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The role of venture capital in Italian IPOs

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Abstract

This paper analyses the role of venture capitalists in Italian Initial Public Offerings (IPOs). Between 1999 and 2012 venture capital backed IPOs are on average less underpriced than non-venture backed IPOs. By using a regression-based approach to account for the non-random distribution of venture financing across firms, I show that the lower underpricing of IPOs venture capital backed is actually due to the causal effect of venture financing. The result is consistent with the certification hypothesis, that is, certifying that the value of issuing firms reflects all relevant inside information, venture capital backing reduces the asymmetric information problem that arises in the IPO process.

1   Introduction

The object of the paper is to shed some light on the role of venture capitalists in Italian IPOs. The importance of venture capital is widely recognized in both developed and emerging countries. Providing an important source of equity funding and often supporting the management of financed firms with their domain expertise, venture capitalists facilitate the birth and the growth of new firms, especially in high technological industries. Moreover they facilitate the entrepreneurs in dealing with other financing providers: private investors, financial intermediaries, and lastly, equity markets. The floatation on stock exchanges is of particular interest because, in addition to represent a source of capital for issuing firms, it is the most profitable exit route for venture capital investors that decide to dismiss their investments in financed firms. Indeed, Gompers and Lerner (2004) report that, although IPOs constitute a small fraction of the total venture capitalists portfolio, they contribute to the highest returns, from 30% to more than 50% of the total.

A measure that is widely used in the economic literature to examine the role of venture capitalists is the underpricing, namely, the difference between the price of the shares in the first day of trading and the price of the shares offered to investors.

The analysis of the venture capital backing's effect on the IPO underpricing is a suitable way to investigate whether venture capitalists are able to reduce the asymmetric information that arises in the IPO process and the cost of flotation. Many theories explain the underpricing in a context of asymmetric information between the actors involved in the IPO, typically issuing firms, underwriters and investors (Baron, 1982; Rock, 1986; Benveniste and Spindt, 1989; Beatty and Ritter, 1986). According to such theories, the underpricing represents a proxy of the ex-ante uncertainty regarding the issue that increases with the increasing of the degree of information asymmetries (Eckbo, 2008).

In addition, Jenkinson and Ljungqvist (2001) state that the underpricing can be thought also as a cost of going public. The IPO involves two types of costs for the issuing firms: direct costs (e.g. underwriting fees, selling commissions, legal expenses, accountancy and audit fess) and indirect costs. The underpricing is considered as the main indirect cost for the original owners, whether they sell their own existing shares or they sell new shares resulting from a capital increase. In the former case the wealth loss is obvious because the original shareholders could have sold their shares at a higher price than the offering price. In the latter case the wealth loss occurs via the dilution of the original shareholders' stakes in the company. Also Ritter (1998) considers the underpricing as an indirect cost of going public and defines the dollar amount of underpricing per share times the number of offered shares as 'money left on the table'.

Following such part of the literature, this paper focuses on the relationship between venture capital backing and underpricing.

Given the contrasting results of empirical literature, the debate about the role of venture capitalists in IPOs is still open and of particular interest. With respect to the large body of studies that investigate the context of the United States, the present paper evaluates the case of Italy where very little has been said. To the best of my knowledge only Ferretti and Meles (2011) analyze the Italian IPOs, finding mixed evidence in favour of the certification hypothesis. In particular, they show that companies backed by private equity syndication investors, i.e. backed by more than one institutional investors, are less underpriced than other companies. The underpricing difference is not significant when companies are backed by single private equity investors or bank-based private equity investors. With respect to the work of Ferretti and Meles that considers all private equity investors, I focus on the specific category of venture capitalists. Moreover, this paper relies on a more rigorous and reliable econometric methodology that account for the endogeneity in the receipt of venture capital

backing. The venture financing is not randomly distributed across firms but is an endogenous choice of entrepreneurs and venture capitalists. This involves a selectivity bias in the receipt of venture financing that can lead to incorrect estimates of the causal effect of venture capital backing on the IPO underpricing.

