (at the 10% level on a one-sided test). This is also significant (at the 10% level on a two-sided test) at the median level (median AFE of High-Reputation-Lead-VC-IPOs= 12%, other IPOs median AFE= 20%).

Interestingly, Low-Reputation-Lead-VC-IPOs are found to have significantly more AFE (71%) than other IPOs (42%) (at the 10% level on a two-sided test). Again, this difference is significant (at the 5% level on a two-sided test) at the median level as well (Low-Reputation-VC-IPOs median AFE= 42%, other IPOs median AFE= 18%).

In line with expectations (**H5**), we find VC-IPOs where a potential conflict of interest exists between sponsors and investors (AFE= 67%) to have a much larger AFE than other IPOs (43%). This difference is not significant at the usual significance levels.

Finally, contrary to expectations (**H7**) the AFE of VC-IPOs where VCs hold a blocking minority interest (AFE=53%) is greater than that of other IPOs (45%), but not significant.

In the second part of our analysis we investigate the evidence for the impact of VCs on the accuracy of prospectus forecasts controlling for cross-sectional determinants of the magnitude of the AFE.

Table 4: Absolute Forecast Error of Prospectus Profit Forecasts for all IPOs, VC and non-VC-IPOs

		AFE by Type of VC involvement	Other IPOs' AFE	Difference
IPOs	Mean	46.15%		
	Median	19.17%		
	St.dev	67.12%		
	Count	187		
VC-IPOs	Mean	55.98%	38.95%	**
	Median	27.81%	17.99%	**
	St.dev	73.31%	61.57%	
	Count	79	108	
IPOs with High-Reputation-VC	Mean	31.57%	48.71%	*
	Median	11.57%	20.11%	**
	St.dev.	47.59%	69.80%	
	Count	28	159	
IPOs with Low-Reputation-VC	Mean	71.09%	42.12%	**
	Median	41.58%	18.07%	***
	St.dev.	82%	63.79%	
	Count	26	161	
IPOs where VCs have a blocking minority	Mean	52.73%	45.18%	
	Median	27.89%	18.38%	
	St.dev.	63.15%	67.82%	
	Count	24	163	
VC-IPOs with potential conflict of interest between sponsors and investors	Mean	67.4%	43.16%	
	Median	27.81%	18.31%	
	St.dev.	89.59%	63.13%	
	Count	23	164	

***, ** respectively 5% and 10% significance level on two-sided tests for difference in means and on two-sided *Mann-Whitney U test* for difference in medians. * 10% significance level on a one-sided test for difference in means. Note that we use parametric *t-test* for difference in means (assuming unequal variances when the results of an *F-test* are conclusive) but also a non-parametric bootstrap test (see Appendix II), with inferences being similar in both cases.

3.4.2 Cross-sectional analysis of the AFE of VC and non-VC-IPOs

3.4.2.1 Methodology

3.4.2.1.1 Control variables

The first variable that we control for in our analysis is the market on which the firm is floated. Because the *Nouveau Marché* attracts many young high growth firms, we would expect more uncertainty and information asymmetry and as a result less forecast accuracy for firms in this market than in the *Second Marché*. However, as pointed out earlier, in the *Nouveau Marché* there is always a written engagement from sponsors on the accuracy of the information provided in the IPO prospectus. Therefore, sponsors in the *Nouveau Marché* could incur a legal liability if some important information is hidden to investors. This could well increase the attention paid by sponsors on the content of the

information provided to investors on that market relative to the *Second Marché*. Furthermore, we have pointed out that managing shareholders may be subject to selling constraints at the time of the IPO and always face share lock-up periods after the IPO. As a result, they may be less tempted to push-up the IPO price by issuing optimistic forecasts that could otherwise result in less accuracy. Having said this, we still expect the first view to hold and for the absolute forecast error on the *Nouveau Marché* to be greater than that on the *Second Marché*.

We also take into account the uncertainty of each firm by controlling for their age at IPO time. In earlier studies it has been argued that young firms lack of track record and their relative lack of understanding of how the environment impacts on their performance may hinder their ability to make accurate forecasts. Thus, Jaggi (1997) finds older companies in Hong Kong to be associated with lower forecast error. Similarly, Mak (1989) shows that in New Zealand firms with an operating history tend to provide more accurate forecasts than firms without one.

We control for the growth options of IPOs using as a proxy their book-to-market ratio. Firms with a lot of growth options may find it more difficult to issue accurate forecasts.

Moreover, our sample span the Internet bubble and it could be that Internet firms found it easier to come up with optimistic forecasts, this in turn leading to lower accuracy. We therefore include in our model a dummy signalling IT, Software and Internet firms[9].

We control for the size of the firms in our sample, using the log value of their tangible assets. We calculated tangible assets as the difference between total assets and intangible assets for the year prior to the IPO. It has been argued that large companies will be able to use the best expertise and techniques to issue accurate forecasts. Some authors have also argued that larger companies might be less susceptible to economic fluctuations. Moreover, one could expect more information asymmetry for small firms than large ones, with small firms as a result issuing more optimistic less accurate forecasts. All this suggests that large firms should be associated with more accurate forecasts. On the other hand, it has to be noted that the corporate bureaucracy and

complexity of large firms may limit their forecasting ability. As regards the empirical evidence, Firth and Smith (1992) find in New Zealand that a negative relationship holds between size and forecast accuracy. They reason that the greater forecast error for larger firms may have been caused by the fact that those firms also raised more capital, hence rendering the forecasts more difficult to make[10]. The net result of all this is that we have little prior expectation about the relation between company size and the magnitude of the absolute forecast error.

A firm's financial leverage is likely to have an impact on the magnitude of the absolute forecast error. This variable gives an indication of the portion of the company's profit that has to be paid as interest, and it is expected that greater financial leverage causes greater variability in earnings (see for instance Firth and Smith (1992)). However, debt service obligations that come with high leverage, by requiring the generation of cash and the avoidance of resource waste, might improve management practices (see Jensen, 1986). As a consequence, managers of highly leveraged firms might produce more accurate forecasts. So once more we do not have any clear prior expectation on the relationship between this variable and the magnitude of the absolute forecast error. To calculate the leverage of a firm we divided total debt by total assets for the accounting year just prior to the IPO.

Earlier research has revealed that macro-economic changes are important factors to consider when attempting to explain firms' performance. The larger the fluctuations in economic activity, the greater the absolute error that one would expect in forecasts. Empirically, Chan et al (1996) in Hong Kong and Mak (1989) in New Zealand do indeed find smaller changes in economic growth to be associated with smaller forecast errors. We computed our economic change variable as the absolute difference between the average quarterly GDP growth for the year prior to and the year following the IPO.

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[9] Note that in unreported results we explicitly controlled for other industrial affiliations, using dummy variables, but did not find any of these variables to have a significant influence on the AFE.

[10] The correlation between size (measured in terms of tangible assets) and new capital raised (the number of new shares sold in the IPO times the offer price) is actually negative (while insignificantly so) in our sample of 187 IPOs. A likely reason for this finding is the requirement on the *Nouveau Marché* that at least 50% of the offer to the public comes from the creation of new shares. Also, we did not find any significant relationship between the size of the offer and the quality of earnings forecasts.

As another means of capturing seasonal patterns that could partly explain the error of prospectus forecasts, we control for the year of flotation of IPOs. Specifically, we use a dummy coded one when firms were floated in 1996 because we found firms floated this year to have issue significantly more accurate forecasts.

VCs are not the only third party that could have an impact on the magnitude of the absolute forecast error of our sample of IPOs. It has been argued that higher ranking sponsors and auditors prefer to be associated with firms that produce prospectus forecasts with little forecast error, so as to protect their reputation. For instance, Cheng and Firth (2000) find the Big Six accounting firms in Hong Kong to be associated with more accurate forecasts. Similarly, Lee et al (2002) in Australia find some evidence that reputable auditors and underwriters reduce the magnitude of the absolute forecast error. We took as our highest ranking auditors the big international accounting firms (Arthur Andersen, Deloitte & Touche Tohmatsu, PriceWaterhouse, Coopers & Lybrand, Ernst & Young, KPMG) as well as some French companies that they had acquired (Calan Ramolino, Fiduciaire de France, GPA Audit et Conseil, and PGA). We took into account the presence of reputable auditors only when the latter had made an explicit comment on the forecast. The method followed to identify our 5 reputable sponsors was described in Chapter 2.[11]

Another important variable used in earlier studies is the horizon of the prospectus forecast. One would expect a negative relationship between the forecast horizon and its accuracy. The longer the period to forecast, the more difficult the forecast should be. For instance, Firth et al (1995) find a positive association between the horizon of the forecast and the magnitude of the forecast error. On the other hand, it has also been argued (see for instance Jaggi (1997)) that the longer the forecast period, the greater the opportunity for management to exercise discretion in maintenance and capital expenditure decisions, hence enabling actual and forecasted values to be matched more closely. However, we still expect the first view to hold and would anticipate a positive relationship between the

[11] Note that we have pointed out earlier that sponsors on the *Nouveau Marché* have not only their reputation at stake but may also be sued in case inaccurate information is disclosed, since they have to deliver in the prospectus an attestation on the accuracy of the information. For this reason, we also modelled the association between reputable sponsors and the forecast error using an interaction dummy so as to capture eventual differences between the two markets. This analysis did not uncover any significant difference between the two markets and the results are not reported here.

horizon of the forecast and the magnitude of its error. Our measure of the forecast horizon is the number of complete calendar months between the date of the auditors' report on prospectus forecasts to the end of the accounting year for which the forecast was made. When auditors did not make a comment on the prospectus forecasts (only 11 cases), we took as a base date for the computation of the forecast horizon the date when the *COB* had stamped its visa on the IPO prospectus.

Finally, we control for variables that could explain the motivation of entrepreneurs to issue more or less accurate forecasts. Firstly, the percentage of shares sold by entrepreneurs at the time of the offer. Entrepreneurs may have more incentive to issue more optimistic (and therefore less accurate) forecasts when they sell a greater percentage of their shares in the issue. To counter balance the latter, Brav and Gompers (2003) suggest that firms that are selling a greater proportion of secondary shares in the IPO may suffer less information asymmetry, so that forecasts may be less optimistic and as result more accurate. Secondly, we use a dummy variable signalling *Second Marché* IPOs where entrepreneurs decided to lock-up their shares following the IPO. On the *Nouveau Marché* entrepreneurs are required to do so for a minimum period of time following the IPO whereas on the *Second Marché* such agreements are discretionary. Therefore, it could be argued that entrepreneurs who lock-up their shares in the *Second Marché* reduce the risk in that market that they may try to take advantage of new shareholders by issuing false information. In turn, the forecasts of those firms may be more accurate.

As in Chapter 2 when testing our hypotheses we first use all the above explanatory variables. However, we ultimately want to select the best explanatory model with the fewest number of variables. To achieve this end, we use a backward variable elimination procedure with removal criteria p-value>0.2. By reducing the number of variables in our models we also address concerns that collinearity (see Table 6) may adversely affect the accuracy of our coefficient estimates.

3.4.2.1.2 Descriptive statistics

Table 5: Descriptive statistics on the variables of our regressions

PANEL A: Continuous variables	Mean	Median	Standard Deviation
Tangible Assets ('000 Euro)	24,173	11,993	36,520
Book-to-market ratio	36.61%	31.84%	27.88%
Leverage	60.74%	63.25%	18.86%
Change in Economic Conditions	0.29%	0.24%	0.17%
Forecast Horizon (month)	6.22	6	311.31%
Entrepreneurs' participation	4.49%	6.07%	40.39%
Age of IPO (year)	19.26	12	21.96
Age of Lead-VC (year)	14.09	13	935.97%
Weighted Average of VCs' age (year)	14.57	14	854.23%
PANEL B: Binary variables	**Count**	**AFE**	**Bias**
Market			
Nouveau Marché	83	73.45% ****	25.51% **
Second Marché	104	24.35%	2.98%
IT, Software, and Internet sector	64	55.33% *	6.50%
Other Industries	123	41.37%	16.35%
Auditor			
High reputation	67	58.96% **	10.34%
Low reputation	120	38.99%	14.45%
Sponsor			
High reputation	111	43.27%	14.11%
Low reputation	76	50.35%	11.32%
Year 1996	21	25.55% **	
Other Years	166	48.75%	–
IPO Lock-up *Second Marché*	28	24.67% ****	-5.37% ***
Other IPOs	159	49.93%	16.21%

****, ***, ** 1%, 5%, and 10% significance level for two-sided tests on the difference between the means of two populations. * 10% significance level for a one-sided test on the difference of means. Note that we use parametric *t-test* for difference in means (assuming unequal variances when the results of an *F-test* are conclusive) but also a non-parametric bootstrap test (see Appendix II), with inferences being similar in both cases.

As expected *Nouveau Marché* firms (AFE=73%) are found in Table 5 to have significantly more AFE than *Second Marché* IPOs (24%) (at the 1% level). IPOs of reputable sponsors (AFE=43%) have only slightly less (and insignificantly so) AFE than IPOs of less reputable sponsors (50%). Reputable auditors (AFE=59%) appear to have significantly more AFE than low reputation ones (39%) (at the 10% level on a two-sided test). In line with expectations, IT, Software, and Internet firms have significantly more AFE (55%) than IPOs in other industries (41%) (at the 10% level on a one-sided test). IPOs floated in 1996 (AFE=26%) issued significantly (at the 5% level on a two-sided

test) more accurate forecasts than IPOs floated in other years (49%). Finally, *Second Marché* IPOs were entrepreneurs locked-up their shares (AFE=25%) have significantly less absolute forecast error than other IPOs (50%) (at the 1% level on a two-sided test).

3.4.2.1.3 Model specification

We depart from previous studies that use a linear model and instead model the AFE as follows:

$$AFE_i = \exp(X_i\beta + \varepsilon_i) \quad (2)$$

This model ensures that we do not mis-model the distribution function of the AFE that should assume negative values with zero probability. The drawback of the model, however, is that it does not allow for AFE with a value of 0.

To estimate the parameters we linearise the above model as follows:

$$Log(AFE_i) = X_i\beta + \varepsilon_i \quad (3)$$

Finally, the residuals of all the regression runs of equation (3) are highly non-normal. We test the robustness of our parametric inferences by computing bootstrapped p-values for each coefficient estimate (the latter are reported in Table 7 along with the parametric p-values). Details of the bootstrapping procedure are presented in Appendix III.

3.4.2.2 Results

Table 7 presents our multivariate models testing whether VCs reduce AFE while controlling for determinants of AFE. Regarding the control variables in models 1 to 7 we find, as expected, in all regression runs that firms on the *Second Marché* issue significantly more accurate forecasts than their counterparts in the *Nouveau Marché*. In addition, we find evidence that the year 1996 was associated with more accurate earnings' forecasts (models 3 to 7, as well as model 1 based on the bootstrapped p-value), significant at the 10% level on a two-sided test. Firms' size is shown to have a positive and significant (at the 10% level on a two-sided test) impact on AFE in models 4 and 7 (as well as model 6 based on the bootstrapped p-value). Finally, in models 1 to 3 and 5 to 7 (models 1, 2, and 7 only when the bootstrapped p-values are used) we find the

Table 6: Correlation matrix of control variables

	Auditors' Reputation	Change in Economic Conditions	Entrepreneurs' participation	Forecast Horizon	IT, Software, and Internet firms	Log Age	Log B/M	Log Tangible Assets	Leverage	Market	IPO Lock-up	Sponsors' Reputation
Change in Economic Conditions	0.03											
Entrepreneurs' participation	0.01	0.02										
Forecast Horizon	0.01	-0.06	0.10									
IT, Software, and Internet firms	0.14	0.00	0.00	0.08								
Log Age	-0.27	-0.07	0.05	-0.08	-0.12							
Log B/M	-0.11	-0.11	0.03	0.08	-0.04	0.23						
Log Tangible Assets	-0.08	0.00	0.09	0.04	-0.17	0.40	0.21					
Leverage	-0.14	-0.16	0.02	-0.05	-0.01	0.05	-0.01	0.17				
Market	-0.25	-0.05	0.13	-0.06	-0.33	0.46	0.16	0.44	0.05			
IPO Lock-up	-0.06	-0.09	0.04	-0.03	-0.14	0.12	0.19	0.27	0.04	0.37		
Sponsors' Reputation	0.12	-0.04	-0.03	0.05	0.02	0.07	-0.02	0.00	0.03	0.07	0.04	
Year 1996	-0.09	0.12	0.06	-0.01	-0.15	0.03	0.04	0.02	-0.01	0.08	-0.01	0.05

Table 7: Models for the Absolute Forecast Error of Prospectus Profit Forecasts

The table reports regression coefficients of Absolute Forecast Errors (187 AFEs for models 1 to 6, and 79 VC AFEs for models 7 and 8) on various independent variables. The following general linear model is used throughout this analysis: $log(AFE_i) = X_i\beta + \varepsilon_i$. In brackets are p-values for two-sided tests, in captions are bootstrapped p-values for two sided tests. Finally, in bold are coefficients significant at the 10% level on a one-sided test at least.

Part (I)	Expected signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept		**-2.872**	**-2.848**	**-2.938**	**-3.408**	**-3.264**	**-3.469**	**-3.879**	**-7.529**	**-6.401**
		[0.09]	**[0.10]**	**[0.09]**	**[0.05]**	**[0.05]**	**[0.04]**	**[0.01]**	**[0.01]**	**[0.02]**
		{0.04}	**{0.06}**	**{0.04}**	**{0.03}**	**{0.02}**	**{0.01}**	**{0.00}**	**{0.00}**	**{0.01}**
Market	-	**-1.384**	**-1.388**	**-1.435**	**-1.521**	**-1.416**	**-1.396**	**-1.488**	**-1.857**	**-1.943**
		[0.00]	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**
		{0.00}	**{0.00}**	**{0.00}**	**{0.00}**	**{0.00}**	**{0.00}**	**{0.00}**	**{0.00}**	**{0.00}**
Year 1996		-0.593	-0.596	**-0.627**	**-0.674**	**-0.623**	**-0.622**	**-0.607**		
		[0.11]	[0.11]	**[0.09]**	**[0.06]**	**[0.08]**	**[0.08]**	**[0.08]**		
		{0.10}	{0.11}	**{0.09}**	**{0.08}**	**{0.08}**	**{0.10}**	**{0.10}**		
Log Tangible Assets	?	0.116	0.116	0.128	**0.172**	0.141	0.155	**0.169**	**0.552**	**0.441**
		[0.30]	[0.29]	[0.24]	**[0.10]**	[0.19]	[0.16]	**[0.09]**	**[0.01]**	**[0.02]**
		{0.25}	{0.22}	{0.19}	**{0.07}**	{0.13}	**{0.09}**	**{0.04}**	**{0.00}**	**{0.02}**
Log B/M	-	0.021	0.026	0.0468	0.129	0.142	0.125			
		[0.93]	[0.91]	[0.83]	[0.55]	[0.51]	[0.56]			
		{0.94}	{0.84}	{0.74}	{0.49}	{0.48}	{0.61}			
Leverage	?	-0.457	-0.454	-0.478	-0.548	-0.427	-0.466			
		[0.47]	[0.47]	[0.44]	[0.37]	[0.49]	[0.45]			
		{0.42}	{0.40}	{0.38}	{0.30}	{0.40}	{0.38}			
Log Age	-	0.038	0.036	0.033	0.048	0.064	0.053		**-0.259**	
		[0.81]	[0.81]	[0.83]	[0.75]	[0.67]	[0.73]		**[0.17]**	
		{0.83}	{0.83}	{0.78}	{0.76}	{0.74}	{0.75}		**{0.16}**	
IT, Software, and Internet firms	+	-0.123	-0.125	-0.103	-0.122	-0.095	-0.136			
		[0.64]	[0.64]	[0.69]	[0.64]	[0.71]	[0.59]			
		{0.66}	{0.64}	{0.70}	{0.65}	{0.78}	{0.61}			
Entrepreneurs' participation	?	0.051	0.052	0.074	0.075	0.047	0.033			
		[0.86]	[0.86]	[0.79]	[0.79]	[0.87]	[0.91]			
		{0.75}	{0.81}	{0.57}	{0.62}	{0.73}	{0.81}			
Change in Economic Conditions	+	2.380	1.291	6.607	9.934	16.324	16.093			
		[0.97]	[0.98]	[0.92]	[0.88]	[0.80]	[0.80]			
		{0.95}	{0.95}	{0.87}	{0.93}	{0.83}	{0.89}			
Auditors' Reputation	-	0.175	0.181	0.202	0.231	0.279	0.255			
		[0.49]	[0.48]	[0.43]	[0.36]	[0.27]	[0.31]			
		{0.46}	{0.33}	{0.34}	{0.30}	{0.24}	{0.24}			
Sponsors' Reputation	-	-0.129	-0.131	-0.127	-0.067	-0.053	-0.038		**-0.573**	**-0.639**
		[0.58]	[0.58]	[0.59]	[0.77]	[0.82]	[0.87]		**[0.06]**	**[0.04]**
		{0.62}	{0.58}	{0.57}	{0.73}	{0.75}	{0.84}		**{0.09}**	**{0.03}**
IPO Lock-up	-	-0.137	-0.134	-0.143	-0.194	-0.255	-0.292			
		[0.69]	[0.70]	[0.68]	[0.57]	[0.46]	[0.40]			
		{0.66}	{0.71}	{0.63}	{0.51}	{0.46}	{0.45}			

Part (I)	Expected signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Forecast Horizon	+	**0.047**	**0.047**	**0.045**	0.040	**0.043**	**0.045**	**0.046**	**0.066**	**0.095**
		[0.17]	**[0.17]**	**[0.19]**	[0.23]	**[0.20]**	**[0.18]**	**[0.16]**	**[0.18]**	**[0.06]**
		{0.19}	**{0.15}**	{0.23}	{0.26}	{0.22}	{0.21}	**{0.17}**	**{0.16}**	**{0.06}**
VC	-	0.032				**0.475**				
		[0.90]				**[0.10]**				
		{0.86}				**{0.06}**				
Conflict between Sponsors and Investors	+		0.079			0.277				
			[0.82]			[0.47]				
			{0.80}			{0.47}				
Blocking minority interest	-			-0.346		-0.386				
				[0.33]		[0.31]				
				{0.30}		{0.26}				
High-Reputation-Lead-VC	-				**-0.976**	**-1.255**	**-0.811**	**-0.798**		
					[0.00]	**[0.00]**	**[0.02]**	**[0.01]**		
					{0.00}	**{0.00}**	**{0.03}**	**{0.02}**		
Low-Reputation-Lead-VC	-						**0.606**	0.463		
							[0.08]	[0.15]		
							{0.05}	**{0.08}**		
Mid-Reputation-Lead-VC	-						0.284			
							[0.42]			
							{0.30}			
Log Age of Lead-VC	-								**-0.718**	
									[0.00]	
									{0.01}	
Log Average age of all VC	-									**-0.699**
										[0.01]
										{0.01}
Adjusted R-squared		0.13	0.13	0.14	0.18	0.18	0.18	0.21	0.39	0.40
F-statistic		3.05	3.05	3.14	3.86	3.45	3.62	9.15	8.98	9.29
Prob. For F-statistic		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Market: dummy variable coding one when a firm is from the *Second Marché*. Year 1996: year dummy. Log Tangible Assets: log value of the difference between total assets and intangible assets at the time of the IPO in Euro. Log B/M: log value of the book-to-market ratio of IPOs with market value estimated at offer price. Leverage: ratio of total debts to total assets at the time of the IPO. Log Age: log value of the age of IPO firms at the time of the IPO. IT, Software, and Internet firms: dummy variable coding one when firms are from IT, Software, and Internet sectors. Entrepreneurs' participation: percentage of entrepreneurs' equity sold at the time of the IPO. Change in economic conditions: absolute value of the difference between the average quarterly GDP growth in the year prior and the year following the IPO. Auditors' reputation: dummy variable coding one when the auditor is one of the big international accounting firms or a French company that they acquired. These include Arthur Andersen, Deloitte & Touche Tohmatsu, PriceWaterhouse, Coopers & Lybrand, Ernst & Young, KPMG, as well as Calan Ramolino, Fiduciaire de France, GPA Audit et Conseil, and PGA. Sponsors' Reputation: dummy variable coding one when a sponsor is one of the 5 most reputable sponsors over the period of our study. These include Groupe Banque Populaire (including Portzamparc), Groupe Oddo-Pinatton, Groupe Crédit Agricole (including Cheuvreux), Groupe Crédit Lyonnais, Groupe CIC (EIFB). IPO Lock-up: dummy variable coding one when the managing shareholders of *Second Marché* IPOs decided to lock-up their shares for a period of time following the IPO. Forecast horizon: number of full calendar months that separates the auditors' report (or the date when the *COB* stamped its visa on the IPO prospectus) from the end of the accounting year for which the forecast was made. VC: dummy variable coding one when at least one VC is backing the IPO. Conflict between Sponsors and Investors: dummy variable coding one when one of the sponsors is affiliated with one of the VC backers. Blocking minority interest: dummy variable coding one when VCs had prior to the IPO a blocking minority and new shares were created or a change in the status of the firm took place. High-Reputation-Lead-VC: dummy variable coding one when the Lead-VC is at least 16 years old at the IPO time. Low-Reputation-Lead-VC: dummy variable coding one when the Lead-VC is less than 9 years old. Mid-Reputation-Lead-VCs: dummy variable coding one when the Lead-VC is between 9 and 16 years old at the IPO time. Log Age of Lead-VC: log value of the age of the Lead-VC. Log Average age of all VCs: log value of a weighted average of the age of VC investors at IPO time using their shareholding at the IPO time as weights.

coefficient on the forecast horizon to be positive –as expected- and significant at the 10% level on a one-sided test.

