

Smart Money?

Investor Mix and the Performance of Entrepreneurial Firms¹

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ABSTRACT

Research has documented a wide variation in investor mix across firms, countries, and industries. This paper investigates the mechanisms by which experienced investors influence the likelihood of a venture going public or being acquired. Drawing on resource-dependence and relational theories, I argue that there is a direct, immediate effect on performance, but also an indirect effect that requires either the investor or the firm, or both, to be proactive. I hypothesize that investors in earlier rounds take advantage of direct and indirect mechanisms, while investors in later rounds only exert a direct effect; thus, I expect the impact of early-round investors to be greater. In addition, I argue that when financial markets are less developed, experienced investors have a greater effect on firm performance. I test these hypotheses using a sample of 689 biotechnology firms from 31 countries and founded between 1990 and 2004. I find support for the hypotheses in two-stage models that control for the probability of a matching between investor and venture.

Keywords: *resource dependence, relational resources, ownership structure, performance, entrepreneurial ventures, value added*

INTRODUCTION

Ever since the separation of ownership from control of the modern corporation, the link between investor mix and firm performance has been a central topic in the business literature. Research has documented that investor mix differs widely across firms, industries, and countries (Berglof, 1990; La Porta, Lopez-de-Silanes, and Shleifer, 1999). A subset of the strategy and entrepreneurship literature has analyzed the impact of investors on firm performance, finding that firm performance is associated with institutional investors (Chaganti and Damanpour, 1991; Thomsen and Pedersen, 2000), venture capital firms (Fitza, Matusik, and Mosakowski, 2008), and in some instances family ownership and/or control (Villalonga and Amit, 2006). The extant literature posits that investors impact firm performance through three different processes: selection, certification, and value-added (Demsetz, 1983; Kortum and Lerner, 2000; Megginson and Weiss, 1991). Yet separating these processes has proven challenging. This paper sheds light on the differences among these mechanisms by analyzing the incentives of firms and investors to cooperate, and empirically tests the implications of this framework.

I build on the mutually consistent perspectives of resource-dependence theory and the relational view of the firm. The former emphasizes that a firm depends on external actors with critical resources (Pfeffer and Salancik, 1978), while the latter argues that partners need to develop organizational complementarities to exploit the synergies in the network of firms (Dyer and Singh, 1998). In other words, there is a cost in extracting the potential rents in a partnership. Conditional on the matching of investors and firms, some relational rents accrue without additional investment, while obtaining further rents requires firms and investors to cooperate. The former are immediate; the latter will only be observed when the benefits outweigh the costs.

For entrepreneurial ventures, partnering with the right investor may be particularly important. Resource accumulation takes time (Dierickx and Cool, 1989), and young firms often reach for resources outside their boundaries using strategic alliances (Eisenhardt and Schoonhoven, 1996). Investors are a source of resources as well. “The source of the money is more important than the valuation, within reason. Think of your investor as someone you are hiring, for free, to help make your company successful,” explains a venture capitalist (eBrandedBooks.com, 2000: 41). I predict that younger firms depend more on the environment and also have less structure and inertia, increasing the potential benefits and decreasing the potential costs; similarly, firms in challenging financial environments may obtain higher rents than firms in easy financial environments.

I test my hypotheses with an international sample of 689 biotechnology firms founded between 1990 and 2004 in 31 countries. Because entrepreneurial firms do not disclose financial information, I follow the extant literature (e.g. Jeng and Wells, 2000; Stuart, Hoang, and Hybels, 1999) in using as the key indicator of performance the likelihood that the firm will experience a liquidity event, i.e., an acquisition or an initial public offering (IPO) in any stock exchange around the world. Correcting for the matching of firms and investors, I analyze the impact of investors on the likelihood of an event using both a hazard and a probit model, finding support for my hypotheses. My theoretical and empirical analyses speak to the literature on the impact of investor mix on performance by analyzing the incentives of both firms and investors to extract rents from their relationships.

INVESTOR MIX AND FIRM PERFORMANCE

Previous research argues that investors impact firm performance through three basic mechanisms: matching, certification/endorsement, and value-added. Matching is a two-sided

process. On the one hand, investors strive to select those firms that are more likely to succeed (Amit, Brander, and Zott, 1998; Baum and Silverman, 2004; Shane and Stuart, 2002), closer (Sorenson and Stuart, 2001), or within a more predictable institutional environment (Guler and Guillen, 2006). On the other, firms select the investors they approach, and when confronted with several offers, they select the one from the most reputed investor, even at a greater price (Hsu, 2004). Were this dual matching efficient, one would expect the most promising firms to be matched to the most savvy investors, though some have pointed out that this may not always be the case (Amit, Glosten, and Muller, 1991).