Considering the IPOs that took place on the Italian stock exchange between 1999 and 2012, this analysis provide empirical evidence that the presence of venture capital investors in the shareholding of issuing firms reduces the extent of the IPO underpricing. By estimating a treatment effect model that control for the endogeneity in the receipt of venture funding, I find that the underpricing difference between the two group of IPOs is statistically significant and directly attributable to the venture backing causal effect.

The rest of the paper is organized as follows. Section 2 provides a summary of theoretical and empirically-grounded hypotheses on the role of venture capitalists in the IPO market, paying special attention to the relationship between venture capital backing and underpricing. Section 3 describes the data, the econometric approach and the results. Section 4 concludes the paper.

2   A selected review about the role of venture capitalists in initial public offerings

In the economic literature the role of venture capitalists is still controversial. Early studies develop and empirically test the so-called certification hypothesis: venture capitalists are well-informed agents about the value of issuing firms they have in the portfolio and their role is to certify that the issue price reflects all available inside information. In such a way, the venture capital certification reduces the information asymmetries that arise in the IPOs process and consequently the extent of the underpricing. A testable implication of the certification hypothesis is that VC backed firms are expected to be less underpriced than non-VC backed ones, being the underpricing difference attributed to the venture capital certification.

Boot and Smith (1986) develop a model that provides a theoretical framework for the certification hypothesis. In their paper an underwriter, i.e. an investment bank that handles the IPO, can be employed to certify that the issue price is consistent with the inside information about the future prospects of the firm. The key assumption of the model is that an asymmetric information problem arises in the IPO process between insiders that are shareholders and outsiders who are potential new investors.

Tirole (2006) generalizes the model of Boot and Smith and argues that issuers can reduce informational asymmetries not only by hiring an underwriter with high reputation, but also by asking to other well-informed agents to certify the quality of the issue (rating agencies, independent analysts, auditors, venture capitalists, etc). The certifying agents must have an incentive to become informed about the firm's value and have to take some actions to convey their information to prospective investors. The actions can be a rating, a report or, as in the case of venture capitalists, a non-negligible stake in the issuing firm. There are no doubts that venture capitalists are well-informed investors. As Gompers and Lerner (2004) notes, venture capitalists are specialized in collecting and evaluating information on start-up and growth companies and may partly overcome the informational asymmetries that arise in an IPO process. Megginson and Weiss (1991) argue that venture capitalists are able to certify the issues because they have a reputational capital at stake. They indeed bring to the market more firms over time and have a very strong incentive to establish a trustworthy reputation in order to retain access to the IPO market on favourable terms. A good reputation for competence and honesty will also allow venture capitalists to establish enduring relationship with fund managers and other institutional investors who are both main investors in venture capital funds and important buyers of shares in IPOs. Moreover Shalman (1990) documents that the

value of the reputation is greater than the maximum possible benefit obtained by certifying falsely. These two conditions make the certification role of venture capitalists truthful for outsiders.

Consistent with the certification hypothesis, various empirical analysis find that VC backed IPOs are less underpriced than non-VC backed IPOs. Magginson and Weiss (1991) find evidence that venture capital backing significantly reduces both the underpricing and the gross spreads of US IPOs. They also show that VC backed firms join the market with underwriters who have higher reputation than underwriters of non-VC backed firms. Similarly Barry *et al.* (1990) provide empirical evidence that the presence of venture capitalists in the ownership structure of issuing firms reduce the extent of underpricing.

In contrast with previous works, recent analysis do not find statistically significant differences in the underpricing of the two groups of IPOs. Some authors even find an opposite result, that is, venture capital backed IPOs are *more* underpriced than non-VC backed (Francis and Hasan, 2001; Peggy and Wahal, 2004; Arikawa and Imad'eddine, 2010; Elston and Yang, 2010). Such a finding casts doubts about the validity of the certification hypothesis and re-opens the debate on the role of venture capitalists. In particular, Lee and Wahal examining a sample of more than 6000 US IPOs between 1980 and 2000 find that VC backed IPOs experience higher underpricing than comparable non-VC backed IPOs. An implication of these analysis is that shareholders of VC backed firms, due to the transfer of wealth to new shareholders, bear higher listing costs than shareholders of non-VC backed firms.