We first test each one of our different hypotheses regarding the impact of the presence of VCs on AFE separately (model 1 to 4). Then, in model 4 we test all the hypotheses together. As in the univariate analysis, we find no relation between the presence of potential conflicts of interest and the magnitude of AFE (models 2 and 5), and therefore reject **H7**. Similar conclusions can be made between the presence of VCs with a blocking minority interest and forecast errors (models 3 and 5) so that **H5** is also rejected. However, when reputation of the Lead-VC is taken into account, we find, in line with our expectations (**H3**), that the presence of a High-Reputation-Lead-VC is associated with significantly (at the 5% level at least) lower forecast errors (models 4 to 7). Interestingly, we note in model 5 that when controlling for High-Reputation-Lead-VCs, the positive coefficient on the VC dummy becomes significant at the 10% level. This suggests that younger VCs may be associated with more AFE. In model 6 we distinguish between Low, High and "Middle"-Reputation-Lead-VCs and find the coefficient on young Lead-VCs to be positive and significant at the 10% level (5% level based on the bootstrapped p-value).

In model 7 where a backward variable elimination procedure is used (with removal criteria p>0.20), the coefficient on the Low reputation dummy becomes insignificant according to the parametric p-value (two-sided p-value= 0.15), but remains so according to the bootstrapped p-value (9% level). The coefficient on the High reputation dummy remains negative and significant.

Note that we examined the leverage and influence of each observation using *leverage values* as well as the *Cook's D* statistic. Although no worrisome case[12] was identified we excluded a number of observations with relatively large *Cook's D*. The exclusion of these observations does not change our results.

Finally, we investigate whether the discretionary nature of prospectus forecast issuance created a bias in our regression results. We test for the selection issue using a model discussed in Heckman (1979), Maddala (1986), and Greene (2000).

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[12] A worrisome case would be one where the *Cook's D* statistic is greater than one (see Jobson (1991)), and the *leverage value* possibly high.

Let us first define PF_i* an unobserved variable measuring the utility for an individual firm i to decide to issue a prospectus forecast (PF_i=1). We have $PF_i^* = \gamma' w_i + u_i$, and if $PF_i^* > 0 \Rightarrow PF_i = 1$, if $PF_i^* < 0 \Rightarrow PF_i = 0$; where w_i is a vector of explanatory variables.

If Y=AFE or Bias and $Y_i = \beta' z_i + \varepsilon_i$; where z_i is a vector of explanatory variables then we have:

$$\mathrm{E}[Y_i | PF_i = 1] = \beta' z_i + \mathrm{E}[\varepsilon_i | u_i > -\gamma' w_i] \tag{4}$$

It is clear from the above equation that the choice to issue a prospectus forecast will have an impact on the quality of the forecast iff ε_i and u_i are not independent. Selection-correction models usually assume that $(u_i, \varepsilon_i) \sim bivariate\ normal[0,0,1,\sigma_\varepsilon, \rho]$. We recognise, however, that the normality assumption is a limitation in the current-case. The normality assumption allows us to rewrite (4) as:

$$\mathrm{E}[Y_i | PF_i = 1] = \beta' z_i + \rho\sigma_\varepsilon \frac{\phi(-\gamma' w_i)}{1 - \Phi(-\gamma' w_i)} \tag{5}$$

where ϕ is the standard normal density function and Φ the standard normal cumulative density function. Because the standard normal is symmetric, we can express (5) as follows:

$$\mathrm{E}[Y_i | PF_i = 1] = \beta' z_i + \pi \frac{\phi(\gamma' w_i)}{\Phi(\gamma' w_i)}; \text{ where } \pi = \rho\sigma_\varepsilon \tag{6}$$

Therefore, standard OLS regression of the self-selection model would produce inconsistent estimates of β, in a similar fashion than when a specification bias is encountered, unless π is equal to 0. In fact, testing for selection bias is testing whether $\pi = 0$.

To test for selection bias, we use Heckman's two-step estimation procedure, namely:

1. We estimate γ in a Probit model where w_i are the significant variables in the Logit model of Table 3. The Probit regression gives the following parameters' estimates:

$$PF_i^* = 10.49 - 0.64 * Log\ OP_i - 0.24 * Log\ B/M_i + 1.30 * Year\ 1999_i + 2.00 * Year\ 2000_i - 0.38 * VC_i$$

Then, for each observation in our models of Table 7 we compute $\lambda_i = \frac{\phi(\gamma' w_i)}{\Phi(\gamma' w_i)}$.

2. We test the null hypothesis of no selection bias, $\pi = 0$. For the sake of brevity, we only report the results for one representative regression (two-sided p-values are in brackets).

$$Log\ AFE_i = -3.87 - 1.43 * Market_i - 0.66 * Year\ 1996_i + 0.13 * Log\ TA_i + 0.04 * FH_i +$$
$$[0.02] \qquad [0.00] \qquad [0.07] \qquad [0.20] \qquad [0.21]$$
$$0.32 * Med.\ Lead\ VC_i + 0.51 * LowLeadVC_i - 0.80 * High\ Lead\ VC_i + 1.89 * \lambda_i$$
$$[0.35] \qquad [0.11] \qquad [0.02] \qquad [0.30]$$

Therefore, no significant selection bias seems to be present.

In order to shed further light on the difference between Low and High-Reputation-VCs, we ran two regressions with VC-IPOs only, and using two different proxies for VC reputation. The first one is the log value of the age of the Lead-VC (model 8). The second one (model 9) is the log value of a weighted average of the age of all VC investors where the weights are the shareholding of each VC divided by the total VC shareholding. For the sake of clarity, we only report results after the use of a backward variable elimination procedure with removal criteria p>0.20. In our smaller sample of VC-IPOs where we control for VC reputation using age as a proxy, the coefficient on the year 1996 dummy is no longer found to be significant. However, the other significant coefficients of previous models remain. In addition, the coefficient for the reputation of sponsors is significant in both models. Still further, we note in model 8 that the coefficient for the log value of the age of the IPO is negative, in line with expectations, and just achieves significance on a one-sided test. In model 9, however, this variable had an insignificant coefficient and was removed from the analysis. Finally, in line with our expectations, the coefficient on each one of the two proxies for the reputation of VCs is found to be negative and significantly different from zero.

Again, we used *leverage values* and the *Cook's D statistic* to identify potential problematic observations. No worrisome case was identified. We removed, however, a number of observations with relatively large *Cook's D*, with this having no significant impact on our results.

3.5 The certification of VCs and the bias of prospectus forecasts

The principal limitation with a comparative analysis of the magnitude of the absolute forecast error is that it says nothing about the direction of the error. It could be argued that if VCs are able to ensure that no adverse information is hidden, prospectus forecasts of VC-IPOs should be less optimistic, i.e. less upwardly biased. To investigate this, we first compute the bias of the prospectus forecast for each firm in our sample as follows:

$$Bias_i = \frac{Forecast_i - Actual_i}{|Forecast_i|} \quad (7)$$

3.5.1 Preliminary evidence on the bias of prospectus forecasts

Table 8 shows descriptive statistics for the bias of prospectus forecasts for different groupings of IPOs. Because the distribution of prospectus bias is severely positively skewed, we use to test the significance of means Johnson *t-test* adjusted for skewness. Given the evidence from Sutton (1992) that a bootstrapped application of the Johnson's *t-test* should be preferred when the population skewness is severe and the sample size small, we computed the critical values for this test using a bootstrap re-sampling technique described in Appendix I. Furthermore, given the non-normality of the data, a non-parametric bootstrap test for comparison of means is used in addition to the parametric *t-test*. The details of the former test are given in Appendix II. We note, however, that inferences do not change whether parametric or non-parametric tests are used. Tests of difference in medians are based on the *Mann-Whitney U test*.

We find a mean value of 13% for the bias of the whole sample, a value that is positive ("optimistic") and significant at the 5% significance level, and which falls in the range of earlier international studies[13]. The positive sign for the average bias is as

[13] For instance and excluding studies that use a different metrix than ours for Bias, Lee et al (2002) find an optimistic bias of 51% for a sample of Australian IPOs, Firth and Smith (1992) for a sample of New Zeland IPOs report a bias of 92%. Still further, in Canada Pedwell et al (1994) find a bias of 78% while Clarkson et al (1989) report a bias of 99% for the same country. In Hong Kong Selva et al (1994) report an optimistic bias of 14% while Chen et al (2001) find a prudent bias of –10%. Moreover, in Malaysia Mohamad et al (1994) report a prudent average bias of -9% wile Jelic et al (1998) find a prudent bias of -33% for the same country. In Singapore Firth et al (1995) find as well an average prudent bias of –20%.

expected under asymmetric information. If some managers abuse their informational advantage and hide some adverse information, one might expect forecasts, on average, to be optimistic. However, the median bias is negative and the positive skewness of the distribution (184.26% in unreported results) is quite high suggesting that the average optimism may be due to the extremely optimistic forecasts of a relatively few number of firms.

Contrary to our beliefs (**H2**) that the presence of VCs should be associated with less optimistic forecast error, we find the average bias of VC-IPOs (16%) to be higher than that of non-VC-IPOs (11%). The difference is not significant. Finally, we note that only non-VC-IPOs have a mean bias that is statistically different from zero (at the 10% level)[14]. The average bias of VC-IPOs just fail to achieve significance (two-sided p-value for bootstrapped *t-test* adjusted for skewness = 0.11).

As shown in Table 8, the average bias of VC-IPOs where VCs hold a blocking minority interest is negative implying that those firms, on average, issued prudent forecasts. The same is true for IPOs backed by High-Reputation-Lead-VCs. Low-Reputation-Lead-VCs are found to be associated with more optimistic bias (25%) than other IPOs (11%) but the difference is not significant. Still further, VC-IPOs where VCs have a blocking minority interest (average bias=-8%) appear to have made significantly more prudent forecasts on average than other IPOs (16%) (at the 10% significance level on a one-sided test). This is true at the median level as well, but not significantly so. Based on this univariate analysis, we accept **H6**. In line with **H4** there is some evidence that VC-IPOs of reputable Lead-VCs (average bias=-3%) were, on average, significantly less optimistic than other IPOs (16%) (at the 10% significance level on a one-sided test). Finally, VC-IPOs with a potential conflict of interest between sponsors and investors appear to have made more optimistic forecasts on average (average bias for those IPOs= 24%, other IPOs=11%). This difference is not significant and therefore **H8** cannot be accepted.

Finally, in the UK Keasey and McGuinness (1991) find a prudent bias of -5% while Dev and Web (1972) report a prudent bias of –12%.

[14] Note that we would not have been able to reject the null hypothesis that the average bias for non-VC IPOs is equal to zero on a two-sided test if a simple *t-test* had been used. Also, not bootstrapping the *t-test* adjusted for skewness does not change significantly our conclusion.

Table 8: Bias of Prospectus Profit Forecasts for all IPOs, VC and non-VC-IPOs

		Bias by Type of VC involvement	Other IPOs' Bias	Difference
IPOs	Mean	**12.98%		
	Median	-2.51%		
	St.dev	80.48%		
	Count	187		
VC-IPOs	Mean	15.54%	*11.10%	
	Median	-1.26%	-2.75%	
	St.dev	91.12%	72.09%	
	Count	79	108	
IPOs with High-Reputation-VC	Mean	-2.59%	***15.72%	*
	Median	-1.89%	-2.58%	
	St.dev.	57.37%	83.74%	
	Count	28	159	
IPOs with Low-Reputation-VC	Mean	24.93%	**11.05%	
	Median	2.94%	-2.58%	
	St.dev.	106.46%	75.71%	
	Count	26	161	
IPOs where VCs have a blocking minority	Mean	-8.08%	***16.08%	*
	Median	-6.16%	6.26%	
	St.dev.	82.59%	79.95%	
	Count	24	163	
VC-IPOs with potential conflict of interest between sponsors and investors	Mean	24.04%	**11.43%	
	Median	0.45%	-3.99%	
	St.dev.	110.33%	75.69%	
	Count	23	164	

***,**,* respectively 1%, 5% and 10% significance level for two-sided tests on one population mean using a bootstrapped application of the Johnson's *t-test* adjusted for skewness (see Appendix I). * 10% significance level on one-sided tests for difference in means. Note that we use parametric *t-test* for difference in means (assuming unequal variances when the results of an *F-test* are conclusive) but also a non-parametric bootstrap test (see Appendix II), with inferences being similar in both cases.

3.5.2 Cross-sectional analysis of the bias of VC and non-VC-IPOs

3.5.2.1 Methodology

As explained earlier, if VCs ensure that no adverse information is hidden, one would expect VC-IPOs to issue less optimistic forecasts. But although there is a substantial body of previous research attempting to model the absolute value of the error of prospectus forecast, only a few studies have attempted to explain the bias of prospectus earnings forecasts (see for instance Lee et al, 2002). Therefore, this analysis is much more exploratory than the earlier one.

3.5.2.1.1 Control variables

From our earlier analysis, we retain as control variables the market in which the firms' shares are floated, the size of the firms, their book-to-market ratios whether they are from the IT, Software, and Internet sectors, their age, the reputation of the auditors

and sponsors, the horizon of the forecast, and the percentage of entrepreneurs' equity holding sold in the issue as well as the dummy for the lock-up of entrepreneurs on the *Second Marché*.[15]

One would expect the market where the problem of information asymmetry is likely to be the greatest (i.e. the *Nouveau Marché*) to have more optimistic forecasts. Similar expectations can be made for small, young and high growth IPOs. As mentioned earlier, Internet firms[16] may have found it easier to come up with optimistic forecasts over our sample period given investors' euphoria with regards to their earnings' prospects. Moreover, it could be argued that higher ranking sponsors/auditors in order to protect their reputation may prefer to be associated with firms that issue more conservative prospectus forecasts[10]. For instance, Lee et al (2002) find strong support for the hypothesis that Big Six auditors are associated with more prudent forecasts. We also control for the forecast horizon because managers may be naturally more inclined to make optimistic forecasts in the early stage of the accounting year (i.e. the longer the forecast horizon) than at the end when most of the trading activity has been realised. We would therefore expect the coefficient for this variable to be positive. Still further, the more shares entrepreneurs sell, the greater their incentives to boost their forecasts. To counter balance the latter, however, Brav and Gompers (2003) suggest that firms that are selling a greater proportion of secondary shares in the IPO may suffer less information asymmetry, so that forecasts may be less optimistic. Finally, by locking-up their shares, entrepreneurs may be signalling that the firm's value was not hyped so that the forecasts of those firms may be less optimistically biased.

Table 5 provides some descriptive statistics on these control variables. As expected *Nouveau Marché* firms (bias=26%) are found to have made significantly more optimistic forecasts than *Second Marché* IPOs (3%) (at the 10% level on a two-sided test). IPOs with a reputable auditor (bias=10%) appear to have made slightly less optimistic forecasts than other IPOs (14%), but the difference is not significant. IPOs with a Low reputation sponsor (bias=11%) are not associated with more optimistic

[15] Note that we did not find any seasonal patterns for the bias of prospectus forecasts.
[16] Note that in unreported results we explicitly controlled for other industrial affiliations, using dummy variables, but did not find any of these variables to have a significant influence on the bias of prospectus forecasts.

forecasts than IPOs of reputable sponsors (14%). IT, Software and Internet firms do not appear to have issued significantly more optimistic forecasts (15%) than IPOs in other industries (12%). Finally, the forecasts of *Second Marché* IPOs where entrepreneurs have their shares locked-up (bias=-5%) are significantly more prudent than those of other IPOs (16%) (at the 5% level on a two-sided test), and in unreported results than prospectus forecasts of other *Second Marché* IPOs (bais= 6%, with the difference being significant at the 10% level on a one-sided test).

As in the previous analysis of the AFE of prospectus forecasts, we first test our hypotheses using all the above explanatory variables. However, we ultimately want to select the best explanatory model with the fewest number of variables. To this end a backward variable elimination procedure is used with removal criteria p>0.2. By reducing the number of variables in our models we also address concerns that collinearity (see Table 6) may adversely affect the accuracy of our coefficient estimates.

3.5.2.1.2 Model specification

The following linear regression model is used to examine the marginal impact of VCs on the bias of prospectus forecast:

$$Bias_i = X_i\beta + \varepsilon_i \quad (8)$$

Again, the residuals of all our regression runs are highly non-normal, and we test the robustness of our parametric inferences by computing bootstrapped p-values for each coefficient estimate (see Appendix III).

3.5.2.2 Results

Table 9 shows the multivariate regression results for the bias of forecast error, examining a variety of VC influences. In all regression runs, *Nouveau Marché* firms are shown to have more optimistic forecasts (at the 5% level at least on a two-sided test, 10% level based on bootstrapped p-values), longer forecast horizons are associated with more

Table 9: Models for the Bias of Prospectus Profit Forecasts

The table reports regression coefficients of Signed Forecast Errors (187 Forecast Errors are used for this analysis) on various independent variables, the definitions of these are given at the end of this chapter. The following general linear model is used throughout this analysis: $Bias_i = X_i\beta + \varepsilon_i$. In brackets are p-values for two-sided tests, in captions are bootstrapped p-values for two-sided tests. Finally, in bold are coefficients significant oat the 10% level n a one-sided test at least.

Part (I)	Expected signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept		**-1.554**	**-1.543**	**-1.685**	**-1.619**	**-1.616**	**-1.649**	**-1.569**
		[0.07]	**[0.08]**	**[0.05]**	**[0.06]**	**[0.06]**	**[0.06]**	**[0.06]**
		{0.12}	{0.15}	**{0.10}**	**{0.10}**	{0.11}	**{0.06}**	{0.13}
Market	-	**-0.324**	**-0.323**	**-0.355**	**-0.304**	**-0.363**	**-0.343**	**-0.356**
		[0.04]	**[0.04]**	**[0.02]**	**[0.05]**	**[0.02]**	**[0.03]**	**[0.01]**
		{0.06}	**{0.05}**	**{0.03}**	**{0.06}**	**{0.03}**	**{0.05}**	**{0.03}**
Log Tangible Assets	-	0.080	0.079	**0.092**	0.083	**0.089**	0.088	**0.083**
		[0.14]	[0.14]	**[0.09]**	[0.12]	**[0.10]**	[0.11]	**[0.10]**
		{0.20}	{0.24}	{0.15}	{0.20}	{0.17}	{0.20}	{0.19}
Log B/M	-	**-0.316**	**-0.315**	**-0.302**	**-0.312**	**-0.307**	**-0.287**	**-0.307**
		[0.00]	**[0.00]**	**[0.00]**	**[0.00]**	**[0.00]**	**[0.01]**	**[0.00]**
		{0.00}	**{0.00}**	**{0.00}**	**{0.00}**	**{0.01}**	**{0.01}**	**{0.00}**
Auditors' Reputation	-	-0.131	-0.129	-0.115	-0.118	-0.106	-0.079	
		[0.31]	[0.31]	[0.37]	[0.35]	[0.41]	[0.54]	
		{0.29}	{0.29}	{0.36}	{0.33}	{0.40}	{0.49}	
Sponsors' Reputation	-	0.043	0.042	0.054	0.053	0.043	0.059	
		[0.72]	[0.72]	[0.65]	[0.66]	[0.72]	[0.62]	
		{0.70}	{0.78}	{0.66}	{0.64}	{0.68}	{0.62}	
Log Age	-	-0.004	-0.004	-0.001	-0.008	-0.006	-0.002	
		[0.96]	[0.96]	[0.99]	[0.92]	[0.94]	[0.98]	
		{0.95}	{0.95}	{0.96}	{0.92}	{0.93}	{0.99}	
IT, Software, and Internet firms	+	-0.199	-0.201	-0.204	-0.211	-0.188	-0.197	-0.198
		[0.13]	[0.13]	[0.12]	[0.11]	[0.15]	[0.14]	[0.12]
		{0.15}	{0.12}	{0.13}	{0.14}	{0.19}	{0.14}	{0.14}
Entrepreneurs' participation	?	0.001	0.000	0.003	-0.008	0.014	0.002	
		[0.99]	[0.99]	[0.98]	[0.96]	[0.92]	[0.99]	
		{0.80}	{0.95}	{0.82}	{0.94}	{0.67}	{0.85}	
IPO Lock-up	-	-0.064	-0.064	-0.074	-0.099	-0.069	-0.108	
		[0.72]	[0.72]	[0.67]	[0.58]	[0.69]	[0.55]	
		{0.50}	{0.54}	{0.46}	{0.32}	{0.53}	{0.38}	
Forecast Horizon	+	**0.048**	**0.048**	**0.047**	**0.049**	**0.047**	**0.046**	**0.048**
		[0.01]	**[0.01]**	**[0.01]**	**[0.01]**	**[0.01]**	**[0.01]**	**[0.01]**
		{0.00}	**{0.00}**	**{0.01}**	**{0.00}**	**{0.00}**	**{0.01}**	**{0.00}**
VC	-	0.004						
		[0.98]						
		{0.97}						

Part (II)	Expected signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Conflict between Sponsors and Investors	+		0.025 [0.89] {0.86}				0.120 [0.55] {0.65}	
High-Reputation-Lead-VC	-			-0.198 [0.24] {0.22}			-0.105 [0.59] {0.55}	
Mid-Reputation-Lead-VC	-						0.104 [0.61] {0.66}	
Low-Reputation-Lead-VC	-				0.161 [0.35] {0.40}		0.178 [0.33] {0.38}	
Blocking minority interest	-					**-0.279** **[0.10]** **{0.08}**	**-0.326** **[0.09]** **{0.16}**	**-0.295** **[0.08]** **{0.09}**
Adjusted R-squared		0.07	0.07	0.08	0.07	0.08	0.07	0.11
F-statistic		2.25	2.26	2.40	2.35	2.52	2.00	4.57
Prob. For F-statistic		0.01	0.01	0.01	0.01	0.01	0.02	0.00

Market: dummy variable coding one when a firm is from the *Second Marché*. Log Tangible Assets: log value of the difference between total assets and intangible assets at the time of the IPO in Euro. Log B/M: log value of the book-to-market ratio of IPOs with market value estimated at offer price. Auditors' reputation: dummy variable coding one when the auditor is one of the big international accounting firms or a French company that they acquired. These include Arthur Andersen, Deloitte & Touche Tohmatsu, PriceWaterhouse, Coopers & Lybrand, Ernst & Young, KPMG, as well as Calan Ramolino, Fiduciaire de France, GPA Audit et Conseil, and PGA. Sponsors' Reputation: dummy variable coding one when a sponsor is one of the 5 most reputable sponsors over the period of our study. These include Groupe Banque Populaire (including Portzamparc), Groupe Oddo-Pinatton, Groupe Crédit Agricole (including Cheuvreux), Groupe Crédit Lyonnais, Groupe CIC (EIFB). Log Age: log value of the age of IPO firms at the time of the IPO. IT, Software, and Internet firms: dummy variable coding one when firms are from IT, Software, and Internet sectors. Entrepreneurs' participation: percentage of entrepreneurs' equity sold at the time of the IPO. IPO Lock-up: dummy variable coding one when the managing shareholders of *Second Marché* IPOs decided to lock-up their shares for a period of time following the IPO. Forecast horizon: number of full calendar months that separates the auditors' report (or the date when the *COB* stamped its visa on the IPO prospectus) from the end of the accounting year for which the forecast was made. VC: dummy variable coding one when at least one VC is backing the IPO. Conflict between Sponsors and Investors: dummy variable coding one when one of the sponsors is affiliated with one of the VC backers. High-Reputation-Lead-VC: dummy variable coding one when the Lead-VC is at least 16 years old at the IPO time. Low-Reputation-Lead-VC: dummy variable coding one when the Lead-VC is less than 9 years old. Blocking minority interest: dummy variable coding one when VCs had prior to the IPO a blocking minority and new shares were created or a change in the status of the firm took place.

optimistic errors (significant at the 1% level on a two-sided test), and the coefficient on the log of IPO's book-to-market ratio is negative and significant (at the 1% level on a two-sided test). Contrary to expectations, there is also some evidence of a positive and significant association between the size of IPOs and the optimism of prospectus forecasts (models 3, 5 and 7 at the 10% significance level on a two-sided test), but only when inferences are based on parametric p-values.