Post-matching, investors enhance firm performance by certifying or endorsing the firm, and by adding value. Regarding the former, partnering with a well-reputed investor signals that the firm is legitimate. This may be particularly beneficial for young firms (Stuart *et al.*, 1999), for which the information asymmetries are acute. Indeed, the net valuation of firms is greater when they partner with reputed investors (Megginson *et al.*, 1991). Besides endorsing the firm, investors add value by contributing to professionalizing the firm's management team and human resource policies (Hellmann and Puri, 2002), or by leveraging their contacts to facilitate access to funding (Hochberg, Ljungqvist, and Lu, 2007) or to foster critical strategic alliances (Hsu, 2006).

These three mechanisms are intrinsically related. Matching and endorsement are two sides of the same coin; it is because savvy investors are believed to pick the most promising ventures that there is a certification effect. The endorsement and value-added mechanisms are also connected because they both rest on the pool of resources of the investor. Investors that have developed capabilities to enhance the value of a firm will most likely build a reputation for doing so, thereby building the foundation for the certification effect. Moreover, since reputation is one of the dimensions of social capital, investors may also build on their reputation to add value. In

sum, the certification and the value-added mechanisms are confounded. As a consequence, it is challenging to separate these mechanisms theoretically or empirically.

One reason these mechanisms are confounded is that the previous literature has overlooked the costs involved in extracting rents from the investor-firm relationships. Existing research on the relational view of the firm argues that firms have to develop organizational complementarities to fully realize the potential for rents in an alliance (Dyer *et al.*, 1998; Kale, Dyer, and Singh, 2002). Qualitative evidence suggests this is also the case in the partnership relationship. Investors add value by participating in the hiring decision, which involves being “there for the hiring process, because we’ve [the investors] interviewed thousands of people, know good interview techniques, and know how to get the right people” (eBrandedBooks.com, 2000: 189), and sometimes involves even stepping in as the CEO while they find the right person.² Investors also add value by offering their know-how on the industry; however, this consulting is tailored for each firm: “the type of consulting offered really depends upon the skill set that the individual VC brings to the table with respect to that specific deal”; “we find ourselves spending a lot of time coaching in the areas they [the entrepreneurs] are not strong in” (eBrandedBooks.com, 2000: 153, 211). Firms also face costs when extracting value from their investors; in fact, experienced management teams do not rely as much on their investors, because the cost of conflict is greater than the benefits from learning from them (Barney *et al.*, 1996). Therefore, because extracting some of the benefits from the relationship is costly, there will only be incentives to do it when the expected net value is positive.

Analyzing the costs and not just the benefits sheds light on how investors impact firm performance. The two-sided matching between a firm and an investor is a search process and, as

² Interview with a venture capitalist, Philadelphia (PA), April 2008.

such, it is costly for both parties. Moreover, because the expected benefit of the matching goes beyond merely obtaining funding, firms are willing to accept a lower valuation to partner with a reputed investor (Hsu, 2004). In return for those costs, two types of benefits accrue to the relationship. First, there are immediate rents that derive from a reduction in information asymmetries. In addition, there is a potential for additional rents, which requires an additional investment (i.e., costs) in the relationship. Consider the network of contacts of the investor. Qualitative evidence shows that having the resource is not sufficient to generate rents. The founder and CEO of a biotechnology company picked a particular investor “because he believed that [the investor] would grant them access to his global network of contacts,” which could be useful for their international strategy. “But we were never introduced to them and it did not help us in our international expansion.”³ This example illustrates that whether the potential benefits are derived from endorsement, value-added, or both, the two partners need to develop organizational complementarities. In other words, while the immediate benefits derive from certification, the mediated benefits derive both from certification and from the value-added mechanisms. Hence, interpreting the mechanisms in terms of benefits and costs overcomes the identification problems of the traditional framework.

In conclusion, two elements are critical to understand the impact of investor mix and characteristics on firm performance: the potential of the investor to add value to the firm (i.e., the investors’ resources and reputation), and the benefits relative to the costs. Building on both the resource dependence theory (Pfeffer *et al.*, 1978) and the relational view of the firm (Dyer *et al.*, 1998), the remainder of this paper develops testable predictions about the impact of investors on firm performance.

³ Interview with the CEO of a Spanish biotechnology firm, Madrid (Spain), December 2005.