Why such shareholders, and venture capitalists in particular, are willing to bear this cost? Two major hypothesis have been proposed in the literature. Some authors suggest that venture capitalists may be subsequently compensated for leaving money on the table. Indeed, underwriters can preferentially allocate to them shares of other underpriced IPOs in exchange of high underpricing in IPOs that they have in portfolio. For instance, Loughran and Ritter (2002) provide examples in which venture capitalists are allocated with shares of underpriced IPOs that they subsequently sell to the market to obtain high profits. A different explanation relies on the grandstanding hypothesis proposed by Gompers and Lerner (1996). Venture capital operators maximize the returns of their investments (mainly) by taking public the firms that they have financed and then, once the investment is liquidated, they return the funds to the original providers (for instance pension funds). Taking many companies public helps venture capitalists to establish a good reputation with fund providers and to raise more money for future investments. Then, venture capital firms are willing to bear the cost of the underpricing in order to taking public as many companies as possible.

The two explanations are not convincing in general. The former refers to the activity that largely occurred just in the early years of the 2000 in the US while the differences in the IPO underpricing are a persistent phenomenon, existing before as well as afterwards such period. The latter explanation does not seem valid for all venture capitalists but, as Gompers argues, the fundraising is an important issue mostly for young venture capitalist firms. Moreover, the hypothesis have been thought with the US financial system in mind where the venture capital is an important source of finance for firms and many IPOs are venture backed. In such a market, due to the possibility of taking public repeated companies, the reputation may be a relevant feature for venture capital firms. In different financial markets, like the Italian one, the venture capital industry is less developed and only few IPOs are venture backed. As a consequence, venture capital firms may be less careful with their reputation on the capital market and may prefer to maximize the proceeds of each investment.

In a recent paper Chemmanur and Loutskina (2007) re-consider the role of venture capitalists and propose a third hypothesis: the market power hypothesis. The authors argue that the underpricing is not the most appropriate measure to evaluate the role of venture

capitalists and propose an alternative measure which they refer as the offer price to intrinsic value ratio. By using such a variable, they show that the role of venture capitalists is not that of certifying the value of the issuing firm, but primarily that of marketing the IPO to other financial market operators (analysts, investment banks, institutional investors) in order to obtain higher valuations for the firm they take public, both in the IPO and in the secondary market. In such a way the presence of venture capitalists in the issuing firms helps shareholders, including venture capitalists itself, to maximize the proceeds of the IPO. Without getting in the heart of the matter about which measure is the most appropriate, the role of marketing the IPOs seems to be more suitable for the underwriters than for the venture capitalists. Indeed, in the IPO process is the underwriter that estimates the value of the issuing company, sets the IPO price and advertises the offering to other financial operators. One alternative interpretation to the results of Chemmanur and Loutskina could be that venture capital backed IPOs are able to attract more prestigious underwriters and it's just such underwriters that obtain higher valuations for the IPOs they manage.[1]

3   Data, model specification and results

To evaluate the role of venture capital backing in the underpricing of IPOs, I consider the IPOs that took place on the Italian stock exchange between 1999 and 2012. During this period a total of 188 firms join the market, 65 of which are VC backed. The distinction between VC backed and non-VC backed IPOs is based on the data collected by the Italian Private Equity and Venture Capitalists Association (AIFI) and published in the yearly Venture Backed IPO Market Report. Data for balance sheet variables and firm characteristics (i.e. sales, total asset, age, size, etc.) come from the prospectus of listing firms, while data for market variables and IPOs characteristics (i.e. index return, oversubscription, price range, underpricing, etc.) come from Borsa Italia Spa, the company that manages the Italian stock exchange.