To test our different hypotheses, we proceed as in the previous analysis of AFE. We first test all our hypotheses separately (models 1 to 5). Then, in model 6 we test all our hypotheses at the same time. Contrary to **H2** (and as in the univariate analysis), we find the presence of VCs to have no significant impact on the bias of prospectus forecasts (models 1 and 5). Still further, we do find the coefficient on the dummy for High reputation Lead-VC IPOs (models 3 and 6) to be negative, but it just fails to achieve significance at the 10% level on a one-sided test; **H4** is rejected. Also, while we find the coefficient on those VC-IPOs where one of the sponsors is affiliated to one of the VC investors to be positive, it is not significant (models 2 and 6) hence rejecting **H8**. The same is true for the coefficient on the Low reputation dummy (models 4 and 6).

Therefore, the earlier evidence of lower accuracy for firms backed by Low reputation Lead-VCs, although possibly reflecting the fact that the latter have little reputational concerns, is not driven by more optimistic forecasts being issued by those firms. It could also be that we are picking up the lower skills of young VCs in selecting less risky ventures as well as their lower abilities to monitor portfolio firms effectively and reduce their risk. If this explanation is correct, it would also suggest that our evidence of better accuracy for IPOs backed by reputable VCs could be due not only to their certification of the information but also to their ability to monitor portfolio firms effectively. Barry et al (1990), for instance, recognise VCs' monitoring ability and argue that the presence of those VCs who are better able at overseeing and guiding portfolio firms should signal to investors the lower uncertainty of the IPOs they back. Yet another explanation for the greater absolute error of Low-Reputation-Lead-VC IPOs' prospectus forecasts could be found in Gompers's (1996) "Grandstanding" hypothesis. According to Gompers, young VCs have some incentives to bring their portfolio firms to the market prematurely so as to signal their ability and to attract investors in follow-on funds, in turn those IPOs should be younger and riskier. In unreported results we did find some

significant evidence (although weak, at the 10% level on a one-sided test only) that Low-Reputation-Lead-VC-IPOs are significantly younger (average IPO age=17 years) than High-Reputation-Lead-VC-IPOs (23 years). We recognise, however, that VCs in our sample intervened at different stages in the life of the firms so that "age" may not be an appropriate variable to judge how pre-mature an IPO was. An investigation of the investment stages in which Low and High-Reputation-Lead-VCs invested does not suggest significant differences: 25% of reputable Lead-VC-IPOs were funded at an early stage while the rest at later stages; 30% of Low-Reputation-Lead-VC-IPOs received funding at an early stage while 70% in later stages. A limitation, however, for the "Grandstanding" hypothesis to explain our results is that it was developed in the US where VC funds are organised around limited partnerships with a predefined lifetime of approximately 10 years, so that young VCs do need to demonstrate their skills rapidly to remain active. In our sample, however, most of the Low-Reputation-Lead-VC-IPOs had a Lead-VC who was not organised around a limited partnership (in only 19%[17] of the time was the Lead-VC a *Fonds Commun de Placement à Risque*, which is a structure similar to the US limited partnership), but instead around structures (such as the limited liability company[18]) that could be thought to offer managers more time to prove their abilities. Having said that, it could possibly be argued that Low reputation Lead-VCs "grandstand" to prove their ability so as to attract quickly not only new funds but also new deals to invest in.

The most interesting finding of this analysis rests with the association between a blocking minority held by VCs and the prudence of prospectus forecasts. In support of **H6,** we find evidence that VC-IPOs where VCs have a blocking minority interest in firms that changed their status or created new shares as part of the IPO, issued prospectus forecasts that are significantly more prudent than other IPOs (models 5 to 7). No marked

[17] M. Adhémar (COB, 1999) notes that FCPR have recently become more common. This structure was created in 1983 but its regime was changed and made more attractive in 1997. The FCPR benefits from a fiscal transparency. This structure also profits from the flexibility of having the fund(s), which consists of the actual shares of investors, separated from the managing company. The lifetime of FCPR varies from 7 to 10 years. Still further, the FCPR enables the management team to get some interest on the performance of the funds under management.

[18] When the young VCs are not a limited liability company or a FCPR, they are a *Société de Capital Risque*. This last structure is similar to a limited liability firm but benefits from some tax advantages in exchange for some investment constraints.

differences were found between separate regressions of VC and non-VC-IPOs, and therefore we report findings for the whole sample only.

Note that the examination of the leverage and influence of each observation using the *Cook's D* statistic and *leverage values* revealed no problematic case. However, a number of observations with relatively large *Cook's D* were removed, with this having no significant impact on our results. Finally, we control for the selection-issue highlighted and described earlier. For the sake of brevity, we only report the result for the test of no selection bias using one representative regression (two-sided p-values are in brackets).

$$Bias_i = -1.63 - 0.26 * Market_i + 0.09 * Log\ TA_i - 0.30 * Log\ B/M_i + 0.05 * FH_i + 0.11 * VC_i$$
$$[0.06] \quad [0.05] \quad [0.10] \quad [0.00] \quad [0.01] \quad [0.43]$$
$$- 0.38 * Block.Mino._i - 0.46 * \lambda_i$$
$$[0.05] \quad [0.62]$$

Again no significant selection bias seems to be present.

3.6 Earnings management

We would like to be reasonably confident that reputable VC-IPOs and VC-IPOs where VCs hold a blocking minority interest are, at least, not associated with significantly more earnings management. Indeed, if this were not to be the case it would be in direct contradiction with our claims that our findings may reflect the certification ability of those VCs.

In line with Degeorge et al (1999) and Lee et al (2002), we investigate the distribution of IPOs' forecast errors. In Table 10 we show the number of observations that just manage to exceed forecast (when bias $\in [-0.10;0[$) and the number that just fail to match or exceed forecast (when bias $\in]0;0.10]$) for different groupings of IPOs. In line with the evidence from Kasznick (1999) and Degeorge et al. (1999) that managers care about matching or exceeding forecasts, we find evidence that for our whole sample the proportion of firms that fall in the first category (firms that just exceed the forecast) is greater than the proportion of firms that fall in the second category.

Worse still, Table 10 shows that VC-IPOs where VCs hold a blocking minority interest have been significantly more likely than other IPOs to just exceed forecasts rather than just failing to do so (at the 5% level on a two-sided test using the *Fisher exact test*). This suggests that our finding of less optimistic forecasts for VC-IPOs where VCs hold a

blocking minority interest may have been at least partly driven by greater degrees of earnings management.

The same preliminary analysis does not reveal, however, that Low and High reputation VC-IPOs may have experienced unusual levels of earnings management.

In order to investigate further the issue of earnings management, we compute for each observation a measure of its Discretionary Current Accruals (DCA) in the forecasted year as defined in Teoh et al (1998[a]). We focus on current accruals because entrepreneurs have been shown to have more discretion over short-term than long-term accruals (see for instance Guenther, 1994. Current accruals are those accounting adjustments in reported earnings that involve short-term assets and liabilities that support the day-to-day operations of the firm. Teoh et al (1998[a]) point out a number of ways for entrepreneurs to increase current accruals. Managers can decide to advance recognition of revenues with credit sales, delay recognition of expenses through low provisions for bad debts, or again defer recognition of expenses when cash is advanced to suppliers.

Table 10: Different measures of Earnings Management

(Part I)

	$[-0.10; 0)$		$(0; 0.10]$	
	Count	**%**	**Count**	**%**
All IPOs	38	60%	25	40%
Non-VC-IPOs	23	59%	16	41%
VC-IPOs	15	62%	9	38%
High reputation VC-IPOs	7	58%	5	42%
Low reputation VC-IPOs	3	50%	3	50%
Other IPOs	28	62%	17	38%
VC-IPOs where VCs hold a blocking minority interest	**7	100%	0	0%
Other IPOs	31	55%	25	45%

** 5% significance level for a two-sided *Fisher exact test*.

(Part II)

	Discretionary Current Accruals		
	Mean	**Median**	**Stdev.**
All IPOs	7.29%	2.60%	37.37%
Non-VC-IPOs	10.06%	2.15%	34.58%
VC-IPOs	3.46%	2.66%	40.85%
High-Reputation-VC-IPOs	3.41%	2.63%	25.56%
Low-Reputation-VC-IPOs	2.78%	5.03%	33.71%
Other IPOs	9.05%	1.66%	40.23%
VC-IPOs where VCs hold a blocking minority interest	6.46%	-0.56%	37.56%
Other IPOs	7.42%	2.96%	37.46%

In order to separate those current accruals that are discretionary from those that are necessary, we proceed as in Teoh et al (1998[a]) using data collected from annual reports and IPO prospectuses. First we calculate current accruals:

$$Current\ Accruals = \Delta[current\ assets - cash] - \Delta[current\ liabilities - current\ maturity\ of\ long - term\ debt] \quad (9)$$

Second, to estimate IPOs' expected current accruals for the year of their first prospectus forecast, we use as a benchmark a sample of 237 seasoned firms listed on the French market for more than three years[19]. We divide our benchmark firms into industry groupings and match our IPOs to these groups. For each IPO we use their corresponding benchmark to estimate, over the forecasted year, a cross-sectional regression of current accruals on the change in sales. Specifically, the following model is run:

$$\frac{CA_{j,t}}{TA_{j,t-1}} = \alpha_0\left(\frac{1}{TA_{j,t-1}}\right) - \alpha_1\left(\frac{\Delta Sales_{j,t}}{TA_{j,t-1}}\right) + \varepsilon_{j,t} \quad (10)$$

where $CA_{j,t}$ are the Current Accruals of firm j in the industry-matched benchmark at time t, the forecasted year; $\Delta Sales$ the change in sales; and TA the firm's total assets.

Non-Discretionary Current Accruals (NDCA) for the IPO firm i over the forecasted year t are then computed as follows:

$$NDCA_{i,t} = \hat{\alpha}_0\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\alpha}_1\left(\frac{\Delta Sales_{i,t} - \Delta TR_{i,t}}{TA_{i,t-1}}\right) \quad (11)$$

where $\Delta TR_{i,t}$, the change in trade receivables, is subtracted to control for the possibility of credit sales manipulation, and $\hat{\alpha}_0$ and $\hat{\alpha}_1$ are the estimated parameters of the previous equation. Discretionary Current Accruals (DCA) are defined as:

$$DCA_{i,t} = \frac{CA_{i,t}}{TA_{i,t-1}} - NDCA_{i,t} \quad (12)$$

In other words, the fitted values of equation (11) correspond to the current accruals necessary to support sales' increases, adjusted for changing industry-wide economic conditions that influence accruals. The values obtained from equation (12) correspond to the current accruals that are not dictated by firm and industry conditions and are therefore believed to have been managed. Table 10 shows the DCA for our total

[19] We note that it has been reported (see Teoh et al, 1998[b]) that firms are involved in earnings management prior to a Seasoned Equity Offering. Less than 10% of our benchmark firms had SEOs over the period of our study, and their impact on our measures of IPOs' earnings management is negligible.

sample (7.3%) and different groupings of IPOs. We find that our sample of VC-IPOs has a lower average DCA (3.46%) than non-VC-IPOs (10.06%). The difference is however insignificant, and the median DCAs of the two sub-groups similar. Similarly, we find Low and High reputation Lead-VC-IPOs to have lower average DCA (respectively 2.8% and 3.4%) than the other IPOs of our sample (9.05%). Differences, however, are insignificant, and the median DCA for High reputation Lead-VC-IPOs and for other IPOs are close to each other (2.6% and 1.7% respectively). The median DCA of Low reputation VC-IPOs is much higher (5%), but again no significant difference is found. Finally, VC-IPOs with a blocking minority interest are found to have a high average DCA (6.5%) compared to the other VC-IPOs of our sample; however, no significant difference is found when comparing this average to the average DCA for the other IPOs of our sample (7.4%). Still further, the median DCA for blocking minority VC-IPOs is actually negative (-0.6%) while that of other IPOs is positive (+2.6%), but again no significant difference is found.

Although the analysis of earnings management via the method of Discretionary Current Accruals does not suggest that our VC-IPOs are associated with significantly less earnings management, we do not find either that they are associated with significantly more earnings management. As a final check of the potential impact of earnings management on our findings, we ran our regression models for AFE and Bias using the DCA of each IPO as an additional explanatory variable. In both sets of regressions the coefficient on the DCA variable is insignificant and negative and our earlier findings remain unchanged. For those reasons, results are not reported.[20]

[20] Because we noticed the presence of a number of outlying observations in the distribution of DCA we performed the same analysis again removing all values more than two standard deviations away from the mean. Two findings are worth mentioning. First, the average DCA of VC IPOs with a blocking minority interest substantially reduces to almost 0%. Second, the average DCA of Low reputation VCs increases to almost 10%. The differences between those two groups of VC IPOs and other IPOs being significant at the 10% level on one-sided tests. Therefore, the relatively high average DCA of Low reputation VC IPOs may well provide further evidence that young VCs have little reputational concerns at least in the sense in which reputation was defined throughout this chapter, i.e. as an indicator of trust. Recall that we also suggested that young VCs may bring their portfolio firms to the market too early so as to build-up some reputation, here an indicator of ability.

3.7 Robustness of our results to the use of different deflators

Our measures of Bias and AFE both use the Prospectus Forecast as a deflator. The robustness of our results to the use of other deflators was investigated. Firstly, we used the Actual value of Earnings as a deflator. We do not report results because they remain qualitatively the same, i.e. after removing a few outlying observations, VCs' reputation is still found to be negatively related to AFE, and a blocking minority held by VCs reduces Bias. However, we note that using the Actual value as a deflator substantially increases the magnitude of the observed average optimistic bias to +38% versus +13% when Prospectus Forecast is used instead.

Perhaps of greater interest, because it does change some of our findings, is the use as a deflator of IPOs' market value estimated at the offer price. As can be seen in Table 11[21],the evidence for High and Low-Reputation-VC-IPOs remains qualitatively the same. High-Reputation-VC-IPOs have significantly less error than other IPOs and Low-Reputation-VC-IPOs (respectively at the 10% level on a one sided-test, and 5% level on a two-sided test). Low-Reputation-VC-IPOs have significantly more AFE than other IPOs at the 10% level on a one-sided test. Table 11 also shows results to hold at the median level.

Table 11: AFE and Bias deflated by Market Value at Offer Price

	Count	Mean	Median	Stdev.
AFE of IPOs with High-Reputation-VC	28	*a,b* 1.17%	*d,e* 0.51%	1.72%
AFE of IPOs with Low-Reputation-VC	26	*b,c* 3.45%	*e,f* 1.15%	4.43%
Other IPOs' AFE	132	*a,c* 1.98%	*d,f* 0.97%	2.88%
Bias of IPOs where VCs have a blocking minority	24	-0.46%	-0.16%	3.26%
Other IPOs' Bias	162	0.19%	-0.06%	3.83%

Two cells of the same column that have an identical letter are significantly different from each other. The letter in the cell describes the significance level. *a,c* 10% significance level on one-sided tests for difference in means. *b* 5% significance level on two-sided test for difference in means. *d,e,f* respectively 1% and 5% significance level for two-sided tests, and 10% level for one-sided test for difference in medians using *Mann-Whitney U test*.

The difference with our prior findings rests first with the evidence on a blocking minority interest hold by VCs. Table 11 shows that despite being negative (prudent), the bias of VC-IPOs where VCs hold a blocking minority interest is not significantly

different from that of other IPOs both at the mean and median levels. Moreover, in unreported results, we find that the average bias of our total sample of IPOs is now equal to 0.11%, a value insignificantly different from zero. Still further the large positive skewness of the distribution of prospectus forecast error vanishes, it is now equal to 24.08% while it was equal to 184.26% when Prospectus Forecast was used as a deflator. We suggest that all this may well be evidence that optimistic forecasts achieved what they were possibly trying to, i.e. push the offer price up. Indeed, this would explain the disappearance of extremely optimistic forecast errors because they would have been matched with large market values. In turn, this would also explain the insignificance of the average bias as well as the fact that Blocking minority VC-IPOs are not found anymore to be significantly more prudent than other IPOs.[22]

3.8 Conclusion

This chapter provided a direct investigation of the association between the presence of venture capitalists and the quality of the information provided by issuing firms by comparing the quality of earnings forecasts in VC-backed IPOs with those of non-VC-backed IPOs. In addition to testing for the mere presence of a VC, the chapter also examined the association between forecast error and the reputation and control effectiveness of VCs.

Overall, our results seem to give some support to the idea that VCs care about the information provided. First of all, we reported that French VC-IPOs between 1996 and 2000 had been less likely than other IPOs to issue a forecast, one possible reason for this being that VCs may fear reputational capital losses that would result if inaccurate information disclosure occurs. We also found, from our analysis of a sample of 187 IPOs that issued a forecast of their net income figure, that in cases where the Lead-VC backing the firm has relatively more reputational capital at stake, the magnitude of the absolute error of the prospectus forecast is reduced. We first associated this finding with the fact that reputable Lead-VCs have more reputation at stake and therefore more interest to certify the quality of the information disclosed. IPOs backed by Low-Reputation-Lead-VCs were found to issue less accurate earnings' forecasts. We argued that we could have

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[21] One outlying observation is removed.

[22] Note that results do not change when controlling for cross-sectional determinants of AFE and Bias.

been picking up not only the lower reputational concerns of young VCs but also their lower skills in selecting less risky ventures and monitoring them effectively. In turn, we recognised that if the latter explanation is correct, it suggests that the better accuracy of IPOs backed by Reputable VCs could be due not only to their certification of the information but also to their ability to reduce IPOs' uncertainty via their valuable monitoring, as suggested by Barry et al (1990). Gompers's (1996) "Grandstanding" hypothesis could also provide an explanation for the greater absolute error of Low-Reputation-Lead-VC-IPOs. According to the author, young VCs have some incentives to bring their portfolio firms to the market prematurely so as to signal their ability and to attract investors in follow-on funds. In turn those IPOs should be younger and riskier. We note, however, that this hypothesis was developed in the US context where VC funds are organised around limited partnerships, whereas in France over the period of our study most of the young Lead-VC-IPOs had their Lead-VC organised around structures that could be thought to offer managers more time to prove their abilities. Having said this, it could possibly be argued that young VCs "grandstand" to prove their ability so as to attract quickly not only new funds but also new deals to invest in. Furthermore, we found some evidence that where VCs have a blocking minority interest that give them a significant influence over the terms of the IPO, the prudence of the prospectus earnings forecast is greater. Looking at the distribution of forecast errors we found some reasons to suspect that this result might have been driven by greater degrees of earnings management. A more refined analysis of earnings management via the method of accruals did not, however, corroborate our earlier concerns. As an additional angle on the problem we investigated potential conflicts of interest between sponsors with an affiliated VC backer and investors. We did not find significant evidence that VC-IPOs, where a sponsor is affiliated to a VC, try to abuse the market by issuing more optimistic forecasts. The quality of earnings' forecasts is not driven by a potential selection bias due to the discretionary nature of prospectus forecasts' issuance.

Finally, we note that despite finding evidence that the reputation of the Lead-VC is associated with better information quality, we did not find investors in Chapter 2 to require lower underpricing the more reputable the VC backer. Also, the evidence that a blocking minority interest hold by VCs is associated with less forecast optimism echoes our previous evidence in Chapter 2 that VCs' degree of control over the firms' affairs

matter to investors and is associated with less underpricing. Indeed, we recall that MBO/MBI-IPOs, this type of VC funding that is associated with reduced underpricing, is also scoring high in terms of cash flow and control rights. In Chapter 2 we also found Early-stage-VC-IPOs to be scoring high in terms of cash flow and control rights. However, these IPOs are not associated with reduced underpricing. We argued that the latter may be evidence that investors fear Early-stage-VCs' potential adverse selection problems at the investment time. In unreported findings we tested whether the stage of funding had an impact on the quality of prospectus forecasts but could not uncover any significant relationship, nor did we find evidence that the blocking minority of MBO/MBI-VCs be associated with better quality forecasts than those of Early-stage-VCs. Note as well that we investigated the impact on the information disclosed of other characteristics of VC backing (such as the specialisation of the Lead-VC) but could not uncover any significant differences, so that results were not reported.

Chapter 4: Lock-up Agreements in France and the Role of Venture Capitalists

4.1 Introduction

It is common to find during an IPO, or any other operation that significantly affects the capital structure of a quoted firm, commitments taken by shareholders not to sell their equity holdings for a period of time (henceforth referred to as lock-up agreements). It has been argued that lock-ups may be used as a device to reduce information asymmetries, as well as a signalling mechanism for higher quality firms. Another explanation for the lock-up provision is the attempt by investment banks to reap additional compensation from the issuing firm.