The experience of the investors

Investors in entrepreneurial ventures are far more than providers of capital. As a venture capitalist observes, “the VCs provide capital and the really good ones provide great strategic insight and a roll up their sleeves [sic] of attitude” (eBrandedBooks.com, 2000: 232). Naturally, the reputation and resources of investors are critical both for the matching process and for the potential benefits the firm may extract from the partnership. Because reputation and resources are difficult to observe, the extant literature focuses instead on the experience of investors, which is how investors learn, accumulate resources, and build a reputation. Experienced investors are, then, assumed to have developed better abilities to select promising investments and to leverage their resources in those firms. In turn, firms select investors based on their experience (Hsu, 2004).

Though experience is necessary to acquire resources and to build a reputation, it is not sufficient. To illustrate this issue consider the investor’s portfolio network; a venture capitalist explains, “we have invested in over 400 companies, about 128 of which have gone public and 134 that have been sold or merged. So we really have a big portfolio that we can pull resources from” (eBrandedBooks.com, 2000: 96). The value of the portfolio network hinges on the success, or at the very least survival, of the portfolio firms. More generally, research has demonstrated that some investors perform persistently better than others (Kaplan and Schoar, 2005), evidence that is consistent with some investors having valuable capabilities and or resources that allow them to earn abnormal rents. Past successes evidence that investors have accumulated resources that are valuable for their portfolio firms; in addition, past successes are one of the mechanism for reputation building (Gompers, 1996).

In line with the extant literature, I assess the performance of entrepreneurial ventures by the occurrence of a liquidity event. Most research focuses on the occurrence of an IPO (e.g., Bottazzi, Da Rin, and Hellmann, forthcoming; Hsu, 2006; Jeng *et al.*, 2000; Stuart *et al.*, 1999), as the best exit scenario. In the current research, I consider the acquisition of the firm, as well, because it is the most common liquidity event (Amit, Brander, and Zott, 1997). Furthermore, at times an acquisition may be preferred to an IPO, as a venture capitalist explained in an interview, “nowadays, IPOs tend to be done as a step towards acquisition. Because going public *per se* does not mean liquidity, neither to the founders nor to the venture capital firm. It also depends on the stock exchange, the firm.... But even when they are public, until a big firm acquires a significant percentage it is not really liquid.”⁴ Since both liquidity events signal firm performance, I predict the following:

Hypothesis 1: Investors’ past successful experience at exiting investments increases the chances of the venture experiencing a liquidity event.

The timing of investment

The synergies derived from the resources and reputation of investors vary across time, and so do the costs of exploiting those synergies. According to the resource dependence theory, the value of the investors’ resources and reputation will be greater for a firm that depends on such resources. In particular, entrepreneurial firms often lack a great many resources, increasing their dependence on the environment; this is even more acute in high-technology industries, where scientists have found companies with very little management knowledge.⁵ However, as

⁴ Interview with a venture capitalist, Philadelphia (PA), April 2008.

⁵ Interview with the founder of a biotechnology startup, Philadelphia (PA), April 2008.

time goes by and the firm deals with day-to-day problems, it develops the capabilities and accumulates the resources it needs to survive, being less dependent on the environment and in turn reducing the potential benefits of the investors' resources. Not only do the benefits of developing an organizational complementarity decrease with time, but the costs increase. As the firm develops routines, hires human capital, and establishes interorganizational relationships, it grows in complexity and gains inertia, hence increasing the costs of making changes. Then, the costs necessary to implement new human resource policies or changing the alliance strategy may be greater.

Qualitative evidence supports the idea that investors in early rounds make an investment in the relationship, which pays off later on. "The relevance of the due diligence process is usually underestimated," explained a venture capitalist in an interview. "Due diligence is a value added process. When we write the term sheet, we establish the terms for the whole deal, such as the composition of the management team. At board meetings we just stick to what we decided then, of course, making changes when necessary."⁶ Moreover, Gorman and Sahlman (1989) found that the allocation of time is also strongly related to the stage at which the investor enters the firm. Lead investors and investors on the first round go personally to the firm with monthly frequency, while investors in later rounds go only to quarterly meetings.

In consequence, I expect the incentives to invest in organizational complementarities to be higher with investors in early stages than with investors in later stages. Nevertheless, at any point in time the immediate benefits should not vary across investors. That is, the reputation of a firm increases by the endorsement of a reputed investor regardless of when the investor came in. Of course, this does not imply that the effects from certification are constant across time. On the

⁶ Interview with a venture capitalist, Philadelphia (PA), April 2008.

contrary, the performance effect of endorsement may be greater in early stages, when the information asymmetries are greater. But at any point in time, reputed investors certify the firm regardless of when they invested in it. Consider, for instance, investment banks, whose endorsement increases the value of a firm in spite of joining months before an IPO (Stuart *et al.*, 1999).

Hypothesis 2: At any point in time, the effect on the chances of a liquidity event of investors' past successful experience at exiting investments is greater for investors that joined in the first round than for investors that joined in later rounds.