  The main object of this section is to verify if VC backed and non-VC backed IPOs experience different extent of the underpricing and understand if such difference is due to the causal effect of the venture capital backing. If the provision of venture financing were randomly distributed across firms, the causal effect of venture capital backing could be simply computed as the difference between the average underpricing of the two groups of IPO. Instead, as pointed out by several authors, venture capital backing represents an endogenous choice of issuing firms and venture capitalists. For instance, if only large companies are interested and receive the venture capital backing, their lower underpricing may be due to the firm size rather than the venture capital backing. Such a choice introduces a selectivity bias both in the provision of venture funding and in the characteristics of VC backed IPOs. To taking into account the problem, I rely on a regression-based approach that, by estimating a treatment effect model, explicitly handle the endogeneity of the venture capital backing. The general estimated equation can be written as:

$$Y_i = \beta_0 + \beta_1 D_i + \delta X_i + \alpha_t + \varepsilon_i \tag{1}$$

where Y_i is the first day return, D_i is a dichotomous variable equals to 1 if IPO i is venture capital backed and 0 otherwise, X_i is the vector of control variables, δ is the vector of coefficients associated with controls and ε_i is the error term. The main coefficient of interest,

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[1] The author in a subsequent paper (Chemmanur and Krishnan, 2012) highlights the relevance of underwriters in marketing the IPOs that they manage.

β_1, measures the difference in the mean underpricing between IPOs backed and IPOs not backed by venture capital investors. The time fixed effects α_t are included in all the specifications of the model to control for the cyclical nature of the underpricing.[2]

Given the above discussion, the dummy variable D_i cannot be treated as exogenous because whether or not a firm receives the venture backing is based on self-selection. In that case, the dummy variable is endogenous and the ordinary least square do not provide consistent estimates of the causal effect β_1.[3] In order to account for the endogenous nature of the venture capital backing, a treatment effect model is used to estimate equation (1). The model is a particular case of more general self-selection models and allows to estimate the causal effect of an endogenous binary variable on a continuous observed variable.[4] In the treatment effect model the equation (1) is the equation of primary interest and the receipt of venture capital backing is modeled as the outcome of an unobserved latent variable D_i^*, such as:

$$D_i^* = \gamma W_i + u_i \tag{2}$$

with

$$D_i = \begin{cases} 1, & if \ \ D_i^* > 0 \\ 0, & otherwise \end{cases} \tag{3}$$

where W_i is a vector of exogenous covariates that affect the receipt of venture funding.[5] The model is estimated by the two step estimator derived in Maddala (1983). In the first stage probit estimates of the treatment equation (2) are obtained:

$$\Pr(D_i = 1 \mid W_i) = \Phi(W_i \hat{\gamma}) \tag{4}$$

These estimates are used to compute the hazard h_i:

$$h_i = \begin{cases} \phi(W_i \hat{\gamma}) / \Phi(W_i \hat{\gamma}), & for \ \ D_i = 1 \\ -\phi(W_i \hat{\gamma}) / \{1 - \phi(W_i \hat{\gamma})\}, & for \ \ D_i = 0 \end{cases} \tag{5}$$

where ϕ is the standard normal density function.

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[2] Some authors observe that the validity of the certification hypothesis is time-dependent. For instance, Coakley *et al.* (2009) studying the IPOs issued on the London Stock Exchange between 1985-2003, show that the difference between the underpricing of VC backed and non-VC backed IPOs is negative over the entire period but it is statistically significant only excluding the internet bubble years (1998-2000).

[3] Technically $E(\varepsilon_i \mid X_i) \neq 0$, or in words, the conditional mean assumption of the disturbance is violated and the OLS estimator is biased and inconsistent.

[4] For a basic discussion of the treatment effect model see Greene (2008), while for a review of more general self-selection models see Maddala (1983).

[5] In the treatment effect model the error terms ε and μ are correlated and bivariate normally distributed. In the data that I analyze, the correlation between the error terms is positive and the ordinary least square will overestimate the coefficient β_1.

Lastly, the parameter of interest β_1 is obtained in the second step by augmenting the equation (1) with the hazard h_i. Table 1 summarizes the estimates obtained with maximum likelihood method.