In order to shed further light on the reasons for shareholders' decisions to enter lock-up agreements, we investigate the empirical impact of theoretical determinants of managing shareholders' decisions to enter discretionary lock-up agreements (DLA) using the data for France. We recognise that the evidence in Chapter 2 suggests that the DLA of managing shareholders may not achieve what they are believed to purport to, namely to reduce information asymmetries and signal firm quality. Indeed, they are not found to be associated with lower degrees of underpricing. However, we find some evidence (although weak) that the DLA of managing shareholders were associated with better long-term performers on average. This may suggest that investors have not anticipated at the IPO time the certification that they convey. Given the focus of the thesis, one of the determinants of the choice of managing shareholders to enter a DLA is hypothesised to be the presence of a VC. If the objective for managing shareholders in entering a DLA is to reduce information asymmetries, we first argue, in line with Brav and Gompers (2003), that IPO firms which benefit from the presence of a VC should be less likely to enter a DLA since the VCs already certify their quality. Given evidence in Chapter 2 that investors may be giving some credit to the certification of MBO/MBI-VC backers and the ownership transfer to managers, we also examine the association between this type funding and the likelihood of entering a DLA. Furthermore, in Chapter 3 we found those VC-IPOs where VCs have a lot of reputation at stake to be associated with better quality

information disclosure (as proxied by the quality of their prospectus forecasts). We argue that our results may reflect the importance of reputable VCs protecting their reputational capital by not certifying falsely. Therefore, despite the fact the reputation of VC investors is not associated with less underpricing, we investigate the nature of its association with the likelihood of the firm entering a DLA. Finally, in Chapter 2 we found that larger degrees of underpricing were associated with the presence of a potential conflict of interest. We suggested that investors might require some compensation for the added uncertainty of those IPOs. Thus, we look at the association between the presence of a potential conflict of interest and the likelihood to enter a DLA, but this time argue that the relationship should be positive if the issuing firms try in this manner to temper investors' concerns[1].

For reasons given later in this chapter, we concentrate our analysis on the *Second Marché* only. First, we find some support for the hypothesis that lock-ups may be used as a signalling mechanism since firms that do a subsequent (seasoned) equity offerings (SEOs) are more likely to have entered a DLA. It could be that firms try signalling their quality at IPO time with a DLA so as to obtain a better price in a subsequent offering. Second, in line with the idea that lock-ups may be entered into to reduce information asymmetry, we find that managing shareholders of older IPOs are less likely to have entered a DLA. Third, in line with the Brav and Gompers (2003) commitment story, larger post-IPO shareholdings of managing shareholders reduces the likelihood of their entering a DLA. Indeed, this result suggests that managing shareholders may want to signal their commitment to the company when their shareholding is going to be low in the aftermath of the IPO, possibly in order to reduce problems of information asymmetries. Fourth, even though we do not find that the presence of a VC reduces the chances of a DLA, the managing shareholders of MBO/MBI-VC-IPOs are less likely to enter a DLA, other things being equal. The evidence on the MBO/MBI dummy, coupled with that on the managing shareholders' equity holding, leads us to suggest an alternative explanation for the fact that those IPOs are less likely to issue a DLA to one based on the superior certification of MBO/MBI-VC backers. We argue that because investors are likely to

[1] Other characteristics of VC involvement were investigated as well, but because no significant relationship was found results are not reported for the sake of brevity.

understand that, despite the low post-IPO shareholding of MBO/MBI managing shareholders, this type of financing signals an increase rather than a lowering of managerial equity stakes, DLA may be less necessary as a signal of managing shareholders' commitment to the firm. Finally, we find neither the presence of potential conflicts of interest between sponsors and investors to be associated with more frequent managing shareholders' DLA, nor the reputation of the VC backer to be associated with less frequent DLA.

In the second part of the analysis we examine stock price movements and volumes of transactions around lock-up expiry. It has been shown that lock-up expiry is associated with a substantial price drop, and an increase in the volume of transactions. Furthermore, of interest for this thesis is the fact that VC-IPOs have been found to experience the largest price drops and increases in the volume of transactions. Amongst the different possible explanations proposed, three are often retained. The first one claims that the price drop may be due to worse than expected news about insider sales. The second one asserts that the negative return may be due to downward sloping demand curve with costly arbitrage. Brav and Gompers (2003) argue that the evidence of larger price drops and increases in the volume of trades for VC-IPOs may be traced back to the fact that many VCs are required to distribute their shares of issuing firms to their shareholders who then tend to sell them automatically. Third, Brav and Gompers (2003) find that price drops are lower for firms that are more informationally transparent. They argue that this result is consistent with the idea that lock-ups are entered to overcome moral hazard problems subsequent to the IPO.

We note from the outset that in France, because of the characteristics of old shareholders' exit, the observed increase in the volume of shares traded after the lock-up expiry is going to be biased downward. This is because old shareholders selling a large stockholding are likely to try placing those shares with investors rather than selling directly in the market. It is anticipated that this problem will be particularly important for VCs since they are likely to try selling a lot of their shares on the unlock date. This, however, does not rule out the downward sloping demand curve with costly arbitrage explanation since, at the end of the day, the new shares have to be taken by the market.

Moreover, VCs are active shareholders with an in-depth knowledge of the firm so that information about VCs' sales may convey some valuable signal to the market on how well the firm is doing. In line with this idea, worst than expected news about VC selling should be associated with larger price drops. Information about VCs' selling activity is likely to leak from the advertising campaign. Moreover, at the opening of the market on the day just following the placing, *Euronext* issues on computer screens a note on the amount of shares sold in the operation. However, nothing is said in this note about which shareholders are actually selling.

Still further, because market's sensitivity to transactions by VCs should increase with the degree of information asymmetry about the firm and VCs' potential adverse selection, we also pay a particular attention to the price behaviour around the first lock-up expiry of Early-stage-VCs. Early-stage-VC-IPOs were found to be young high growth, and it was argued that VCs suffer greater degrees of potential adverse selection when investing in early stage. Another reason for the market's greater sensitivity around the first lock-up expiry of those IPOs is the fact that the date also correspond in most cases to the unlock date of managing shareholders. Those IPOs, being young firms, should still rely on the close involvement of their managing shareholders. Managing shareholders' incentives to put the necessary efforts to monitor performance will have already been substantially diluted with the arrival of VCs, so that their unlocking might trigger great concerns on the part of investors.

Finally, we examine the relation between volume of trades, amount of shares unlocked and the price drops. If the volume of trades reflects investors' concerns about insiders' selling activity, larger volumes should be associated with larger price drops. If the amount of shares unlocked is a proxy for the amount of shares that insiders sell, the downward sloping demand curve with costly arbitrage theory would predict larger amount of shares unlocked to be associated with larger price drops. Also, as more shares are unlocked, investors' concerns should grow.

As in the US, we find that French IPOs experienced a significant price drop at lock-up expiry as well as an increase in the volume of trades for up to 30 days after the event date. We note, however, that the observed increase in the volume of trades is not as high as in the US. Two reasons may explain this finding. First, Field and Hanka (2001)

report in the US that the public float on average potentially triples at lock-up expiry. In our sample, although high, the increase in tradable equity due to the first lock-up expiry only doubles the public float on average. The second reason is the market practice of placing shares with investors when large blocks are exited. We notice that the volume of transactions starts increasing 10 days before the lock-up expiry date. This is not the case in the US where the increase in the volume of shares traded has been linked with the sales of unlocked shareholders. In France, it could be that investors get "nervous" just prior to the lock-up expiry, possibly out of concerns regarding the outcome of the event.

Moreover, we find that the evidence for the price drop is concentrated within our sample of Early-stage-VC-IPOs where VCs' shares are released. Our findings remain unchanged after controlling for possible determinants of the price drop at lock-up expiry. The cross-sectional analysis of abnormal returns also shows the price hit to increase with the level of IPO's growth options, and the length of the lock-up period. We also find that for Early-stage-IPOs where VCs' shares are released a larger abnormal volume of trades is associated with a lower abnormal return. One explanation for our results could be that Early-stage-IPOs where VCs' shares are released are less price elastic. Another explanation could be that the market is more sensitive to insiders' selling at those unlock dates because of the relatively large asymmetry of information for those firms, the possibly larger adverse selection problem faced by VCs, and the risk that incentives for managing shareholders are further reduced. This explanation is consistent with Brav and Gompers (2003) finding of larger price drops for less informationally transparent IPOs.

This chapter is organised as followed. Section 2 introduces the institutional setting of the study and describes our sample. Section 3 exposes the motivation for as well as the hypotheses of the chapter. Section 4 and 5 are concerned with the detailed analysis of our hypotheses. Finally, Section 6 concludes the chapter.

4.2 French institutional setting

It is interesting to note that lock-up agreements in France go against the principle of free trading in the shares of quoted firms. As a matter of fact the French court considers null any clause that would prevent a shareholder from exiting a company by

selling its shares[2]. Having said this, the principle of "free trading" is not absolute and the jurisprudence allows lock-up clauses when they are made for a limited period of time and when they are "legitimate"[3]. For all these reasons, lock-up agreements imposed by the authority (mandatory lock-up agreements) and those that are freely entered by shareholders (discretionary lock-up agreements) because they are limited in time and have for objective the "market's moralisation", both comply with the jurisprudence.

4.2.1 *Euronext*'s mandatory lock-up agreements

Euronext imposes that managing shareholders on the *Nouveau Marché* enter lock-up agreements. Firms that issue their shares on the *Nouveau Marché* are generally very young so that investors make their investment decisions essentially based on the quality of the firms' managing shareholders. Thus, it seems sensible to ensure on this market that managing shareholders remain committed to the performance of their firm by agreeing not to sell or transfer a given percentage of their shares for a minimum period of time after the admission[4]. Initially the instruction required that the managing shareholders of firms more than two years old should engage themselves not to sell for a period of three years at least 80% of their equity holdings. The instruction allowed, however, for *Euronext* and the managing shareholders to agree on a less stringent lock-up clause depending on the specificity of the issuing firm. This instruction was modified in 1998 so that managing shareholders until September 2003[5] had to agree to hold:

- at least 80% of the financial instruments owned at the time of listing for a period of one year from the listing date,

or

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[2] See Cass. com. 22 Octobre 1969, Rev. sociétés 1970, p.288

[3] See C A Paris 4 mai 1982, Gaz. Pal. 1983, 1, jur. P. 152; Cass. Com. 26 avril 1984, Rev. Societes 1985, p. 411, note J. Mestre.

[4] See: Article P.1.1.31, Book II, Specific rules applicable to the French regulated markets http://www.amf-france.org/styles/default/documents/general/4890_1.pdf.

[5] We note that this requirement has recently been made more stringent. Since September 15 2003 managing shareholders may only sell up to 20% of their financial instruments at the IPO time. Moreover, they undertake not to sell or transfer 100% of their remaining financial instruments for one year after admission. Subject to the consent of the issuer, *Euronext* may grant exemptions from the mandatory holding period under conditions specified in an instruction. Such exemptions shall be published on their effective date at the latest.

- 100% of the financial instruments owned at the time of listing for a period of six months from the listing date.[6]

In addition, where the issuer is less than two years old, managing shareholders may not be able to dispose at all of their holdings during the first two years of the issuer's existence[7].

It is required from issuing firms to show in the IPO prospectus the details of the shareholders' engagement. Furthermore, to ensure that the locked shares are not sold, it is also required that the securities concerned be held in escrow by the sponsor/market maker or an institution designated by the firm that will be held responsible in case investors do not comply with the requirements of the lock-up agreement[8].

As already explained, it is the managing shareholders only that are subject to the mandatory lock-up agreements. Although managing shareholders are commonly defined as all shareholders with a board position, no clear definition is given for who should be considered as a managing shareholder. This lack of clarity allows for some flexibility in the application of the regulation, despite the fact that *Euronext* must approve the list of managing shareholders that the issuing firm draws in the IPO prospectus. Of particular interest to this study, we realised that a number of VCs were not classified in the IPO prospectus as managing shareholders while possessing a board position. As a result those VCs appear to be released from the requirements defined above. However, discussions with professionals suggest that *Euronext* do not ask for the list of managing shareholders in the IPO prospectus to be amended as long as the shareholders that it believes should be classified as managing shareholders are locked-up. As a result, it could well be that some other VCs than the ones listed in the IPO prospectuses as managing shareholders were bound to enter a mandatory lock-up agreement. Our classification is based on the list drawn in the IPO prospectus and should therefore be interpreted with caution.

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[6] See Article 1, instruction NM 3-02: holding period and disclosure requirements applicable to managing shareholders http://www.bourse-de-paris.fr/fr/index_fs.htm?nc=2&_ni=1&nom=marche. Décision n 98-21du CMF relative aux règles de marché de la Société du Nouveau Marché http://www.amf-france.org/styles/default/documents/general/4919_1.pdf.

[7] See Article 2, instruction NM 3-02: holding period and disclosure requirements applicable to managing shareholders http://www.bourse-de-paris.fr/fr/index_fs.htm?nc=2&_ni=1&nom=marche.

4.2.2 Discretionary Lock-up Agreements (DLA)

In addition to the mandatory lock-up agreements for the managing shareholders of firms floated on the *Nouveau Marché*, or for the other shareholders of firms on the *Nouveau Marché* and all shareholders on the *Second Marché*[9], there is the possibility to enter DLA. This can be done in three ways:

- by entering an "Engagement contractuel de conservation des titres"
- by settling a "Pacte d'actionnaires"
- by reconducting a "Pacte d'actionnaires"

As evidenced latter in this chapter, an increasing number of shareholders on the *Second Marché* are entering such agreements. A clause that gives sponsors the right to allow the sale of shares prior to the end of the lock-up period can often be found, making these agreements less stringent than mandatory lock-ups. For the sponsor not to damage its reputation or be held liable in case investors are abused by selling shareholders, it is expected that they only authorise the sale of locked shares in order to reduce the volatility of the firms' shares and maintain market equilibrium. In a few number of cases only, the possibility for shareholders to sell their shares is made contingent on the level of the market price relative to the introduction price, or the permission of other shareholders.

4.2.2.1 Descriptive statistics

On the *Nouveau Marché* between 1996 and 1997, the managing shareholders of only one firm decided to lock-up more shares for a longer period of time than required by the legislation (see Table 1). In 1998, 5 firms (or 14% of all IPOs this year) saw their managing shareholders entering more stringent lock-up agreements than required. Between 1999 and 2000 this was done by the managing shareholders of 24 firms. The difference between the number of DLA made by managing shareholders in the 1996-1998 and 1999-2000 periods can be explained by the fact that lock-up agreements up to December 1998 were very stringent; as already explained, managing shareholders could not sell more than 80% of their shareholdings for 36 months after the IPO. In none of the

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[8] See: Article P.1.1.31.

[9] We note that in one instance *Euronext* imposed a mandatory lock-up agreement on a *Second M*arché IPO (LVL Medical).

cases does the "Engagement contractuel de conservation" mention the possibility of sponsors granting managing shareholders earlier exit. Because of those DLA, the lock-up of the shares of managing shareholders are sometimes staged over a period of time, with at every stage fewer shares being locked. We define a stage as a period of time over which a shareholder has the same amount of its shares locked. At the end of a stage, the shareholder will have all or part of its shares unlocked. If only part of the shares are unlocked, this will mark the start of another stage. The length of and amount of shares locked at every stage are defined in the IPO prospectus.

Table 1 shows that in 50 firms on the *Nouveau Marché*, VCs had some of their shares locked after the IPO. We note that in two instances VCs were classified in the IPO prospectus as managing shareholders and entered in addition to the mandatory lock-up a DLA. These two cases are reported in the row for VCs rather than the one for managing shareholders in Table 1. We note that in another 6 firms VCs were classified as managing shareholders but did not enter a DLA. We noted earlier that no clear definition is given for who should be considered as a managing shareholder. In fact, *Euronext* does not care whether shareholders in the IPO prospectus are accurately classified as managing shareholders or non-managing shareholders as long as the shareholders that it believes should be classified as managing shareholders are locked-up for the required period of time. Therefore, it could well be that in more than 8 instances were VCs bound to enter a mandatory lock-up agreement. In fact, we note than in 26 cases VCs that entered a lock-up agreement also had seats on the board of the firm. We note that the lock-up of VCs is sometimes also staged over time. At most VCs have 100% of their shares locked in the first lock-up period and at least 62%. The length of the first lock-up period varies from 3 months after the IPO to 36 months. Finally, the median VC has a lock-up period of 6 months and 100% of its shares locked over the first lock-up period.

We note that managing shareholders and VCs are not the only shareholders subject to lock-up agreements. We also find in a number of instances, 44 firms, "other" shareholders to have entered lock-up agreements. The number of such agreements increased in absolute, as well as relative terms, over time. In 1996 the "other" shareholders of 3 firms (or 10% of all IPOs this year) decided to do so, in 2000 the "other" shareholders of 19 firms entered into such agreements (or 43% of all firms this

year). These agreements are sometimes staged over time, at most those "other" shareholders had 100% of their shares locked in the first lock-up period and at least 67%. As with the lock-up of VCs, the length of the first lock-up period varies from 3 months after the IPO to 36 months. The median "other" shareholder had 100% of its shares locked for 6 months.

Finally, in 19 cases VCs could be granted earlier exit from their lock-up agreements. A similar clause was mentioned in 13 of the "Engagement contractuel de conservation" of "other" shareholders.

On the *Second Marché* we find managing shareholders to have taken an "Engagement contractuel de conservation" in 21 cases[10] (see Table 2). In a few cases, the lock-up is staged over time. Managing shareholders locked-up at most 100% of their shares and at least the51% in the first lock-up period. The longer first lock-up period was 120 months, the shortest one 2 months. In 5 instances there is a clause that allows for the earlier exit of managing shareholders. The median managing shareholder had 88% of its shares locked for 36 months.

VCs on the *Second Marché* also agreed to lock-up their shares over a period of time. Table 2 reports that this was done in 16 cases. The length of the first lock-up varies from 2 to 18 months, and the percentage of shares locked-up from 13% to 100%. In 3 cases the "Engagement contractuel de conservation" had a clause for early expiry. The lock-ups are sometimes staged over time. Finally, the median percent of shares locked-up by VCs is 100%, and the median lock-up length 6 months.

As shown in Table 2, the "other" shareholders of 15 firms also decided to lock-up their shares. In 3 instances their agreements included a clause for earlier exit. In one case the lock-up agreement is staged over time. At least 98% of those "other" shareholders' shares are locked over the first lock-up period. The length of the first lock-up period varies from 6 to 45 months. The median "other" shareholder had 100% of its shares locked for 9 months after the IPO.

[10] Note that we have included one company (LVL medical) for which *Euronext* specifically required that shares be locked-up.

Table 1: Discretionary Lock-up agreements on the *Nouveau Marché*

	1996 Count	%	1997 Count	%	1998 Count	%	1999 Count	%	2000 Count	%	Total Count	%	% Locked first lock-up Min	Med	Max	Length first lock-up (month) Min	Med	Max
Managing shareholders	_		1	*6%	5	14%	8	28%	16	36%	30	21%						
VCs	2	**29%	6	75%	12	71%	9	47%	21	75%	50	63%	62%	100%	100%	3	6	36
Others	3	*10%	2	12%	11	30%	9	31%	19	43%	44	31%	67%	100%	100%	3	6	36

*As a percentage of all IPOs; **As a percentage of all VC-IPOs

Table 2: Discretionary Lock-up agreements on the *Second Marché*: "Engagement contractuel de conservation"

	1996 Count	%	1997 Count	%	1998 Count	%	1999 Count	%	2000 Count	%	Total Count	%	% Locked first lock-up Min	Med	Max	Length first lock-up (month) Min	Med	Max
Managing shareholders	1	*3%	_		10	15%	5	19%	5	42%	21	12%	51%	88%	100%	2	36	120
VCs	1	**17%	1	7%	8	24%	2	29%	4	44%	16	23%	12.5%	100%	100%	2	6	18
Others	_		1	*3%	6	9%	2	8%	6	50%	15	9%	98%	100%	100%	6	9	45

*As a percentage of all IPOs; **As a percentage of all VC-IPOs

Table 3: Discretionary Lock-up agreements on the *Second Marché*: "Clauses d'inaliénabilité"

	1996 Count	%	1997 Count	%	1998 Count	%	1999 Count	%	2000 Count	%	Total Count	%	% Locked first lock-up Min	Med	Max	Length first lock-up (month) Min	Med	Max
Managing shareholders	6	*20%	3	8%	9	14%	3	12%	2	17%	23	14%	4%	100%	100%	6	8	120
VCs	_		_		1	3%	_		_		1	1%		100%			6	
Others	_		_		1	2%	_		_		1	1%		90%			24	

*As a percentage of all IPOs; **As a percentage of all VC-IPOs

Table 4: 2nd to 5th stage lock-ups for the shareholders of *Second* and *Nouveau Marché* IPOs

	Nouveau Marché												Second Marché								
	2nd Stage Min	Med	Max	3rd Stage Min	Med	Max	4th Stage Min	Med	Max	5th Stage Min	Med	Max	2nd Stage Min	Med	Max	3rd Stage Min	Med	Max	4th Stage Min	Med	Max
Managing Directors																					
Length (month)	3	12	30	3	12	12	3	12	18		3		2	6	24		2				
% locked	3%	80%	90%	3%	60%	60%	25%	40%	60%		20%		4%	50%	67%		33%				
Count		23			7			5			1			6			1				
VCs Length (month)	3	6	12	3	3	3	3	3	3	3	3	3	2	6	6	2	3	3	3		
% locked	20%	50%	95%	50%	50%	50%	25%	33%	40%	20%	25%	20%	13%	50%	67%	13%	23%	33%	13%		
Count		16			5			5			3			5			2			1	
Other Length (month)	3	6	12	3	7	12	3	3	6		3		9	53	96						
% locked	6%	50%	90%	5%	50%	80%	16%	25%	40%		20%		1%	46%	92%						
Count		16			5			3			1			2							

Finally, we note in unreported results that, in 5 firms, employees also decided to lock some of their shares (between 50% and 100%) over some period of time (6 to 60 months).

In parallel to "Engagements de conservation" one can find some "Clauses d'inaliénabilité" in the "Pacte d'actionnaires". The "Pacte d'actionnaires" are instruments used to organise, in addition to the firm's status, the relations between some or all the different shareholders of the firm. These are generally kept secret until the firm is quoted on an exchange. At the time of an IPO, shareholders may decide either to cancel a "Pacte d'actionnaires", re-conduct one, or create a new one. Amongst the different clauses that may be included in a "Pacte d'actionnaires" one may find a "Clause d'inaliénabilité". This clause is similar to an "Engagement de conservation" since it forbids the sale of shares for those who subscribe to the clause or imposes that those shareholders that entered the "Pacte d'actionnaires" be only able to sell their shares to other shareholders in the "Pacte". In that sense they are different from another type of clause called "Clause de préemption" and which only obliges a shareholder to ask first the other shareholders of the firm for their interest in the shares they are about to sell before actually selling them to a third party. Sometimes an early exit from a "Clause d'inaliénabilité" is made possible but is conditional on the permission of other shareholders.

There is no case of firms on the *Nouveau Marché* with a "Pacte d'actionnaires" that includes a "Clause d'inaliénabilité". In contrast, this is often the case on the *Second Marché*. For 23 firms the managing shareholders had entered such an engagement. In 6 cases there was a clause for the earlier exit of shareholders. Moreover, those lock-ups are generally not staged over time. Managing shareholders lock from 4% to 100% of their shares over 6 to 120 months. In 1996 the managing shareholders of 6 firms (or 20% of all IPOs this year) were tied by such a clause. This was also the case for 3 firms in 1997 (8% of all firms this year), 9 firms in 1998 (14% of all firms), 3 firms in 1999 (12%), and 2 firms in 2000 (17% of all firms). Still further, the median managing shareholder had 100% of its shares locked for 8 months. It is only in 2 instances that VCs and "other"

shareholders are tied up by such a clause. In one case we find the clause to concern as well employees of the firm.

4.2.3 Characteristics of 2nd to 5th stage lock-ups

In Table 4 we describe the percentage of shares locked-up and the length of lock-up periods for the second to the fifth stage of the lock-up. As explained earlier, we define a stage as a period over which a shareholder has the same amount of its shares being locked. At the end of a stage the shareholder will have part or all of its shares unlocked. If only part of the shares are unlocked this will mark the start of a new stage. The length of and amount of shares locked at every stage are defined in the IPO prospectus. As could have been expected the number of firms at each stage decreases as well as the median length of the lock-up and percentage of shares locked-up.

4.3 Hypotheses

In this Chapter we widen the existing literature on lock-up expiry and the decision to contract lock-up agreements by providing the first analysis of the French market. We also pay a particular attention to the role of VCs in this context.

Firstly we look at the determinants for the decision to enter a lock-up agreement. We concentrate our analysis only on the *Second Marché* for a number of reasons. First of all, because our purpose is to investigate the likelihood of IPO firms entering a lock-up agreement we need the lock-up agreement to be discretionary. However, on the *Nouveau Marché* managing shareholders have first to enter a mandatory lock-up agreement and then can decide whether they want to complement the latter with a DLA. This makes the DLA of managing shareholders hardly comparable to those of VCs and other shareholders who do not have to enter a mandatory lock-up agreement in the first place. Secondly, we have noted earlier that *Euronext* does not care whether shareholders in the IPO prospectus are accurately classified as managing shareholders or non-managing shareholders, as long as the shareholders that it believes should be classified as managing shareholders are locked-up. This problem affects primarily the classification of VC backers, so that it could well be that some VCs other than the ones listed in the IPO prospectuses as managing shareholders were, in fact, bound to enter a mandatory lock-up

agreement. The difficulty in distinguishing between mandatory and discretionary lock-up agreements therefore implies that identifying DLA is tentative. Muddying the water still further there has been a change over the period of our study in the regulation on mandatory lock-ups on the *Nouveau Marché*, with the legislation becoming much less stringent since the end of year 1998. On the *Second Marché*, however, the situation is much clearer since all lock-up agreements were discretionary over the period of our study.

Furthermore, we notice that the common practice is to lock in priority the shares of managing shareholders, with other shareholders possibly following. For instance, on the *Nouveau Marché* we have just mentioned that *Euronext* imposes the mandatory lock-up of managing shareholders. On the *Second Marché* in most cases (44 IPOs, see Tables 2 and 3) it is the managing shareholders who are locked-up, while less IPOs have their "other" shareholders and (as could have been expected) VCs locked-up (in 16 and 17 cases respectively)[11]. Moreover, when non-managing shareholders are locked-up, managing shareholders are also locked-up in most cases (90% of the time) so that the lock-ups of non-managing shareholders can be seen as complements to those of managing shareholders rather than substitutes. This practice makes sense since managing shareholders are likely to be the most informed shareholders, and investors base their investment decision partly on their quality. For those reasons, the lock-ups of managing shareholders for a period of time after the IPO may give a strong signal to the market that should help reducing problems of information asymmetries and signal the firms' quality (for some evidence on information asymmetries and the lock-up choice see: Brav and Gompers (2003), and Brau et al (1999)). We recognise, however, that the evidence in Chapter 2 suggests that the DLA of managing shareholders do not reduce information asymmetries and signal the firm's quality, since they are not found to be associated with lower degrees of underpricing. Having said this, we also find some evidence (although weak) that the DLA of managing shareholders are associated with better long-term performers, with this possibly suggesting that investors might not have anticipated the certification that they convey. Therefore, because the locking-up of managing

[11] We note, however, in Tables 2 and 3 that the frequency at which VCs and managing shareholders lock-up their shares are similar.

shareholders seems to matter, because most lock-ups involve managing shareholders, and since on the *Second Marché* investigating the likelihood of managing shareholders' DLA is similar to investigating the likelihood of a firm having any of its shareholders entering DLA, we focus our analysis on the likelihood of managing shareholders' DLA.

We believe in line with the certification ability of VCs, and the analysis of the determinants of the lock-up choice by Brav and Gompers(2003), that the managing shareholders of those firms that already benefit from the certification of VCs should be less likely to enter a DLA.

H1: Managing shareholders of VC-IPOs are less likely to enter discretionary lock-up agreements than those of non-VC-IPOs.

Given evidence in Chapter 2, that investors may be giving some credit to the certification of MBO/MBI-VC backers and the ownership transfer to managers, we examine the association between this type of funding and the likelihood to enter a lock-up agreement. We argued that the ownership transfer to managers should enhance entrepreneurial actions. We also related the lower underpricing of MBO/MBI-IPOs to the fact that those firms score high in the proxies for the quality of VC involvement and control. In line with the latter in Chapter 3 we shown some evidence that VCs' certification is a positive function of their ability to force the decisions made by the firms they back.

H2: Managing shareholders of MBO/MBI-VC-IPOs are less likely to enter discretionary lock-up agreements than those of other IPOs.

In Chapter 3 we found those VC-IPOs where VCs have a lot of reputation at stake, to be associated with a better quality of information disclosed. Therefore, even though the reputation of VC investors is not associated with less underpricing, we investigate the nature of its association with the likelihood for managing shareholders to enter a DLA.

H3: Managing shareholders of VC-IPOs in which VCs have a lot of reputation at stake are less likely to enter discretionary lock-up agreements than those of other IPOs.

In Chapter 2 we found larger degrees of underpricing when a potential conflict of interest between sponsors with an affiliated VC in the firm and investors is present. We suggested that investors might require some compensation for the added uncertainty of those IPOs. In this chapter, we look at the association between the presence of potential conflicts of interest and the likelihood to enter a DLA, but, this time, argue that the relationship should be positive if the issuing firms try in this manner to temper investors' fears.

H4: Managing shareholders of VC-IPOs with a potential conflict of interest between sponsors and investors are more likely to enter discretionary lock-up agreements than those of other IPOs.

Our second objective is to document the price movement as well as changes in the volume of transactions around and at the lock-up expiry date in France. It has been shown that lock-up expiry is associated with a substantial price drop and an increase in the volume of transactions (for some evidence see: Brav and Gompers (2003), Brau et al (1999), Field and Hanka (2001), Ofek and Richardson (2000), Bradley et al (2000) Espenlaub et al (2001)). Amongst the different possible explanations proposed, three are often retained. The first one purports that the price drop may be due to worse than expected news about insider sales. The second one asserts that the negative return may be due to downward sloping demand curve with costly arbitrage. If the demand for shares is not totally elastic, increasing supply would decrease the price. In an efficient market, the forthcoming price pressure should have been forseen since the date of the lock-up expiry as well as the number of shares locked are known at the time of the IPO. As a result, there should be no price decline at the time of the lock-up expiration. However, as pointed out by Brav and Gompers (2003), to arbitrage the observed abnormal return may be risky and costly. The authors point out that despite observing a negative average abnormal return, 40% of all returns on the event day were positive highlighting the risk of selling stocks short. Furthermore, they find transaction costs

eliminate the abnormal return. Finally, Brav and Gompers point out that borrowing shares before the expiry of the lock-up to set up a short position may not be easily done given the low amount of shares floated. The last explanation for the price drop at lock-up expiry comes from Brav and Gompers (2003) finding that price drops are lower for firms that are more informationally transparent. The authors argue that the evidence they uncover is consistent with the idea that lock-ups are entered to overcome moral hazard problems subsequent to the IPO. We examine price and volume movements around the expiry of the first lock-up period[12] of IPO shareholders. In line with previous evidence we expect that:

H5: The expiry of the first lock-up period of IPO shareholders is associated with a significant price drop.

With regard to the volume of shares traded at lock-up expiry, we note from the outset that in France the volume observed is going to be biased downward. There are three ways for old shareholders to exit a company at the end of the lock-up period in France. Firstly, they can simply decide to sell their shares in the market after the lock-up period. This is the simplest method of exit but also the most dangerous one since it may create large fluctuations in the quoted price. Secondly, shareholders may want to contract a third party to organise the sale of shares over time according to market conditions. The advantage of this method is that it avoids a large and brutal increase in the volume of shares available for trading that could depress the stock price. On the other hand, because the sale of shares is staged over time, investors are subject to the risk that the stock price reverse in the future.

Thirdly, for a third party to facilitate the exit of a large stockholding by trying to create some interest for the locked-up shares. This is being done via the significant marketing of the firm to investors as well as the negotiation of a price for the offer, which is often at a discount. Despite the efforts of the third party, a smooth exit will ultimately depends on the market's willingness to take up the locked-up shares. We note that it is

[12] Recall that different shareholders may have different lock-up agreements, or that lock-ups may be staged over time.

very likely for the sponsor of the IPO to be chosen as the third party since the locked-up shares are under its responsibility and it is often chosen as the market maker for the shares of the firm. Because shareholders are likely to use this last method when selling a lot of shares, the volume increase is going to be biased downward if the investors that subscribes to the offer do not sell immediately their stockholding. The above discussion, however, does not rule out the downward sloping demand curve with costly arbitrage explanation since the new shares have to be taken by the market.

Of interest for this thesis is the fact that VC-IPOs have been shown to experience the largest price drops and increases in the volume of transactions. Brav and Gompers (2003) argue that the evidence of larger price drops and increases in the volume of trades may be traced back to the fact that many VCs are required to distribute their shares of issuing firms to their shareholders who then tend to sell them automatically. The sale of shares by VCs is a way for them to realise gains and justify their performance so that it is expected that they will try to exit as early as possible, even if they have to counsel a discount to investors. For those reasons, discussions with professionals suggest that VCs favour placing their shares with investors (third method). As a result, the observed volume of shares traded at VCs' exit is going to be downward biased. As explained above, even if the observed volume of shares traded will not directly reflect VCs' sales, movements in prices may still be explained by the downward sloping demand curve with costly arbitrage hypothesis since ultimately the market has to absorb the increased supply of shares. Moreover, VCs are active shareholders with an in-depth knowledge of the firm so that it is believed that information about VCs' sales may convey some valuable signal to the market on how well the firm is doing. It is expected that VCs will ultimately exit their investment so that if they stay in the firm longer than expected, it should signal the better quality of the portfolio company. In contrast, VCs are expected to try exiting as early as possible if they believe that the stock price will reverse. Therefore, worst-than-expected news about VC selling should be associated with large price drops. Even if investors may not be able to observe an increase in the volume of trades that would signal VCs' selling activities, it is likely that some information about VCs' sales "leak" from the advertising campaign. Moreover, at the opening of the market on the day just following

the placing, *Euronext* issues on computer screens a note on the operation. Nothing is said, however, about which shareholders are actually selling. Therefore, the second hypothesis that we want to test concerns specifically the presence of VCs.

H6: The abnormal price drop at lock-up expiry is larger for IPOs where VCs' shares are released.

Because market's sensitivity to transactions by VCs should be a positive function of the degree of information asymmetry about the firm and VCs' potential adverse selection at investment time, we pay particular attention to the price behaviour around the first lock-up expiry of Early-stage-IPOs where VCs' shares are released. Early-stage-VC-IPOs were found to be young high growth firms, and it was argued that VCs suffer greater degrees of potential adverse selection when investing in early stage. Another reason for the possible greater market's sensitivity around the first lock-up expiry of those IPOs is the fact that they also correspond, in most cases, to the unlock date of managing shareholders (80% of the cases). Those IPOs being young firms they should still heavily rely on the close involvement of their managing shareholders whom incentives to put the necessary efforts to monitor performance had already been substantially diluted with the arrival of VCs, so that their unlocking might trigger great concerns on the part of investors. In summary, our hypothesis goes along the lines of Brav and Gompers (2003) finding of larger price drops for less informationally transparent firms.

H7: The abnormal price drop at lock-up expiry is larger for Early-stage-IPOs where VCs' shares are released.

If the volume of transactions after the lock-up expiry reflects investors concerns about insiders selling activities, larger increases in the volume of transactions may well be associated with larger price drops. Similarly, large increases in the volume of trades, if they reflect insiders selling activities would, according to the downward sloping demand curve with costly arbitrage explanation, be associated with larger price drops. If data were available we could have used the ratio of the number of shares sold by

unlocked shareholders to the number of tradable equity prior to the unlock date so as to control for the relative importance of each exit on the equity supply. However, no record of those sales could be found. As another proxy for the selling activities of insiders, we use the increase in tradable equity at lock-up expiry, i.e. the ratio of shares unlocked to tradable equity prior to the end of the lock-up. Note that a difficulty when computing the percentage increase in tradable equity is the fact that some new shares may have been issued after the IPO. The issuance of those new shares may have been part of a Seasoned Equity Offering, the exercise of warrants and stock options, and the payment of dividends in equity. For this reason, for each company in our sample we consulted *Euronext*'s notes on the major corporate events that occurred since the IPO and incorporated the change in the amount of equity tradable when needed. However, our corrected measure of tradable equity may still give a biased measure of the true increase in the number of tradable shares since the issuance of new shares may have also be subject to some lock-up agreements. Unfortunately, this information could not be found and is therefore not taken into account in our calculations.

H8: The abnormal return at lock-up expiry is negatively related to the change in the volume of trades.

H9: The abnormal return at lock-up expiry is negatively related to the amount of unlocked shares.

4.4 The certification of VCs and the likelihood of contracting a DLA

4.4.1 Sample

The sample we use consist of 170 IPOs from the *Second Marché*[13] identified earlier (see Chapter 2). Over the 1996-2000 period on the *Second Marché*, 44 of the 170 IPOs had their managing shareholders entering a DLA.

[13] Note that the one company, LVL Medical, which was explicitly required by *Euronext* to enter a lock-up agreement, is not excluded from our sample. However, excluding this IPO does not change our findings.

4.4.2 Preliminary evidence on the likelihood for managing shareholders to enter a DLA

Table 5 presents a preliminary comparative analysis of the likelihood for the managing shareholders of non-VC-IPOs, VC-IPOs and different sub-groups of them to enter a DLA on the *Second Marché*. Firstly, contrary to expectations (**H1**), we do not find evidence that the managing shareholders of VC-IPOs are less likely to enter a DLA than those of non-VC-IPOs. Secondly, and in contradiction with our expectations (**H2**), we do not find MBO/MBI-VC-IPOs to be associated with a significantly lower likelihood of managing shareholders' DLA. We note, however, that the other VC-IPOs of our sample are significantly more likely than non-VC-IPOs to have their managing shareholders entering a DLA. Interestingly, we find the likelihood of managing shareholders of Low-Reputation VC-IPOs entering a DLA to be higher than that of other IPOs (IPOs that are backed neither by a High nor Low-Reputation-VC), as well as that of the non-VC-IPOs of our sample. However, the High-Reputation-VC-IPOs of our sample are not found to be significantly less likely to have their managing shareholders entering a DLA; **H3** is therefore also rejected. To determine High and Low-Reputation-VC-IPOs we partitioned our sample of VC-IPOs into three groups with an approximately equal number of firms. High-Reputation-VC-IPOs are IPOs with a Lead-VC that is at least 15 years old at IPO time. Low-Reputation-VC-IPOs are IPOs with a Lead-VC that is less than 9 years old. Finally, conflicts of interests are not associated with a significantly greater likelihood of managing shareholders' DLA and therefore we cannot accept **H4**.

Table 5: Likelihood for managing shareholders to enter a discretionary lock-up agreement

	Count	Lock-up	%
			a,b
Non-VC-IPOs	101	22	22%
VC-IPOs	69	22	32%
MBO/MBI-VC-IPOs	24	5	21%
			a
Non-MBO/MBI-VC-IPOs	45	17	38%
IPOs with High-Reputation-VC	26	8	31%
			b,c
IPOs with Low-Reputation-VC	21	9	43%
			c
Other IPOs	123	27	22%
VC-IPOs with a potential conflict of interest	35	12	34%
Other IPOs	135	32	24%

In Table 5 we perform *chi-square* tests on the difference between two distributions. All significant differences are so at the 5% level. Two cells that have an identical letter are significantly different from each other. For instance, non-VC-IPOs are significantly less likely to have their managing shareholders entering a DLA than Non-MBO/MBI-VC-IPOs at the 5% level (*a*).

4.4.3 Cross-sectional analysis of the likelihood for managing shareholders to enter a DLA

4.4.3.1 Methodology

4.4.3.1.1 Control variables

In this section we re-examine the association between the presence of VCs and the likelihood for managing shareholders to enter a DLA on the *Second Marché* (**H1** to **H4**), controlling, in a Logit model, for some variables likely to partly explain this choice. Most of our variables are proxy for information asymmetry.

The first variable we control for is the log value of the offer proceeds. Large offerings are generally made by large firms for which the information asymmetry is lower. It has also been argued that the larger the offer, the greater is the amount of information available on the issuing firm, as well as the number of financial analysts following the IPO. Therefore, if lock-up agreements are entered to reduce problems of information asymmetries we would expect larger offerings to be associated with a lower likelihood of entering DLA.

Two other variables that have been commonly used to proxy for the uncertainty and information asymmetry of IPOs are the book-to-market ratio and size of issuing firms. It is commonly argued that the information asymmetry of an offer should increase as a company develops more complex projects for which the likelihood of success is uncertain. The book-to-market ratio has very often been used to proxy for such growth options. Therefore, we expect a negative sign on the coefficient of this variable, i.e. the managing shareholders of firms with more growth options should be more likely to enter DLA. Finally, it is reasonable to expect that more be known about large firms than small firms so that the size of the IPO firm may be negatively related to the likelihood of entering a DLA.

The age of issuing firms should also capture the different degrees of information asymmetry of our IPO firms. Young firms are expected to suffer from more information asymmetries so that managing shareholders of young firms may be more likely to enter DLA.

Theory and empirical evidence suggest that reputable underwriters can certify the quality of issuing firms, hence reducing problems of information asymmetries. For this reason, managing shareholders of firms with reputable sponsors should find it less necessary to enter DLA so as to reduce information asymmetries. According to this hypothesis we should therefore expect a negative sign on the coefficient of this variable. However, discussions with professionals (sponsors, financial analysts, and bankers) suggest that sponsors who are keen that the introduction be successful may be pushing for shareholders to enter a DLA that should signal shareholders' confidence in the firms' performance. Moreover, it was said earlier (see Chapter 1) that sponsors may try to reap additional compensation from the issuing firm by making them entering a lock-up agreement. If this is the case, because the bargaining power of reputable sponsors is likely to be greater than that of their less reputable counterparts, they could well be more likely to be associated with DLA. Therefore, the net effect is that we have no prior expectation with regards to the sign of this variable.

Because our study spans the Internet bubble period, we also control for IT, Software and Internet firms. The valuation of those firms is likely to be uncertain and, as a result, the managing shareholders of IT, Software and Internet firms may have more likely entered DLA so as to reassure investors.

We saw in Chapter 2 that the motivations of shareholders have an impact on the stock market performance of IPO firms. Here we control for the participation and post-IPO ownership of managing shareholders. The level of participation in the IPO is measured by the percentage of managing shareholders' shares sold to new investors. In order to reduce fears that they may try to abuse the market managing shareholders may be more likely to enter DLA when they sell a large percentage of their shares in the IPO. However, it could also be argued, in line with Brav and Gompers (2003), that firms that are selling a greater proportion of secondary shares in the IPO suffer less information asymmetry so that a DLA may be needed less. Therefore, we have again no prior expectation with regard to the sign of our control variable.

Our measure of managing shareholders' post-IPO ownership is based on the anticipated (just prior to the IPO) post-IPO managing shareholders' shareholding[14].

[14] It does not take into account possible uses of the green shoe option.

Firms where managing shareholders are expected to hold a small equity stake in the firm after the IPO may be more likely to enter a lock-up agreement so as to reassure investors about the quality of the firm as well as to signal their intention to stay involved for a minimum period of time. This is important since investors base partly their investment decision on the quality of managing shareholders. Interestingly, we note that the predictions for the post-IPO shareholding of managing shareholders are in conflict with those for the presence of a VC, since the presence of VCs tends to lower managing shareholders' shareholdings.

Brav and Gompers (2003) argue that firms may want to enter a lock-up agreement so as to signal their quality at IPO time. One of the possible objectives of doing so is to obtain a higher offer price. Evidence in Chapter 2 suggests that this may not have been the case since DLA were not associated with lower underpricing. Alternatively, a firm may want to signal its quality at IPO time because it has in mind to come back to the market in a subsequent (seasoned) equity offering (SEO) where it hopes the signalling mechanism would help it to obtain a better price for its shares. If this is the case, firms that made a SEO after their IPO may well be more likely to enter a DLA.

Finally, we have shown major differences in the likelihood of issuing a DLA over time. For this reason we also control for year dummies in our regression analysis.

4.4.3.1.2 Descriptive statistics

From our descriptive statistics in Table 6 it does not appear that the managing shareholders of firms backed by reputable sponsors on the *Second Marché* are less likely to enter a DLA. Furthermore, we do not find that managing shareholders of firms in the IT, Software and Internet sectors were more likely to enter DLA. However, firms that made a subsequent equity offering are found to have been significantly more likely to have entered DLA. Table 6 also reports the likelihood of DLA for year 2000 and 1997, respectively the year of highest and lowest likelihood of DLA issuance.

Table 6: Descriptive statistics on the variables of our models

PANEL A: Continuous Variables	Average	Median	Stdev
Offer Proceeds (m Euro)	12.73	6.87	16.51
Book-to-market ratio	40.66%	33.96%	33.69%
Size of IPO (m Euro)	71.55	39.47	94.18
Age of IPO (year)	25.45	18	2452%
Managing shareholders' participation	9.10%	8.84%	11.36%
Managing shareholders' shareholding after	68.18%	75.1%	20.49%
Age of Lead-VC (year)	14.98	13	1708.67%
Weighted Average of VC's age (year)	14.62	12.36	1154.33%

PANEL B: Binary variables	Count	Discretionary Lock-ups	%
Year 2000	12	7	58%
Year 1997	37	3	8%
Seasoned Equity Offering	*21	9	43%
No-SEO	149	35	23%
Sponsor			
High-Reputation	106	28	26%
Low-Reputation	64	16	25%
IT, Software and Internet sector	24	7	29%
Other Industries	146	37	25%

* 10% significance level for a *chi-square* test on the difference between two distributions.

4.4.3.2 Results

Table 7 presents our Logit models testing the association between the presence of VCs and the likelihood for managing shareholders to enter DLA. Regarding the control variables for the lock-ups on the *Second Marché* (models 1 to 5) we find in all regression runs, the managing shareholders of firms floated in 2000 to have been significantly more likely to enter a DLA, while managing shareholders of firms floated in 1997 were significantly less likely to do so. We also find, in line with our expectations, managing shareholders of younger IPOs to have been more likely to enter a DLA (significant at the 10% level on a one-sided test at least). Firms that made a SEO in the three years that followed their IPO were significantly more likely to have had their managing shareholders entering a DLA (at the 10% level on a one-sided test at least). Finally, the larger the post-IPO shareholding of managing shareholders, the lower the likelihood that they enter a DLA. This result suggests that managing shareholders may want to signal their commitment to the company when their shareholding is going to be low in the aftermath of the IPO.