As a preliminary analysis, in column 1 I start with a bivariate ordinary least square regression between the underpricing and the venture capital backing (*Venture Backing*). Such a first step is useful in order to compare the point estimates of β_1 in the various specification of the model. In column 2, I also replicate the regression proposed by Megginson and Weiss (1991). The underpricing is regressed on the dummy variable for the venture capital backing, the size of the offering (*Size*), the age of the issuing firms (*Age*) and the underwriter reputation (*Underwriter Reputation*). For all the regressors, I expect a negative relationship with the underpricing. Ritter (1987) has documented that, due to economies of scale, with the increasing of the amount offered the cost of going public decreases. The age of the issuers is considered in the literature as proxies of the ex-ante uncertainty regarding the price of firm's shares. Indeed, Leland and Pyle (1977) argue that a correct evaluation of young firms is a difficult task for the outside investors. The underwriter reputation is included in the model in order to separate the certification provided by venture capitalists and the one provided by the underwriter that manage the offer.

In column 3, I extend the set of controls introducing additional variables that the empirical literature has identified as determinants of the IPO underpricing. The variable *Distance* accounts for the geographic localization of issuing firms and measures the physical distance (in kilometres) between the headquarter of issuers and Milan, the city where is located the Italian stock exchange. Acconcia *et al.* (2011) consider such a variable as a proxy of the asymmetric information between insiders of issuing firms and outside investors and provide empirical evidence that it is positively correlated with the underpricing. Following their reasoning, I expect that the farther away is the listing firm, the higher is the level of the underpricing. The width of the preliminary IPO price range (*Range*) refers to the indicative prices set at the beginning of the book-building procedure. According to Hanley (1993), I hypothesize that a wider price range is typical for IPOs with high uncertainty. Then, I expect a positive relationship with the underpricing. *Revision* measures the revision of the IPO price relative to the average value of the price range and it is considered as a proxy of the information gathered by the underwriter during the roadshow. Cornelli and Goldreich (2003) show that the variable is positively correlated with the underpricing. The gross spread (*Fees*), defined as the fees charged by the underwriter in percentage of the IPO price, represents with the underpricing, the main cost of going public.[6] Prabhala and Puri (1998) observe that such a cost is usually higher for IPOs harder to price and then consider the gross spread as a proxy of the risk associated to the IPOs. Also for this control variable I expect a positive relationship with the underpricing. *Greenshoe* is the ratio between the number of shares dedicated to the greenshoe option and the total number of shares sold to the market. Benveniste and Spindt (1989) argue that the greenshoe option reduces the risk of the issue and consequently the extend of the expected underpricing. I also add the dummy variable *Bank Uw* that is equals to 1 if the IPO underwriter is a bank that owns equity of the issuing firm and 0 otherwise. This control is of particular interest for the Italian bank-based financial system where banks are often founders or financiers of issuing firms.[7] Furthermore, in order to account for the possible joint certification provided by underwriters and venture capitalists, I also include in the regression an interaction term between the underwriter reputation and the venture capital backing (*Venture Backing – Underwriter Reputation*) equals to 1 if the IPO is

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[6] Chen and Ritter (2000) for example, show that in the US IPOs the gross spread is closely clustered around the 7%.

[7] A similar role of the underwriters is documented also by Elston and Yang (2010) in the German context.

VC backed and is handled by high quality underwriters. Lastly, a further important control is the sector of activity in which the issuing firms operate. Bradley and Jordan (2002) for instance, after controlling for the industry effect, do not find any difference in the underpricing of VC and non VC backed IPOs.

In the last column, I estimate the equation of column 3 by the treatment effect model to account for the endogeneity in the receipt the venture capital backing. The exogenous variables that could affect the receipt of venture funding (the regressors of equation 2) are the size and the age of issuing firms, the return of the market index, the distance from the headquarter of the stock exchange and the dummies for the sector of activity.