In model 1 we test our first hypothesis regarding the impact of VCs on the likelihood of managing shareholders' DLA. We do not find, contrary to expectations

(**H1**) and as in the previous univariate analysis, the presence of VCs to be associated with a lower likelihood of managing shareholders' DLA. There is no evidence that the managing shareholders of IPOs with a potential conflict of interest between sponsors and investors were more likely to enter a DLA (model 2), or that reputable VC backers reduces the need for DLA (model 3). Those results confirm the earlier findings of our univariate analysis and we therefore reject both **H3** and **H4**. We also note that controlling for cross-sectional determinants of the likelihood to enter a DLA, we do not find anymore Low-reputation-Lead-VC-IPOs to be significantly more likely to enter a DLA.

In models 4 and 5 (where independent variables with coefficients that have a p-value>0.20 are removed), we re-investigate the association between MBO/MBI-VC-IPOs and the likelihood for managing shareholders to enter a DLA. Controlling for cross-sectional determinants of the likelihood of managing shareholders' DLA, we find that MBO/MBI-VC-IPOs are less likely to have their managing shareholders entering a DLA. This result offer some support to **H2** that investors value the monitoring and certification ability of MBO/MBI-VCs as well as the ownership transfer to managers. However, we believe that it is important to interpret our finding for MBO/MBI-IPOs in light of the evidence that managing shareholders' equity holding is negatively related to the likelihood to enter a discretionary lock-up, since the presence of VCs tends to reduce managing shareholders' equity holdings. With these two results in mind, we suggest an alternative explanation that one based on the superior certification of MBO/MBI-VC backers for the fact that those IPOs are less likely to issue a DLA. We argue that because investors are likely to understand that despite the low post-IPO shareholding of MBO/MBI managing shareholders this type of financing signals an increase rather than a lowering of managerial equity stakes, DLA may be less necessary as a signal of managing shareholders' commitment to the firm[15]. We recall from Table 5 that the likelihood of DLA for non-VC-IPOs and MBO/MBI-VC-IPOs are almost identical.

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[15] Discussions with professionals (venture capitalists, sponsors, financial analysts, and bankers) suggest that this explanation may not be unreasonable.

Table 7: Logit models for the likelihood of managing shareholders' discretionary lock-up agreements on the *Second Marché*

170 IPOs are used in models 1 to 4; 69 VC-IPOs are used in model 6. In brackets are p-values for two-sided tests. Finally, in bold are coefficients significant at the 10% level on a one-sided test at least.

	Expected Signs	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	?	-1.388 [0.76]	-0.971 [0.83]	-1.467 [0.74]	-0.268 [0.95]	**2.259 [0.05]**	**2.074 [0.10]**
Log IPO Size	-	0.505 [0.24]	0.393 [0.36]	0.531 [0.23]	0.422 [0.33]		
Log Offer proceeds	-	-0.321 [0.45]	-0.272 [0.52]	-0.368 [0.40]	-0.259 [0.55]		
Log B/M	-	0.296 [0.43]	0.296 [0.43]	0.355 [0.35]	0.279 [0.46]		
Managing shareholders' Shareholding after	-	**-2.564 [0.06]**	**-1.777 [0.14]**	**-2.099 [0.11]**	**-3.061 [0.02]**	**-2.871 [0.01]**	**-6.017 [0.01]**
Managing shareholders' participation	?	-1.615 [0.49]	-1.009 [0.66]	-1.191 [0.60]	-1.993 [0.39]		
IT, software and Internet firms	+	-0.051 [0.93]	-0.039 [0.95]	-0.112 [0.85]	-0.206 [0.74]		
Sponsors' Reputation	?	0.169 [0.68]	0.129 [0.76]	0.178 [0.67]	0.148 [0.72]		
Log Age	-	**-0.399 [0.11]**	**-0.404 [0.11]**	**-0.421 [0.09]**	**-0.481 [0.06]**	**-0.408 [0.10]**	
Year 1997	-	**-1.622 [0.01]**	**-1.596 [0.01]**	**-1.579 [0.02]**	**-1.602 [0.02]**	**-1.619 [0.01]**	**-1.591 [0.18]**
Year 2000	+	**1.579 [0.03]**	**1.527 [0.03]**	**1.605 [0.03]**	**1.506 [0.04]**	**1.583 [0.03]**	**1.499 [0.11]**
Seasoned Equity Offering	+	**1.058 [0.05]**	**1.069 [0.05]**	**1.107 [0.05]**	**0.889 [0.11]**	**0.787 [0.14]**	**2.005 [0.05]**
VC	-	-0.444 [0.40]					
Conflict between Sponsors and Investors	+		0.185 [0.73]				
High-Reputation-Lead-VC	-			-0.535 [0.39]			
Low-Reputation-Lead-VC	-			0.268 [0.66]			
MBO/MBI-VC-IPO	-				**-1.391 [0.05]**	**-1.199 [0.08]**	**-1.385 [0.11]**
McFadden R-squared		0.15	0.14	0.15	0.16	0.14	0.26
LR statisitc		27.61	27.02	28.32	31.04	26.96	21.06
Prob. For F-statistic		0.01	0.01	0.01	0.00	0.00	0.00

Log IPO Size: the log value of the market value of the firm at the offer price in Euro. Log Offer proceeds: the log value of the number of shares in the offer multiplied by the offer price in Euro. Log B/M: log value of the book-to-market ratio of IPOs with market value estimated at offer price and book value being the first book value after the IPO. Managing shareholders' Shareholding after: the anticipated shareholding of managing shareholders as a result of the IPO. Managing shareholders' participation: the percentage of managing shareholders' shares sold to new investors. IT, software and Internet firms: dummy variable coding one when firms are from the IT, Software, and Internet sectors. Sponsors' Reputation: dummy variable coding one when a sponsor is one of the 5 most reputable sponsors over the period of our study. These include Groupe Banque Populaire (including Portzamparc), Groupe Oddo-Pinatton, Groupe Crédit Agricole (including Cheuvreux), Groupe Crédit Lyonnais, Groupe CIC (EIFB). Log Age: the log value of the age of the firm at the time of the IPO. Year 1997 and Year 2000 are year dummy variables. Seasoned Equity Offering: dummy variable coding one when the firm came back to the market in the three years that followed the IPO. VC: a dummy variable coding one when the IPO is VC-backed. Conflict between Sponsors and Investors: dummy variable coding one when one of the sponsors is affiliated with one of the VC backers. High-Reputation-Lead-VC: dummy variable coding one when the Lead-VC is at least 15 years old at the IPO time. Low-Reputation-Lead-VC: dummy variable coding one when the Lead-VC is less than 9 years old. MBO/MBI-VC-IPO: dummy variable coding one when VC-IPOs received venture capital funding to finance a MBO/MBI.

In model 6[16] we show, for a sample of 69 VC-IPOs, that the evidence for the likelihood of VC lock-ups is mirroring our findings for the likelihood of managing

[16] Independent variables with coefficients that have a p-value>0.20 are removed for the sake of clarity.

shareholders' DLA. The likelihood of VCs' lock-ups decreases as managing shareholders' shareholding increases and reduces in the case of MBO/MBI-IPOs. It could be that VCs try to add to the signal provided by managing shareholders' DLA so as to reduce further investors' concerns.

4.5 Price and volume reactions at lock-up expiry

4.5.1 Sample

The sample we use consist of 149 IPOs. We consider all the first lock-up expiry of IPO shareholders on the *Second* and *Nouveau Marché*. Because we want to be sure that the events we look at are shareholders' first lock-up expiry, we removed all those IPOs where shareholders could have been granted earlier exit. Although investors would have known if some shareholders had exited their shares before the expiry date (because *Euronext* would have made an announcement), no record is being kept so that it is difficult not only to identify precisely the date when shareholders were granted earlier exit, but also to be sure that they exited earlier or not. In cases where some shareholders had been unlocked before the first lock-up expiry date in the IPO prospectus, investors would have had the opportunity to adjust their beliefs about insiders' selling behaviour and, as a result, the price and volume reaction at a later lock-up expiry would not be comparable with that of IPOs' first lock-up expiry. We also excluded companies with a "Pacte d'actionnaire" where the "Clause d'inaliénabilité" had been re-conducted, meaning that shareholders agreed to lock their shares longer, as well as one company where the "Clause d'inaliénabilité" had been changed after the IPO. Companies that delisted before the lock-up expiry, and firms for which the lock-up period had not yet ended at the time this study was conducted are excluded. Finally, we checked that none of the 149 firms had a major corporate event[17] over the -30 days to +30 days period around the lock-up expiry, so as to be confident that the volume and stock behaviour were not influenced by another corporate event than the first lock-up expiry itself.

As shown in Table 8, 27 firms come from the *Second Marché* and 122 from the *Nouveau Marché*. The average length of the first lock-up of IPO shareholders is equal to

[17] Such as a Seasoned Equity Offering or the expiry of a later lock-up agreement.

17 months and the median length to 12 months[18]. Table 8 also reports the ratio of shares unlocked to the number of shares available for trading prior to the unlock day. On the *Nouveau Marché* the average figure is equal to 99%, and 163% on the *Second Marché*. The average between the two markets is 110%. The first lock-up expiry doubles on average the volume of tradable equity. This is quite high but still lower than the figure reported by Field and Hanka (2001) in the US where the public float potentially triples, on average, at lock-up expiry. In 50 cases the first expiry concerns the shares of VCs, 14 cases on the *Second Marché* and 36 cases on the *Nouveau Marché*. The expiration of the first VCs' lock-up led, on average, to a substantial increase in the amount of tradable shares of 54%, 72% and 47% on the *Second* and *Nouveau Marché* respectively.

Table 8: Descriptive statistics of sample used in the analysis of lock-up abnormal returns

PANEL A: Control variables		**Mean**	**Median**	**Stdev.**
Length first lock-up (month)		17.01	12	12.65
Size of IPO (m Euro)		103.14	61.2	127.17
Age (year)		14.11	11	14.95
Book-to-market ratio		31.72%	26.54%	22.30%
PANEL B: Price drop and Equity released		**ALL**	**Second Marché**	**Nouveau Marché**
Market	Count	149	27	122
Cumulative price Drop at [0;+1]			*-0.32%*	**-1.28%*
Reputable Sponsors	Count	75	19	56
Reputable Sponsors' Cumulative Price Drop at [0;+1]		*-0.78%*		
Other Sponsors' Cumulative Price Drop		*-1.44%*		
IPOs where Managing shareholders' shares are released	Count	125	22	103
Managing shareholder IPOs' Cumulative Price Drop at [0;+1]		**-1.17%*		
Other IPOs' Cumulative Price Drop		*-0.78%*		
Total shareholding released (%)	Mean	110.21%	162.83%	98.56%
	Median	80.01%	104.08%	74.59%
	Stdev.	126.35%	181.65%	108.08%
IPOs where VCs' shares are released	Count	50	14	36
Total shareholding released IPOs where VCs' shares are released (%)	Mean	135.85%	182.23%	117.81%
	Median	97.63%	174.32%	89.25%
	Stdev.	117.17%	141.35%	102.98%
VCs' shareholding released (%)	Mean	53.79%	72.36%	46.57%
	Median	43.59%	57.05%	42.43%
	Stdev.	47.69%	60.70%	40.30%
IPOs where Early-stage VCs' shares are released	Count	24	2	22
Total shareholding released IPOs where Early-stage-VCs' shares are released (%)	Mean	140.20%	113.08%	142.66%
	Median	100.21%	113.08%	100.21%
	Stdev.	114.33%	132.02%	115.80%
Early-VCs' shareholding released (%)	Mean	51.28%	14.54%	54.62%
	Median	43.58%	14.54%	44.87%
	Stdev.	46.91%	7.33%	47.62%

* significant at the 10% level on a two-sided test.

[18] In unreported results we also find the average length of *Second Marché* IPOs to be equal to 12 months and the median length to 9 months. On the *Nouveau Marché* the average length is equal to 18 months and the median one to 12 months.

4.5.2 Methodology

We look at the 61 trading days surrounding the expiry date. Given the evidence that book-to-market and size are related to returns (see Fama and French (1992), Brav and Gompers (1997) amongst others), we first compared the performance of our sample of IPOs against that of 237 firms[19] traded on the French stock exchange that did not have an IPO over the period of our study but have similar book-to-market and size characteristics. To form our book-to-market and size portfolios we proceeded as in Chapter 2. Every month companies were ranked according to their market value and then divided into four groups with an approximately equal number of firms. In parallel, every year at the end of June benchmark, firms were ranked based on the value of their book-to-market ratio at the end of December just prior to the ranking date. The intersection of these 4 size and 4 B/M groupings leading to 16 size and book-to-market portfolios. We report abnormal returns starting from the 30th trading day prior to the unlock date. Each IPO is matched at the end of the 31st trading day prior to the unlock day to one of those portfolios based on its market value on the matching day and its B/M at the end of December just prior to that same day. For firms quoted for less than a year the following December book value was used instead.[20]

For each IPO in our sample, the excess return is calculated as follows:

$$AR_{i,t} = R_{i,t} - R_{b,t} \qquad (1)$$

where $R_{i,t}$ is the daily return for the ith IPO at time t and $R_{b,t}$ is the average daily return at time t of all the firms in the benchmark portfolio b.

To check the robustness of our results, we also use alternative benchmarks. The second benchmark used is the Midcac Index, the Index of French mid-capitalisation. Abnormal returns are also calculated using the market model methodology, as in Ofek and Richardson (2000). The estimation period is 90 trading days ending 10 days before the lock-up expiry date. A longer period would have been desirable for more accurate

[19] We note that Seasoned Equity Offerings have been found to perform abnormally (see Loughran and Ritter (1995) amongst others). Less than 10% of our benchmark firms had SEOs over the period of our study, and their impact on the excess performance of our IPO firms is negligible.

[20] Note that we also re-conducted the matching of IPOs with style portfolios every month (i.e. every 20 trading days) so as to allow for the possible time-varying characteristics of each IPO and each matching portfolio firm, with this leaving our findings essentially unchanged.

estimates, but the length of the estimation period is limited by the relatively short lock-up periods of some IPOs. We were concerned not to include in our estimation period the post-IPO underwriter stabilisation period (assumed to last for approximately 10 days (see Derrien and Degeorges (2001)). The market index used in the analysis is the *Datastream French Total Market Return Index* (R_m, a value weighted Index). 7 firms were excluded from the analysis because not enough daily returns to estimate the market model parameters were available. Over the period [-100; -10[for each IPO firms we ran the following regression model:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_t \tag{2}$$

where β_i measures the sensitivity of firm *i* to the market –this is a risk measure-, and α_i is the mean return not explained by the market. The regression produces the estimates $\hat{\beta}_i$ and $\hat{\alpha}_i$ that are used to compute the predicted return of firm *i* at any date *t* $\in$ [-10; +30][21]:

$$\hat{R}_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t} \tag{3}$$

Table 9 reports the significance levels of abnormal returns computed from the market model at each one of the 41 days in our [-10; +30] period. These are based on a test statistic that use an estimate of the standard deviation of average abnormal returns calculated over a 50 trading days period ending 10 days before the unlock date:

$$\hat{S}(AR) = \left[\frac{1}{50} \sum_{t=-60}^{-11} \left(AR_t - \overline{AR} \right)^2 \right]^{1/2} \tag{4}$$

where AR_t is the average daily residual return, and $\overline{AR}$ their average over the 50 days period. Table 9 also reports the significance levels of average abnormal returns over

[21] Note that in addition to using the simple market model technique, we investigated the impact of thin trading using Dimson (1979) methodology. In Dimson's market model the systematic risk is estimated in a multiple regression model consisting of the previous, synchronous and subsequent market index returns as explanatory variables. Specifically, the methodology involves estimating the following model: $R_{i,t} = \alpha_i + \sum_{k=-n}^{n} \beta_{i,k} R_{m,t+k} + \varepsilon_{i,t}$ where R_i is the return on security *i* and $R_{m,t+k}$ the return on the market index at time $t+k$. As a security is more thinly traded the number of lead and lag terms, *n*, should increase. Different specifications of the Dimson technique were used, with up to three lead and lag terms being included. Using beta estimates corrected for thin trading does not change significantly our results and therefore only findings based on the simple market model methodology are reported in Table 9.

the benchmark portfolios and the *Midcac* Index that are based on test statistics that use not only a 50 trading day estimate of the standard deviation of average abnormal returns (calculated as above) but also cross-sectional estimates of standard deviation. We note that cross-sectional estimates of standard deviation would lead to inflated *t-statistics* if cross-sectional correlation were important.

Previous evidence that the volume of shares traded increases at the lock-up expiration date leads us to examine the abnormal volume of trades at and around the unlock day. We define normal volume for each IPO as being the average volume of trades from the 55^{th} trading day to the 11^{th} trading day prior to the event day where the two days with the largest volume of trades are removed (so that the computation of the normal volume is actually based on 43 trading days). This was done to ensure that our measure of normal volume was not affected by any outlying day. It actually proved to be an important precaution to take given evidence that outlying days could sometimes have extremely high volumes of trades driving the average normal volume to a very high level. Therefore, our measure of normal volume is, namely:

$$NV_i = \frac{1}{43}\sum_t V_{i,t} \tag{5}$$

where $t \in [-55; -11]$ and $V_{i,t}$ is the volume of trades for firm i at date t. The average abnormal volume for each of the 61 trading days in Table 9 is the average of IPOs' ratio of the difference between the actual volume for the day and the normal volume divided by the normal volume. In order to eliminate the effect of outliers on the computation of the average abnormal volume of trades, we deleted observations more than 4 standard deviations away from the mean in each one of the 61 trading days considered. Therefore the formula for the average abnormal volume of trades is namely:

$$\varpi_t = \frac{1}{n_t}\sum_i \left(\frac{V_{i,t}}{NV_i} - 1\right) \tag{6}$$

where $t \in [-30; +30]$, and n_t is the number of included observations after removing the outliers.

4.5.3 Preliminary evidence

In Table 9 we test our hypothesis (**H5**) on price movements at lock-up expiry. We do not find a significant price drop on the unlock date but on the following day. The fact that the average price drops on day +1 rather than day 0 is not surprising in the French context, where *Euronext* sometimes postpones by one day the unlock date and where the completion of the placing of old shares with investors is often announced at the opening of the market on the day following the unlock date. The magnitude of the price drop on day +1 (-0.7%) using benchmark portfolios is in line with previous evidence in the US for the unlock date. The evidence of a significant and negative price drop is robust to the benchmark used and to the way the standard deviation of average abnormal return is computed. Furthermore, the average abnormal return on day 1 is also the 3rd lowest in the 61 trading days period that surrounds the event date when style-based portfolios are used. Using a style-based benchmark also returns the most conservative (highest) estimate for the average abnormal return on day 1. Ball et al (1995) warn against the problems associated with the use of historical stock data from database that record estimated closing prices. Because this is the case with *Datastream*, we followed Ball et al and tested the robustness of our results by computing bid-to-bid returns. Although this does not reflect an implementable trading strategy, computing returns in this way enables us to address the concern that the reported average return might be an artefact of movement of daily closing prices within the bid-ask spread. Computing returns from bid-to-bid prices does not change our findings, we find (in unreported results) an average abnormal return (over benchmark portfolios) of similar magnitude (-0.76%) and significantly different from zero at the 10% level[22]. In line with Brav and Gompers (2003) who point out that despite observing a negative average abnormal return, 40% of all returns on the event day were positive, we find for our sample of French IPOs 47% of positive returns on day +1. Therefore, it may be risky to arbitrage the observed abnormal return[23]. Finally, we note that whichever benchmark we use, the [-30; +30]

[22] The above average return was computed using 134 firms for which closing bid prices were available. The unavailability of some bid prices has not only to do with the fact that some firms were not traded on day 1 (10 instances) but also to the fact that for small stocks French market makers sometimes do not quote the closing bid price.

[23] We note that 10 firms were not traded on day 1. Excluding those companies actually increases (in absolute terms) the magnitude of day 1 return to –0.76%, significantly different from zero at the 10% level.

period saw the substantial underperformance of the average IPO, with the majority of average abnormal returns being negative.

Along with this significant price drop, we also notice an increase in the average volume of transactions in the period just surrounding the unlock date [-10; +10] relative to the period [-30;-11]. We find the average abnormal volume of trades over the [-30; -11] period to be equal to 0.9% a value insignificantly different from zero and significantly lower than the average abnormal volume of transactions of 20.06% observed over the [-10;+10] period. The average abnormal volume of transactions over the [-10; +10] period is also found to be significantly different from zero at the 1% significance level. Over period [+11; +30] the average abnormal volume of transactions decreases but remains relatively high however (9.57%) and significantly larger (at the 5% significance level) than the average abnormal volume of transactions for the [-30; -11] period. The average abnormal volume of transactions of the [+11; +30] period is also found to be significantly different from zero at the 1% level. We note, however, that the volume increase is not as important as in the US where Field and Hanka (2001), for instance, report, on day +1, a substantial increase in the volume of transactions of 80% above average. They also show that, although the volume reduces in the days following the unlock date, it still remains high at 40% above average and stabilises there for the following 49 trading days. Moreover, we note that in France most of the large volume days are observed in the 10 days just prior to the unlock date. This is not the case in the US where the increase in the volume of shares traded has been linked with the sales of unlocked shareholders. In France, it could be that investors get "nervous" just prior to the lock-up expiry, possibly out of concerns regarding the outcome of the event. There are at least two possible explanations for the fact that the volume of trades after the unlock date is not as high as in the US. First, Field and Hanka (2001) report in the US that the public float on average potentially triples at lock-up expiry. In our sample, although high, the increase in tradable equity due to the first lock-up expiry is only doubling the public float on average. The second reason is that for the largest exits, shares tend to be placed with investors. As a result, the largest sales of old shareholders are not observed, with the latter probably biasing downward the average volume of trades.

Table 9: Abnormal return and abnormal volume at and around the unlock day

Days	ARPOR	ARMIDCAC	AAV	Days	ARPOR	ARMIDCAC	ARMM	AAV	Days	ARPOR	ARMIDCAC	ARMM	AAV
-30	0.01%	0.14%	-3.69%	-10	-0.26%	0.06%	-0.05%	4.30%		*b*			*a*
									11	-0. 64%	-0.51%	-0.59%	27.77%
-29	-0.27%	-0.30%	-9.44%	-9	-0.32%	-0.41%	-0.57%	-0.76%	12	0.19%	0.29%	0.34%	10.45%
			aa		*b*			*aa*	13	-0.13%	-0.13%	-0.08%	21.52%
-28	-0.20%	-0.26%	27.59%	-8	-0.59%	-0.51%	-0.49%	40.15%					
-27	-0.35%	-0.37%	17.31%	-7	-0.08%	-0.03%	0.02%	19.41%	14	-0.17%	-0.15%	-0.05%	3.47%
-26	0.37%	0.54%	10.94%					*aa*		*a,bb*			
				-6	-0.18%	-0.16%	-0.58%	44.65%	15	-0.65%	-0.43%	-0.50%	20.19%
-25	-0.04%	-0.03%	-10.32%	-5	0.05%	0.17%	0.36%	4.80%	16	0.01%	0.10%	0.15%	1.17%
-24	-0.19%	-0.20%	-9.08%			*b*			17	-0.34%	-0.17%	-0.15%	0.12%
				-4	0.54%	0.64%	0.64%	14.81%					
-23	-0.51%	-0.63%	-9.93%		*a,bb*				18	-0.41%	-0.41%	-0.45%	-0.15%
				-3	-0.69%	-0.44%	-0.51%	9.65%					
		a		-2	0.14%	0.14%	-0.31%	4.92%					*a*
-22	-0.70%	-0.79%	-4.77%						19	0.03%	0.07%	-0.14%	32.46%
-21	0.40%	0.46%	-0.13%					*aaa*		*aa,bb*	*aa,bb*	*aa,b*	
				-1	0.05%	0.21%	0.13%	40.30%	20	-0.87%	-0.85	-0.82%	4.60%
-20	-0.14%	-0.10%	-5.33%	0	-0.40%	-0.55%	-0.48%	20.46%	21	-0.24%	-0.08%	-0.32%	22.18%
-19	0.41%	0.39%	-0.05%		*a,bb*	*aa,bb*	*a,b*		22	-0.54%	-0.51%	-0.42%	5.79%
				1	-0.71%	-0.89%	-0.80%	14.77%					
-18	0.04%	0.12%	8.49%	2	0.44%	0.49%	0.52%	14.67%	23	0.11%	0.08%	-0.08%	-4.95%
-17	-0.05%	-0.23%	-6.06%	3	-0.52%	-0.43%	-0.27%	17.74%	24	-0.46%	-0.34%	-0.33%	1.23%
-16	-0.44%	-0.47%	-3.68%	4	0.36%	0.20%	0.32%	23.50%	25	0.00%	0.19%	-0.02%	10.47%
			a					*a*	26	-0.03%	0.01%	-0.05%	11.21%
-15	-0.42%	-0.40%	20.42%	5	-0.05%	0.11%	0.16%	21.07%					
-14	-0.23%	-0.18%	11.55%	6	0.01%	0.12%	-0.11%	14.57%					*a*
									27	-0.24%	-0.11%	0.00%	19.88%
	a		*a*	7	-0.36%	-0.10%	-0.23%	24.22%		*aaa,bbb*	*aaa,bbb*	*aaa,bb*	
-13	-0.54%	-0.47%	-14.30%						28	-1.12%	-1.04%	-0.96%	1.82%
-12	-0.26%	-0.25%	-1.93%					*a*	29	-0.25%	-0.23%	-0.09%	-3.92%
				8	-0.30%	-0.46%	-0.16%	27.53%					
-11	-0.58%	-0.56%	-0.50%	9	-0.09%	-0.17%	-0.08%	7.46%		*b*			
									30	0.58%	0.37%	0.34%	6.12%
								aaa					
				10	-0.34%	-0.36%	-0.30%	53.14%					

AAV	*c,d*
[-30; -11]	0.9%
AAV	*aaa,c,e*
[-10; +10]	20.06%
AAV	*aaa,d,e*
[+11; +30]	9.57%

ARPOR: Average abnormal daily return above benchmark portfolios; ARMIDCAC: Average abnormal daily return above the Midcac Index; ARMM: Average abnormal daily return computed with the market model method. $^{(aaa,bbb),(aa,bb),(a,b)}$ 1%, 5%, and 10% significance level for two-sided *t-tests* using respectively a cross-sectional estimate of standard deviation and an estimate based on a time series of average abnormal returns over a 50 days estimation period. Note that the latter statistic is used from day -10 onwards for all measures of abnormal returns.

^{c} 1% significance level for two-sided *t-test* on the difference between two means. ^{d,e} 5% significance level for two-sided *t-test* on the difference of two means.

In Table 10 we look at the price drop and abnormal volume of transactions over the period surrounding and following the unlock date for all IPOs and different groupings of them using our style-benchmark. We note, however, that our main findings do not change when a different benchmark is used. The abnormal returns around the event date are the Cumulative Average Abnormal Returns for the $[-1;+1]$ period and CAAR for the $[-2;+2]$ period. The abnormal returns following the events are the CAAR for the [0; +1] and [0; +3] periods. CAARs are computed as follows:

For each IPO we compute the Cumulative Abnormal Return:

$$CAR_{i,t} = \sum_{t} AR_{i,t} \tag{7}$$

where $t \in [-2;+3]$. Then we estimate the average CAR for all firms:

$$CAAR = \frac{1}{n}\sum_{i=1}^{n} CAR_i \tag{8}$$

where n correspond to the total number of included observations. The abnormal volume of transactions around the lock-up expiration date are the Average Abnormal Volumes (AAV) within the $[-1;+1]$ and $[-2;+2]$ periods. We also examine the AAV over the [0; +1] and [0; +3] periods. The AAV are computed as follows:

$$AAV_t = \frac{1}{T}\sum_{t} \varpi_t \tag{9}$$

where $t \in [-2;+3]$ and T is the number of days included in the average.

The CAAR of the full sample is equal to –1.06% over the $[-1;+1]$ period but increases to –0.48% over the longer $[-2;+2]$ period. Despite a large negative CAAR on the $[-1;+1]$ period, the figure is insignificantly different from zero. The CAARs for the [0; +1] and [0; +3] periods are of similar magnitude (respectively –1.1% and –1.2%), however only the CAAR for period [0; +1] is significant[24].

[24] Note that similar inferences are made whether one uses a *t-test* based on a cross-sectional estimate of standard deviation, or an estimate of the standard deviation based on the time series of average abnormal returns over a 50 days period. Still further, removing 15 companies that were not traded on day +1 and/or day 0 increases (in absolute terms) the magnitude of the average cumulative price drop to –1.23%, significantly different from zero at the 10% level.

The evidence of a negative CAAR for the [0; +1] period is robust to the benchmark used. Using the Midcac Index we find a CAAR of –1.45%, significant at the 5% level. Using the market model the CAAR (-1.28%) is also significant at the 5% level. Finally, in unreported results we checked that the significant CAAR for period [0; +1] is not an artefact of bid-ask spread movements by computing returns from bid-to-bid closing prices. We found a CAAR of –1.26% significant at the 10% level[25]. Turning to the analysis of the volume of shares traded, only the AAV for period [-1; +1] is found to be significantly different from zero (at the 5% level).

Table 10: CAAR and AAV at and around the unlock day for different groupings of IPOs

		[-1; +1]		[-2; +2]		[0; +1]		[0; +3]	
		CAAR	**AAV**	**CAAR**	**AAV**	**CAAR**	**AAV**	**CAAR**	**AAV**
Total Sample									
Benchmark Portfolios	Mean	-1.06%	*aa* 22.98%	-0.48%	11.60%	*a* -1.11%	15.47%	-1.19%	7.94%
	Median	-1.01%	-24.28%	-1.57%	-6.43%	-0.56%	-22.67%	-1.08%	-22.67%
	St.dev.	9.14%	116.28%	11.59%	87.85%	7.44%	118.52%	11.16%	104.23%
	Count	149	140	149	135	149	142	149	142
Midcac Index	Mean					*aa* -1.45%			
Market Model	Mean					*aa* -1.28%			
IPOs where VCs' shares are released		*aa,b*		*aa,bb*		*a*			
	Mean	-2.96%	0.79%	-3.40%	-2.58%	-1.84%	-2.22%	-1.98%	0.97%
	Median	-1.72%	-33.09%	-1.93%	-18.63%	-0.77%	-34.45%	-0.69%	-25.33%
	St.dev.	8.04%	100.79%	10.20%	72.36%	7.31%	103.10%	10.38%	93.19%
	Count	50	46	50	43	50	48	50	46
		b	*aaa*	*bb*	*a*		*a*		
Other IPOs	Mean	-0.10%	33.85%	1.00%	18.23%	-0.74%	24.51%	-0.79%	11.50%
	Median	-0.76%	-16.09%	-1.26%	-1.54%	-0.53%	-15.84%	-1.16%	-8.93%
	St.dev.	9.55%	122.19%	12.01%	93.85%	7.51%	125.22%	11.56%	86.86%
	Count	99	94	99	92	99	94	99	90
IPOs where Early-stage-VCs' shares are released		*aa,bb*		*a,b*		*aa,bb*		*a*	
	Mean	-5.09%	39.59%	-4.57%	16.42%	-4.49%	32.71%	-4.38%	21.42%
		c				*c*			
	Median	-4.39%	-3.39%	-2.18%	2.12%	-2.47%	-3.25%	-1.75%	5.36%
	St.dev.	10.06%	124.39%	12.77%	90.39%	8.70%	117.52%	11.69%	101.64%
	Count	24	23	24	21	24	23	24	23
		bb	*a*	*b*		*bb*			
Other IPOs	Mean	-0.29%	19.72%	0.31%	10.71%	-0.45%	12.14%	-0.58%	5.20%
		c				*c*			
	Median	-0.73%	-25.27%	-1.55%	-6.51%	-0.46%	-27.87%	-0.37%	-15.14%
	St.dev.	8.79%	114.91%	11.24%	87.75%	7.02%	118.91%	10.99%	86.26%
	Count	125	117	125	114	125	119	125	113

aaa,aa,a respectively 1%, 5%, and 10% significance levels for two sided *t-tests* for the significance of the mean. *b,bb* respectively 10% and 5% significance level for two-sided *t-tests* on the difference of two means. *c* difference in median significant at the 5% level using the *Mann-Whitney U test*. To identify the values being compared look at the letters at the top (for difference in means) or in the middle (for difference in medians) of the cells. Two cells of the same column with the same letters are significantly different from each other.

In Table 10 we also test **H6** and **H7** regarding the relationships between VCs, Early-stage-VCs and the price drop at lock-up expiry. In line with expectations (**H6**),

[25] The average return from bid-to-bid closing prices is based on 127 IPOs for which a closing bid price could be found on day +1 and day 0.

event dates that correspond to VC unlock dates are found to be associated with large price drops, significant over all periods but the [0; +3] period. For unlock dates that do not correspond to the unlocking of some VCs, price drops -if any- are low and insignificant. Furthermore, we find that over the [-1; +1] and [-2; +2] periods, CAARs for the two groups were significantly different (at the 10% and 5% significance levels respectively). The large negative CAARs experienced by VC-IPOs are in line with the US evidence. However, they are not associated with large increases in the volume of trades. In fact, the AAV for period [0; +1] is negative, insignificantly so however. The largest increases in volumes of transactions are observed for those IPOs where no VCs are unlocked at the expiry of the first lock-up period. Despite large differences in the AAV of VC and non-VC-IPOs, the large standard deviations in the AAV of our estimates lead us never to find those differences to be significant at the usual significance levels.

In line with **H7**, large price drops observed earlier are concentrated in VC-IPOs where Early-stage-VCs are unlocked. The CAARs for those IPOs are always negative and significant[26]. Also, Table 10 shows that CAARs of Early-stage-IPOs where VCs' shares are released are found to be significantly lower than the CAARs of other IPOs over all periods but period [0; +3]. This evidence holds at the median level as well over periods [-1; +1] and [0; +1]. No abnormal return can be found for the other IPOs of our sample over all periods under examination[27].

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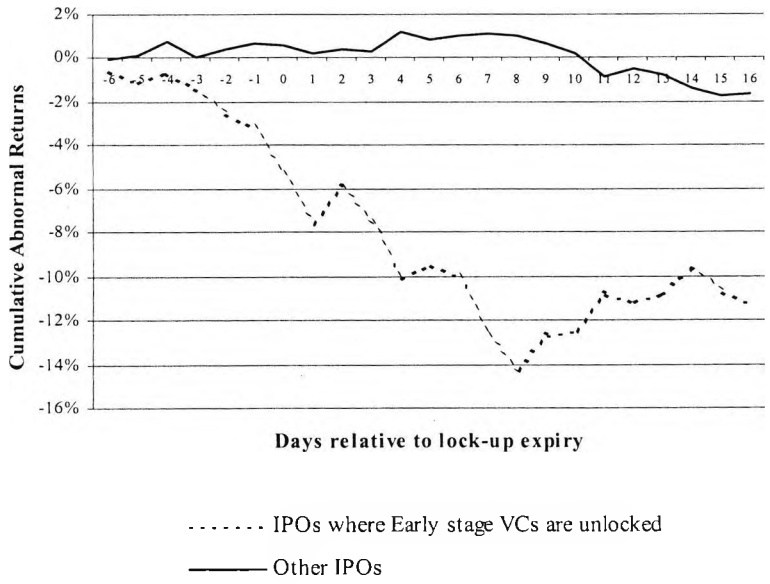
[26] In unreported results we find that the average daily return for this sub-group of IPOs on day +1 is the third lowest of the [-30;+30] period, while the average daily return on day 0 is the fifth lowest. The large negative abnormal returns found at the lock-up expiry of Early-stage-VCs are not the results of a few outliers. In unreported results we found that two-third of those IPOs had a negative CAR for period [0; +1].

[27] Note that for those 24 Early-stage-IPOs where very large price drops are observed we went further than just checking *Euronext*'s notices for major corporate events. We also consulted the *Factiva* database, a database that covers 8,000 sources (mainly newspapers and journals) from 118 countries, to see whether any other events not reported in *Euronext*'s notices could have explained the price drops. First of all, we were surprised to observe that when an announcement had been made by the firm in the period surrounding the lock-up expiry it was generally positive (9 instances). These range from announcements about sales increases, profits increases, the award of a business recognition, new strategic alliances and sales agreements. In only 3 cases was the news rather bad for the firms. Namely, one firm had its earnings lower than forecasted, another one reported a major loss, and finally the last case is about a controversial partnership (Genset concluded an agreement with the Chinese government to allow it doing DNA profiles of China's people, the latter raising substantial fears of eugenics). Finally, we note than in one instance a firm announced that it had recruited a new sales director but we could not tell from the articles whether this was seen as bad or good news by the market. We removed the later 4 companies and re-ran our analysis without finding any significant changes. For instance, the CAAR over period [0;+1] actually decreases to –4.84%, significant at the 5% level.

Figure 1 shows that the CAARs of Early-stage-IPOs where VCs' shares are released keep on declining until the eighth day after the lock-up expiry. Large negative abnormal returns, of similar magnitude than those observed on day 0 and day +1, are found on day +4 and day +7. For the other IPOs of our sample over the same period, no abnormal pattern is apparent. Garfinkle et al (2002) find that daily excess returns become very negative in the weeks prior to the unlock date. They argue that this result may indicate that the market partially anticipates the negative price effect from the end of the lock-up period. In unreported results we also found that the negative abnormal returns observed prior to the unlock date and reported in Table 9 are due mainly to the poor performance of Early-stage-IPOs where VCs' shares are released.

Figure 1: Cumulative Abnormal Returns around lock-up expiry



Contrary to our previous evidence for the whole sample of IPOs where VCs are unlocked, we find in Table 10 that the unlocking of Early-stage-VCs, despite being most probably downward biased, is associated with relatively large abnormal volumes of shares traded. This is despite the fact that in Table 8 the unlocking of VCs and Early-stage-VCs are shown to lead to similar average increases in public float. The same is true when looking at the total average increases in public float for both types of VC-IPOs.

However, we never find in Table 10 the abnormal volume for those IPOs to be significantly different from zero, nor significantly larger than the abnormal volume of trades for the other IPOs of our sample. Even if relatively high, the average volume of transaction at the unlock date of Early-stage-VCs is not as high as the volume observed for VC-IPOs in the US. For instance, Brav and Gompers (1999) report an average abnormal volume of trades for VC-IPOs over the [-1; +1] period of 71%. Over the same period Field and Hanka (2001) observe an average abnormal volume of trades for VC-IPOs of 75%.

4.5.4 Cross-sectional analysis

4.5.4.1 Methodology

4.5.4.1.1 Control variables

In this section we refine our previous analysis of hypotheses **H6** to **H9** on the price drop at lock-up expiry and its relation with abnormal volume of trades and amount of shares unlocked for different groups of IPOs. We do this by performing a multivariate cross-sectional analysis for the CAAR of our sample of 149 IPOs over the [0; +1] period. Many of the control variables that we use have been utilised in previous US studies.

Information asymmetries have been linked to the observed price drop at lock-up expiry. For this reason, we control for measures of informational asymmetry such as size, book-to-market value, whether the firm was floated by a reputable sponsor, the age of the IPO at the unlock date. Moreover, we control for the market where the IPOs are floated. The *Nouveau Marché* is the market for young high growth firms with many firms coming from the high-tech sector. Firms from the high-tech sector have been shown to experience important drops in value at lock-up expiry[28]. The specific characteristics of the individual lock-up agreements are taken into account, including: the length of the first lock-up period, the ratio of shares unlocked at expiry to the total number of shares available for trading prior to expiry. Finally, we control for the unlocking of managing shareholders. As with the unlocking of VCs, the selling

[28] Note that we controlled as well for industrial differences and the year of the lock-up expiry using dummy variables, but these did not make any significant impact on our regression results.

behaviour of IPO managing shareholders on the unlock date may give important signal to investors regarding the overall performance of their firm.

Descriptive statistics on the variables of our sample can be found in Table 8. In line with the idea that investors may be more sensitive to insiders' selling for less informationally transparent IPOs, we find reputable sponsor IPOs, IPOs from the *Second Marché*, and IPOs where managing shareholders are not unlocked to have lower price drops than their counterparts over the [0;+1] period, but differences are not significant. However, the price drops of *Nouveau Marché* IPOs, and IPOs where managing shareholders are unlocked are both significantly negative.

As in the previous Chapters, we first test our hypotheses using all the above explanatory variables. However, we ultimately want to select the best explanatory model with the fewest number of variables. To this end a backward variable elimination procedure is used with removal criteria p>0.2. By reducing the number of variables in our models we also address concerns that collinearity (see Table 11) may adversely affect the accuracy of our coefficient estimates.

Table 11: Correlation matrix of control variables

	Market*	Sponsors' Reputation	Log B/M	Log IPO Size	Log Age	Length of First lock-up
Sponsors' Reputation	0.15					
Log B/M	0.20	-0.12				
Log IPO Size	0.06	0.06	-0.45			
Log Age	0.35	0.08	0.35	-0.17		
Length of First lock-up	-0.18	-0.02	0.16	-0.31	-0.05	
Unlocking of Managing shareholders	-0.03	-0.03	-0.12	0.05	0.00	0.34

*Market: a dummy variable coding one when a firm is from the *Second Marché*.

4.5.4.1.2 Model specification

We use the following linear regression model to examine the cross-sectional behaviour of the CAAR over the [0; +1] period:

$$CAAR_i = X_i\beta + \varepsilon_i \qquad (10)$$

Finally, because our error terms are non-normal we also show p-values computed using a bootstrapping technique described in Appendix III.

4.5.4.2 Results

Results for our cross-sectional analysis are presented in Table 12. In models 1 to 7 we find growth options to have experienced larger price falls as well as firms with the longest lock-up periods. Growth options and firms that have longer first lock-up periods may well be less informationally transparent, hence the larger price drops. We also find some evidence (models 3 and 4) that IPOs of reputable sponsors experienced significantly lower price drops but this rests on the exclusion of IPOs with extremely large abnormal volumes of trades.

In models 1 to 4 we test **H6** regarding the impact of VCs' unlocking on the magnitude of the price drop. In line with expectations, we find the coefficient for the dummy that signals the unlocking of a VC to be significant (at the 10% level at least) and negative, implying that those IPOs where VCs had some or all of their shares unlocked suffered significantly greater price drops over the [0; +1] period.

In addition to testing for **H6** in models 2 to 4 we also test for the impact of the volume of trades and increase in the amount of shares unlocked on the magnitude of the price drop (**H8** and **H9** respectively). In model 2 we include as explanatory variables the total percentage increase in the number of shares available for trading, and the percentage increase that is due specifically to the unlocking of VCs. None of those variables are found to have a significant coefficient, and therefore **H9** is rejected. In model 3 we control for the average abnormal volume of trades over the period. The coefficient of this variable is negative but insignificant. Given evidence of a significant positive relationship between abnormal volume of trades and price drops for VC-IPOs (see Field and Hanka (2001), and Bradley et al (2000)), we interact in model 4 the abnormal volume variable with the dummy for the unlocking of VCs, and a dummy signalling IPOs where no VC is unlocked. In line with the US findings, only for those IPOs where VCs are unlocked does the abnormal volume of trades explain part of the price drop at lock-up expiry. The coefficient on this variable is negative and significant at the 10% level (on a two-sided test when the parametric p-value is used, and on a one-sided test when the bootstrapped p-value is used). The empirical evidence supports **H8** only when VCs are unlocked.

In models 5 and 6 we test **H7** by controlling for the stage when VCs intervened in the issuing firm. As explained earlier, we expect those IPOs where VCs intervened at an early stage to face potentially more information asymmetry than the other VC-IPOs of our sample, given that they were found to be young high growth firms (see Chapter 2). Moreover, we recall that according to Amit et al (1990) in a setting with asymmetric information about entrepreneurs' skill level best ventures will be self funded, but average ventures may be funded by venture capitalists because of the same pricing for all "lemons" in the VC market. Wang et al (2003) argue that as the information asymmetry is more severe for Early-stage ventures when investors' products and services have not yet been proven, the effect of adverse selection should be more severe in firms supported by VCs from the early stage. As a result, we argue that investors aware of those problems may be more sensitive to the selling activity of VCs in Early-stage-IPOs. Another reason for the possible greater market sensitivity around the first lock-up expiry of Early-stage-IPOs where VCs' shares are released may be the fact that they also correspond in most cases (80% of the time) to the unlock date of managing shareholders. Those IPOs are young firms. They should therefore still heavily rely on the close involvement of their managing shareholders whom incentives to put the necessary efforts to monitor performance had already been substantially diluted with the arrival of VCs. As a result, their unlocking might trigger great concerns on the part of investors. In models 5 and 6, where a backward elimination procedure with removal criteria $p>0.2$ is used, we find, in line with expectations (**H7**) and the earlier univariate analysis, that the large price drop at VCs' unlock date is due to the unlocking of Early-stage-VC-IPOs. The evidence for **H8** is narrowed further since it appears that it is only for IPOs where Early-stage-VCs are unlocked that the abnormal volume of trades is significantly negatively related to the magnitude of the two-day cumulative return. Given the latter finding we re-evaluate in model 7 the evidence for the increase in tradable equity at the unlock date[29] (**H9**) by conditioning the variable on the exit of Early-stage-VCs. We find the coefficient on this variable just to achieve significance on a one-sided test using the

[29] For the sake of clarity a backward variable elimination procedure is used, with removal criteria $p>0.2$.

Table 12: Cross-sectional analysis of the Cumulative Abnormal Return over period [0;+1]

149 IPOs are used in models 1, 2, and 7; 138 in models 3 and 4; 145 in model 5; and 147 in model 6. The difference between the number of observations in each model being due to the removal of companies with extreme abnormal volumes of trades, as well as companies that are not traded on day 1 and day 0. The following general linear model is used throughout this analysis: $CAAR_i = X_i\beta + \varepsilon_i$. In brackets are p-values for two-sided tests, in captions are bootstrapped p-values for two sided tests. Finally, in bold are coefficients with p-value<0.2.