Table 1: Regression analysis: the effect of venture capital backing on the IPO underpricing

$Y = underpricing$	(1)	(2)	(3)	(4)
Venture Backing	-2.87**	-3.16***	-4.63*	-6.02**
	(-2.59)	(-3.19)	(-1.89)	(-2.19)
Bank Uw			-4.51*	-4.52**
			(-1.84)	(-1.98)
Venture Backing – Underwriter reputation			0.22	0.22
			(1.03)	(1.14)
Size		-1.27**	-1.79**	-2.03***
		(-2.79)	(-2.38)	(-2.66)
Age		-1.35*	-1.54**	-1.51**
		(-1.84)	(-2.17)	(-2.16)
Underwriter Reputation		-0.06	-0.16*	-0.15*
		(-1.17)	(-1.85)	(-1.81)
Distance			0.02***	0.02***
			(3.66)	(3.74)
Range			0.06***	0.06***
			(3.22)	(3.55)
Fees			1.59	1.57*
			(1.61)	(1.75)
Greenshoe			-0.34**	-0.34**
			(-2.29)	(-2.55)
Revision			7.70***	8.03***
			(8.13)	(9.94)
Constant	7.63***	61.06***	0.54	4.98
	(7.67)	(15.38)	(0.06)	(0.98)
Year Dummies	yes	yes	yes	yes
Industry Dummies	no	no	yes	yes
Observations	181	181	168	163
Pseudo R^2	0.16	0.20	0.42	-
Wald Test (p-value)	-	-	-	0.05

***, **, * statistically significant at 1, 5 and 10% level.

The results are consistent with the previous discussion. The dummy for the venture backing, the main variable of interest, is statistically significant at usual levels in the various specifications and it is negatively correlated with the first day return: IPOs venture capital backed are less underpriced than IPOs non-venture capital backed. It is interesting to notice that when I account for the endogeneity problem by using the treatment effect model the coefficient of the dummy is greater, in absolute value, than those predicted by the OLS. In other words, the OLS estimate of the venture capital backing effect is biased upward. The proxy of the underwriter reputation shows the expected negative sign and it is statistically significant. This means that, as highlighted by other studies (Johnson and Miller, 1988; Carter and Manaster, 1990; Carter *et al.*,1998), also high quality underwriters are able to certify the IPOs they handle and that their certification is a complement to the one provided by venture capitalists. Such a finding represents further support in favour of the certification hypothesis. Lastly, the underpricing significantly reduces when the underwriters also have a stake in the issuing firm while does not significantly change when high quality underwriters manage IPOs venture capital backed. The other controls are in general statistically significant with the expected signs. In particular, the fees paid to the underwriters are positively correlated with the underpricing. This mean that IPOs with low underpricing, as for instance VC backed IPOs, are associated with low fees, excluding a possible trade-off between indirect and direct cost of going public.

4 Conclusions

During the period 1999-2012, VC backed IPOs are less underpriced than non-VC backed ones. Using a regression based-approach that allow to explicitly handle the endogeneity in the receipt of venture funding, I conclude that the difference in the average underpricing between the two groups of IPOs is actually due to the causal effect of venture capital backing. As a further result, I find that also high quality underwriters are able to certify the IPOs they manage and that their certification is complementary to the certification provided by venture capital investors. Both results are consistent with the certification hypothesis of Boot and Smith (1986) and the theoretical model of Tirole (2006), where various well-informed agents are able to certify the value of issuing firms.

The provided empirical evidence indicates that venture capital backing play an important role in the reduction of information asymmetries between issuing firms and outside investors, and consequently of the IPO underpricing. Given that the underpricing is considered as the main indirect cost of floatation, the result suggests that an efficient venture capital industry may help to overcome the so called "funding gap" – the financing problems faced by new and small firms – with wide advantages for the overall economy. This is particularly true for the case of Italy where the financial system, given the opacity and the family management of domestic firms, is strongly affected by relevant information asymmetries between outside investors and insiders of firms. From this point of view, also the government would be actively engaged in promoting programs to support the venture capital industry, as, for instance, it has occurred in other European countries such as Germany and United Kingdom.

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