Part (I)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant	**0.052** **[0.16]** **{0.13}**	0.041 [0.28] {0.26}	0.034 [0.35] {0.33}	0.037 [0.32] {0.31}	**0.057** **[0.10]** **{0.16}**	**0.046** **[0.00]** **{0.00}**	**0.047** **[0.00]** **{0.00}**
Market	-0.006 [0.72] {0.70}	-0.006 [0.72] {0.58}	-0.008 [0.64] {0.46}	-0.008 [0.62] {0.42}	-0.009 [0.55] {0.41}		
Sponsors' Reputation	0.010 [0.40] {0.43}	0.009 [0.42] {0.35}	**0.019** **[0.11]** **{0.13}**	**0.023** **[0.06]** **{0.06}**	0.014 [0.24] {0.25}		
Log IPO Size	0.004 [0.52] {0.51}	0.003 [0.66] {0.65}	0.009 [0.21] {0.19}	**0.009** **[0.16]** **{0.19}**	0.005 [0.46] {0.49}		
Log B/M	**0.029** **[0.01]** **{0.03}**	**0.028** **[0.01]** **{0.01}**	**0.031** **[0.00]** **{0.01}**	**0.033** **[0.00]** **{0.01}**	**0.028** **[0.01]** **{0.03}**	**0.018** **[0.02]** **{0.01}**	**0.018** **[0.02]** **{0.09}**
Log Age	-0.002 [0.81] {0.82}	-0.002 [0.81] {0.80}	-0.003 [0.76] {0.77}	-0.006 [0.49] {0.47}	-0.006 [0.47] {0.46}		
Length of First lock-up	**-0.002** **[0.00]** **{0.08}**	**-0.002** **[0.00]** **{0.00}**	**-0.002** **[0.00]** **{0.00}**	**-0.002** **[0.00]** **{0.00}**	**-0.002** **[0.00]** **{0.00}**	**-0.001** **[0.00]** **{0.00}**	**-0.001** **[0.00]** **{0.00}**
Unlocking of Managing shareholders	0.002 [0.89] {0.85}	0.014 [0.51] {0.47}	0.005 [0.78] {0.68}	0.009 [0.63] {0.55}			
Unlocking of VCs	**-0.039** **[0.01]** **{0.02}**	**-0.037** **[0.09]** **{0.08}**	**-0.034** **[0.03]** **{0.02}**	**-0.041** **[0.01]** **{0.01}**			
Log % Increase in tradable shareholding		-0.007 [0.22] {0.24}					
Log 1+% Increase in tradable shareholding due to VC		0.017 [0.69] {0.65}					
Log 1+Average Abnormal Volume of trades			-0.002 [0.65] {0.75}				
Log 1+AAV where VCs are unlocked				**-0.011** **[0.10]** **{0.12}**			

Part (II)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Log 1+AAV where no VC is unlocked				0.003 [0.50] {0.36}			
Unlocking of Late-stage-VCs					-0.011 [0.59] {0.51}		
Unlocking of Early-stage-VCs					**-0.057** **[0.00]** **{0.00}**	**-0.049** **[0.00]** **{0.00}**	**-0.055** **[0.00]** **{0.00}**
Log 1+AAV where Early-stage-VCs are unlocked					**-0.030** **[0.05]** **{0.02}**	**-0.031** **[0.04]** **{0.03}**	
Log 1+AAV where Late-stage-VCs are unlocked					-0.001 [0.99] {0.99}		
Log % Increase in tradable shareholding where Early-stage-VCs are unlocked							**-0.019** **[0.19]** {0.23}
Adjusted R-squared	0.06	0.05	0.09	0.10	0.11	0.12	0.11
F-test	2.14	1.86	2.44	2.53	2.74	5.87	5.64
Prob. For F-statistic	0.04	0.06	0.01	0.01	0.00	0.00	0.00

Market: dummy variable coding one when a firm is from the *Second Marché*. Sponsors' Reputation: dummy variable coding one when a sponsor is one of the 5 most reputable sponsors over the period of our study. These include Groupe Banque Populaire (including Portzamparc), Groupe Oddo-Pinatton, Groupe Crédit Agricole (including Cheuvreux), Groupe Crédit Lyonnais, Groupe CIC (EIFB). Log IPO Size: the log value of the market value of the firm at Lock-up expiry in m. Euro. Log B/M: log value of the book-to-market ratio of IPOs with market value estimated prior to lock-up expiry and book value being the latest book value available prior to the lock-up expiry. Log Age: the log value of the age of the firm at Lock-up expiry in years. Length of First lock-up: the number of months from the IPO to the first lock-up expiry. Unlocking of VCs: a dummy variable coding one when VCs are unlocked at the first lock-up expiry. Unlocking of Managing shareholders: a dummy variable coding one when managing shareholders are unlocked at the first lock-up expiry. Log %Increase in tradable shareholding: log value of the ratio of shares unlocked to the total number of shares available for trading prior to the lock-up expiry. Log 1+% Increase in tradable shareholding due to VC: log value of the ratio of VCs' shares unlocked to the total number of shares available for trading prior to the lock-up expiry plus one. Log 1+Average Abnormal Volume of trades: the log value of one plus the average abnormal volume of shares traded. Where the abnormal volume of shares traded on a day is equal to the number of shares traded on that day divided by the (normal) average volume of shares traded calculated over period [-55; -11] minus one. Log 1+AAV where VCs are unlocked: the log value of one plus the average abnormal volume of shares traded for IPOs where VCs are unlocked. Log 1+AAV where no VC is unlocked: the log value of one plus the average abnormal volume of shares traded for IPOs where no VC is unlocked. Unlocking of Late-stage VCs: a dummy variable coding one when Late-stage-VCs are unlocked at the first lock-up expiry. Unlocking of Early-stage-VCs: a dummy variable coding one when Early-stage-VCs are unlocked at the first lock-up expiry. Log 1+AAV where Early-stage-VCs are unlocked: the log value of one plus the average abnormal volume of shares traded for IPOs where an Early-stage-VC is unlocked. Log 1+AAV where Late-stage-VCs are unlocked: the log value of one plus the average abnormal volume of shares traded for IPOs where the VCs that are unlocked invested in the company at a late stage. Log % Increase in tradable shareholding where Early-stage-VCs are unlocked: log value of the ratio of shares unlocked to the total number of shares available for trading prior to the lock-up expiry for those IPOs where Early-stage-VCs are unlocked.

parametric p-value (the coefficient is insignificant when the inference is based on the bootstrapped p-value). Therefore, **H9** is only weakly supported.

One explanation for our results could be that Early-stage-IPOs where VCs' shares are released are more price inelastic. Another explanation, which could also provide some rationale for the former one, is that the market is more sensitive to insiders' selling at those unlock dates because of the relatively large asymmetry of information for those firms, the possible larger adverse selection problem faced by VCs, and the risk that the incentives of managing shareholders to put the necessary efforts to monitor performance reduce further. This explanation is consistent with Brav and Gompers (2003) finding of larger price drops for less informationally transparent IPOs. Finally, if the abnormal volume of transactions after the lock-up expiry reflects investors' concerns about insiders selling activities, larger volumes of transactions should be associated with larger price drops. Also, as more shares are unlocked investors' concerns should grow.

As in previous, chapters we examined the leverage and influence of each observation using *leverage values* as well as the *Cook's D* statistic. Although no worrisome case[30] was identified we excluded a number of observations with relatively large *Cook's D*. The exclusion of these observations does not change our results.

4.6 Conclusion

In this Chapter we provided the first empirical analysis of IPO lock-up agreements in France. First of all we documented the specificity and diversity of French lock-ups. It is mandatory for managing shareholders to enter a lock-up agreement on the *Nouveau Marché*. On the *Second Marché*, lock-up agreements are discretionary. We explained how lock-up agreements are sometimes staged over time. Secondly, we identified a number of determinants for the likelihood of managing shareholders to enter a discretionary lock-up agreement on the *Second Marché*.

In line with the idea that lock-ups may be entered into to reduce information asymmetry, we found that managing shareholders of older IPOs are less likely to enter a

[30] A worrisome case would be one where the *Cook's D* statistic is greater than one (see Jobson (1991)), and the *leverage value* possibly high.

DLA. We found some support for the hypothesis that issuing firms may be using lock-ups as a signalling mechanism since subsequent (seasoned) equity offerings (SEOs) more likely occur in firms with DLA. Larger post-IPO shareholdings of managing shareholders reduce the likelihood of their entering a DLA. This result is in line with Brav and Gompers (2003) commitment story, and it suggests that managing shareholders may want to signal their belief in the company especially when their shareholding after the IPO is going to be severely diluted. We found neither the mere presence of a VC nor the reputation of the VC backer to reduce the incidence of a DLA. The presence of potential conflicts of interest between sponsors and investors was not associated with more frequent managing shareholders' DLA. Interestingly, however, the managing shareholders of MBO/MBI-VC-IPOs were less likely to enter a DLA, other things being equal. The evidence on the MBO/MBI dummy, coupled with that on the managing shareholders' equity holding, led us to suggest an alternative explanation than one based on the superior certification of MBO/MBI-VC backers for the fact that those IPOs are less likely to issue a DLA. We suggested that investors may understand that despite the low post-IPO shareholding of MBO/MBI managing shareholders, this type of financing signals an increase rather than a lowering of managerial equity stakes, so that DLA may in turn be needed less as a signal of managing shareholders' commitment to the firm.

At lock-up expiry, we documented that prices dropped. We did not find the abnormal return on the unlock day to be significantly different from zero. However, the abnormal return on the following day (day +1) is negative and significant. This result is not surprising given the French context where *Euronext* sometimes postpones by one day the unlock date and where the placing of old shares with investors is often announced at the opening of the market on the day following the unlock date. The CAAR for period [0;+1] is negative and significant, with the latter evidence being robust to the use of different benchmarks as well as to the computation of daily returns from bid-to-bid prices. In parallel to the observed price drops we also documented a significant increase in the volume of trades around the lock-up expiry. 30 days after the expiry of the first lock-up period the volume of trades is still relatively high. We noted, however, that the observed increase in the volume of trades is not as high as in the US. Two reasons may explain the latter finding. First, Field and Hanka (2001) report in the US that the public

float potentially triples on average at lock-up expiry. In our sample, although high, the increase in tradable equity due to the first lock-up expiry is only doubling the public float on average. The second reason is the market practice of placing shares with investors when large blocks are exited. We noticed that the volume of transactions starts increasing 10 days before the lock-up expiry date. This is not the case in the US where the increase in the volume of shares traded has been linked with the sales of unlocked shareholders. In France, it could be that investors get "nervous" just prior to the lock-up expiry, possibly out of concerns regarding the outcome of the event.

Finally, we found that the evidence for the price drop is concentrated within our sample of IPOs where VCs' shares are released and, within this sample, amongst the unlock dates of Early-stage-VCs. We tested for the robustness of our results by controlling for possible determinants of the price drop at lock-up expiry in a cross-sectional setting. The cross-sectional analysis of abnormal returns shown the price drop to increase with the level of IPO's growth options, and the length of the lock-up period. Most importantly given the focus of this thesis, we shown that, controlling for potential cross-sectional determinants of abnormal return, Early-stage-IPOs where VCs' shares are released still experience the largest price hit, and that the magnitude of the abnormal volume of trades helps explain the abnormal return of those firms. The coefficient on the latter variable is negative. We proposed two explanations for our results. The first one is that Early-stage-IPOs where VCs' shares are released are less price elastic. The second one, which could also provide some rationale for the former one, is that the market is more sensitive to insiders' selling at those unlock dates because of problems of information asymmetry, adverse selection, and the risk of reduced incentives for managing shareholders to monitor performance. This explanation is consistent with Brav and Gompers (2003) finding of larger price drops for less informationally transparent IPOs.

Summary and Conclusions

Despite the fact that the IPO market is subject to extensive academic coverage we believe that we have found interesting new results that should help improve our understanding of the economics of this market. Furthermore, even though the study focuses on the French IPO market, and as a result substantially enlightens our understanding of the institutions and economics of this specific market, we believe that our results have broader implications. This is because we have addressed a number of new issues independent of the specific context of the investigation. These include the role of specialisation of VC investors in investment stock market performance. We have also identified a new arena where the certification role of VCs could be tested, namely that of IPO prospectus forecasts.

One of our first findings was that VC-IPOs with a potential conflict of interest between sponsors and investors have greater degrees of underpricing. We argued that this could represent evidence that investors fear the opportunistic behaviour of affiliated sponsors. On the other hand, we did not find evidence that firms understand the need to reassure investors at the IPO time by having their managing shareholders entering lock-up agreements more frequently when potential conflicts of interest are present. Nevertheless, investors' concerns (if any) over this issue might be exaggerated. We certainly found no significant evidence for IPOs with a potential conflict of interest trying to abuse the market via significantly more optimistic forecasts, or evidence of worse long-run performance for those firms. We recognised, however, that in the latter case it could alternatively be maintained that greater underpricing coupled with "normal" excess performance in the long-run is evidence that the market anticipated the conflict of interest problem and as a result priced the IPOs correctly.

Secondly, we showed that differences in investment stages are important. For instance, we identified substantial differences in the involvement of VCs in MBO/MBI, Early and Development stages, as evidenced by their control and cash flow rights, their level of specialisation and syndication, and their affiliation at IPO time. Specifically, we showed that VCs are more involved at IPO time in MBO/MBI and Early-stage

investments than in Development-IPOs. Interestingly, after controlling for potential conflicts of interest only MBO/MBI-VC-IPOs were found to be associated with lower degrees of underpricing. We suggested that the positive effect on investors' sentiment of good monitoring for Early-stage-VC-IPOs might have been offset by the negative adverse selection effect identified in the literature. Because information asymmetry is more severe for Early-stage ventures as their products and services have not yet been proven, the effect of adverse selection should be more severe in firms supported by VCs from the early stage. Further evidence that investors are concerned about Early-stage-VC-IPOs was found when examining returns at lock-up expiry. Indeed, we reported a large price drop at the first lock-up expiry of Early-stage-IPOs where VCs' shares are released. We argued that this might be explained by the fact those IPOs are less price-elastic. However, we also suggested that the market may be more sensitive to insiders' selling at those unlock dates because of the relatively large asymmetry of information for those firms, the possible larger adverse selection problem faced by VCs, and the risk that incentives for managing shareholders to put the necessary efforts reduce further. This explanation is consistent with Brav and Gompers (2003) finding of larger price drops for less informationally transparent IPOs. Having said all this, it seems that once again investors' concerns (if any) might have been exaggerated since despite the large price drop at the first lock-up expiry of Early-stage-IPOs where VCs' shares are released we found on average no evidence of worse long-run performance for Early-stage-VC-IPOs than the rest.

Having pointed out a few cases where investors might have got it wrong we also recognise that they might have correctly valued the certification role of VCs with larger cash flow and control rights, as is the case with MBO/MBI-IPOs that were found to be less underpriced. Indeed, when VCs have a blocking minority interest in firms going to IPO we found that the prospectus earnings forecast diplayed more prudence. Looking at the distribution of forecast errors we found some reason to suspect that this result might have been driven by a greater degree of earnings management. A more refined analysis of earnings management via the method of accruals did not, however, corroborate these earlier concerns. Also, our results remain unchanged to controlling for possible selection bias induced by the discretionary nature of prospectus forecast issuance.

However, another fact that the market seems not to have anticipated, because it is not associated with less underpricing, is the greater certification ability of reputable VCs. We found evidence that the reputation of VC investors (as proxied by their age) is associated with greater forecast accuracy. At the other end of the spectrum, IPOs backed by Low-Reputation-VCs were found to issue less accurate earnings forecasts. This might reflect two things: (a) the smaller reputational concerns of young VCs and (b) their lesser skills in selecting less risky ventures and monitoring them effectively. If the latter explanation is correct, it would also suggest that our evidence for the greater accuracy of forecasts from IPOs backed by reputable VCs could be due not only to their role in the certification of information but also to their ability to monitor portfolio firms effectively. Yet another explanation for the lower accuracy of Low-Reputation-Lead-VC-IPOs could be found in Gompers's (1996) "Grandstanding" hypothesis. According to Gompers, young VCs have some incentives to bring their portfolio firms to the market prematurely so as to signal their ability and attract investors in follow-on funds, in turn those IPOs should have more uncertainty attached to them.

Finally, and as highlighted earlier in the discussion of the lock-up expiry of Early-stage-IPOs, the presence of VCs or rather VC sub-groups is not the only characteristic of the capital and ownership structure of IPO firms at work: we found evidence that the shareholding of entrepreneurs counts as well. For instance, we showed that managing shareholders recognise the need to signal their commitment to the firm when their shareholding is going to be substantially diluted as a result of the IPO. Not only that, in the long-run there is weak evidence that the performance of an IPO increases with the post-IPO shareholding of entrepreneurs. However, we also found, as a counter balance, that the presence of Specialist VC backers is associated with better long-term performance. It might be the case that the deeper knowledge of more specialised VCs enables them to make better investment decisions and monitor the investee firms more effectively. Interestingly, if true this does not seem to be anticipated by the market at the IPO time since those firms were not found to face lower underpricing.

At the very beginning of this thesis it was mentioned that one of its limitations would be the relatively short period of time over which our analysis would be performed.

Therefore, it might be the case that our results are to some extent period-specific. An obvious extension of this thesis would therefore be to re-run our analysis over a larger period of time. Also, because the hypotheses we test are very specific and the sample size relatively small, the statistical significance of our findings at times rests on only a few observations. Increasing the sample size might therefore also improve the reliability and credibility of our results.

Other obvious extensions of our work would be to investigate our hypothesis in other markets. The international evidence on IPO performance at lock-up expiry is scarce and more research is needed to understand the economics of this phenomenon. Moreover, we were, to our knowledge, the first to have investigated the impact of VC specialisation on the stock market performance of IPOs. Further international evidence would help establish our findings or otherwise. With a large enough sample one could try refining our specialisation variable. For example, by defining specialisation not only in terms of the investment stage but also in terms of the industries where VCs invest. We note, however, that VCs often invest in only a few industries so that it is not clear how valuable such a refinement would be. Finally, another area of research that needs international evidence in support is that of VC backing and IPO prospectus forecast error. Our results suggest that this is an interesting arena in which to investigate the certification ability of VCs. We have also hinted at an alternative arena where VCs' certification could be tested, namely that of earnings management. Indeed, we found that differences may exist in the ability and motivation of different VC-types to control the extent that firms manage their earnings. This is a potentially important issue since Teoh et al (1998[a]) show that earnings management by firms can mislead investors.

Appendices

Appendix I: A bootstrapped application of the Johnson's *t-test*

The Johnson (1978)'s *t*-statistic adjusted for skewness is computed as follows: $J = t + \frac{1}{3\sqrt{n}}\hat{\gamma}t^2 + \frac{1}{6\sqrt{n}}\hat{\gamma}$; with: t being the Student's *t*-statistic computed as follows: $t = \frac{\bar{y}}{\hat{\sigma}(y)/\sqrt{n}}$ (with $\bar{y}$ being the mean of the variable of interest); $\hat{\gamma}$ an estimate of the coefficient of skewness given by: $\hat{\gamma} = \frac{\sum_{i=1}^{n}(y_i - \bar{y})^3}{\hat{\sigma}(y)^3 n}$; $\hat{\sigma}(y)$ an estimate of the standard deviation of *y*; and n the number of observations in the sample. The adjusted *t*-statistic has approximately a Student *t* distribution with *n-1* degrees of freedom.

In the vein of Lyon et al (1999), we bootstrapped the adjusted *t*-statistic by drawing 1,000 re-samples of size n from the original sample. For each of these bootstrapped re-samples we computed the following statistic: $J^b = t^b + \frac{1}{3\sqrt{n}}\hat{\gamma}^b t^{b2} + \frac{1}{6\sqrt{n}}\hat{\gamma}^b$ where $t^b = \frac{y^b - \bar{y}}{\hat{\sigma}(y^b)/\sqrt{n}}$ and $\hat{\gamma}^b$ is the bootstrapped equivalent of $\hat{\gamma}$, this to approximate the null hypothesis sampling distribution of the original adjusted *t*-statistic. To test the null hypothesis of zero mean at the significance level α we determined two critical values, c_u and c_l, such that: $\Pr[J^b \le c_l] = \Pr[J^b \ge c_u] = \frac{\alpha}{2}$. The null hypothesis is rejected when the value of the adjusted *t-test* for the original sample, J, is greater than c_u or smaller than c_l.

Appendix II: A bootstrap-type test for testing the difference in means

The method we use is described in Efron and Tibshirani (1993, p. 224). We first compute the observed value of the usual two-sample *t*-statistic: $t = \frac{\bar{y}_1 - \bar{y}_2}{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^{\frac{1}{2}}}$, where $\bar{y}_1$ and $\bar{y}_2$ are the means of our samples, n_1 and n_2 the number of observations in each sample, and s_1^2 and s_2^2 their respective variances.

We then estimate the distribution of y_1 and y_2 under the null hypothesis of common mean as follows:

1) We compute: $\tilde{y}_{1,i} = y_{1,i} - \bar{y}_1 + \bar{\mu}$ where *i*= 1,..., n_1 and $\bar{\mu}$ the mean of the combined sample; and $\tilde{y}_{2,j} = y_{2,j} - \bar{y}_2 + \bar{\mu}$ where *j*= 1, 2,..., n_2.
2) We generate y_1^b and y_2^b respectively of size n_1 and n_2 by drawing with replacement from $\tilde{y}_1$ and $\tilde{y}_2$, and evaluate: $t^b = \frac{\left(\bar{y}_1^b - \bar{y}_2^b\right)}{\left(\frac{s_1^{b2}}{n_1} + \frac{s_2^{b2}}{n_2}\right)^{\frac{1}{2}}}$, *b* denotes re-sampled values.
3) Step two is repeated 1,000 times and the position of t in the sampling distribution is then used to infer the significance of the difference between the two-sample means. To test the null hypothesis of zero mean difference at the significance level α we determined two critical values, c_u and c_l, such that: $\Pr[t^b \le c_l] = \Pr[t^b \ge c_u] = \frac{\alpha}{2}$. The null hypothesis is rejected when the value of the *t-test* for the original sample, t, is greater than c_u or smaller than c_l.

Appendix III: Bootstrapped p-values of coefficients estimates

The method we use is described in Davison and Hinkley (1999, p. 264-281). Let us write our regression models as follows:

$Y = X\beta + \varepsilon$; with X a matrix of m observations by n variables; β a vector of n parameters; ε and Y vectors of m error terms and dependent variables respectively.

The null hypotheses that we want to test are $H_0 : \beta_i = 0$, with $i = 1,\ldots, n$. To test those hypotheses the following algorithm is implemented:

1) Fit the full model to obtain $\hat{\beta}$ and s, where $\hat{\beta}$ is the vector of parameter estimates and s the vector of their standard errors. When heteroskedasticity is a problem robust standard errors are used. These are equal to the square roots of the diagonal elements of the matrix: $S = \left(X^T X\right)^{-1}\left(\sum_{j=1}^{n} x_i x_j^T r_j^2\right)\left(X^T X\right)$; where $r_j = \frac{e_j}{\left(1-h_j\right)^{1/2}}$ are the modified residuals which account for leverage h_j, the diagonal elements of the "hat" matrix $H = X\left(X^T X\right)^{-1} X^T$. For each parameter compute and save: $z_i = \frac{\hat{\beta}_i}{s_i}$.

2) Sample randomly with replacement m pairs of independent and dependent variables $\left\{\left(X_j, Y_j\right)_1^b, \ldots, \left(X_j, Y_j\right)_m^b\right\}$, where $j \in \{1,\ldots,m\}$, from $\{(X_1, Y_1), \ldots, (X_m, Y_m)\}$.

3) Fit the least square regression to $\left(X_j, Y_j\right)_1^b, \ldots, \left(X_j, Y_j\right)_m^b$ giving estimates $\hat{\beta}^b$ and s^b, with s^b being the vector of robust standard errors computed as in 1) when heteroskedasticity is a problem.

4) For each parameter compute and save: $z_i^b = \frac{\left(\hat{\beta}_i^b - \hat{\beta}_i\right)}{s_i^b}$

5) Repeat steps 1) to 4) 1,000 times. The two-sided bootstrapped p-value reported is equal to twice the lowest of the two one-sided p-values computed as follows: $\frac{\#\{z_i^b \geq z\}}{1{,}000}$ (when $H_1 : \beta_i > 0$) and $\frac{\#\{z_i^b \leq z\}}{1{,}000}$ (when $H_1 : \beta_i < 0$).

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