The development of financial markets

The synergies derived from the resources and reputation of investors also vary across different institutional environments. In particular, in the presence of weak financial institutions the rents that accrue to the experience of the investors are greater than in strong financial environments. Countries differ massively in financial market development; compare, for instance, the stock market capitalization (as % of GDP)⁷ in 2004, which was 33 in China, 43 in Germany, 139 in USA and 230 in Switzerland. Changes across time are notorious as well, with an increase from 12 to 56 in India from 1990 to 2004, and from 53 to 139 in the United States in the same period.

The development of financial institutions is one of the major determinants of the investment in entrepreneurial firms, because it is a major conduit for investors to realize profits. In fact, research has found that the strength of a country's financial institutions is one of the major determinants in the decision to invest in that country's entrepreneurial firms (Guler and

⁷ World Development Indicators

Guillen, 2006; Jeng *et al.*, 2000); and firms that invest in weak financial environments tend to have better selection capabilities that confer on them a competitive advantage (Guler and McGahan, 2006; Lerner, Indahl, and Zinterhofer, 2005).

Despite lowering the chances of a matching, less developed financial environments make firms more dependent on their investors more generally, because the resources they control are scarcer and, more importantly, because the problem caused by the information asymmetry is greater. Because the liquidity of the new issuing markets tends to be low, only the very best ones are taken public. Then, the immediate benefits from being endorsed by a reputed investor are higher than in strong financial markets. This is similar to the case of hot and cold markets. Gulati and Higgins (2003) show that in cold markets investors are believed to select their investments more carefully and that, in turn, the endorsement effect is higher. A similar mechanism operates in the case of cross-national IPOs. Markets have less information on foreign than on national firms, making a cross-national IPO more challenging. In these cases, the endorsement by an internationally reputed investor is particularly valuable (Hursti and Maula, 2007).

Hypothesis 3: The effect on the chances of a liquidity event of investors' past successful experience at exiting investments is greater to the extent that financial markets are less developed in the home country of the venture.

METHODOLOGY

Research setting

I use an international sample of entrepreneurial biotechnology ventures to test the hypotheses. The high capital requirements of biotechnology firms make this industry attractive as a research setting because both the firms and their investors are more visible to researchers, reducing potential sample selection bias towards bigger firms. Besides, the high capital

requirements are an incentive for firms to go public or be acquired; since most of the firms aspire to experience a liquidity event, the occurrence of such an event tends to be tied to performance. Finally, having an international sample of ventures increases the observed variation in types of investors; for instance, the levels of competition vary across countries, resulting in differences in their specialization strategy and in their experiences in taking companies public (Lerner *et al.*, 2005). Furthermore, the different competitive environments and the frictions to invest in a different country will facilitate the design of an identification strategy.

Using Venture Economics as the main source of data, I compiled a sample of biotechnology ventures founded between 1990 and 2004 (i.e., including the pre- and post-dot com bubble periods) and followed them until they experienced a liquidity event or until 2005. I excluded those firms that were spin-offs from a big corporation or joint ventures, because these are at an advantage to experience a liquidity event. Venture Economics reports on VC funding to a population of 1,336 biotechnology firms during the period of analysis, more than half of which were founded in the United States. In order to cover as many countries as possible, I included all non-U.S. biotech firms and a 10% random sample of U.S. biotech firms. I identified 848 U.S. biotech firms in Venture Economics founded during the period of analysis, and randomly sampled 85 firms.⁸ Out of the 688 non-U.S. biotech firms, only 611 were used in the analyses, as a result of missing data; conditional mean analyses do not reveal any bias. Overall the sample spans 3,479 years and 31 countries, including the United States (516 venture-years), Germany (913), the United Kingdom (432), France (364), Korea (337), Canada (305), and Australia (159).

⁸ For those firms in the random sample with a missing founding year, I researched a variety of sources (e.g., websites, news) and found the information for almost all of them. Those firms that turned out to be pre-1990 or not a startup (e.g., joint venture or subsidiary) were replaced with a randomly sampled firm.

Venture Economics collects the full investment history for each firm, including funding by government-affiliated institutions, financial institutions, strategic investors, or venture capital firms. Indeed, the database has been widely used in both the entrepreneurship (Megginson *et al.*, 1991; Sahlman, 1990; Shane *et al.*, 2002) and multinational literatures (Guler and Guillen, 2006, 2007; Guler and McGahan, 2006, 2007), being the most comprehensive cross-national database of investments. In order to assess the effect of investors' experience on the venture's performance it is necessary to focus on a certain type of investor, because the experience and size of different types of investors is hardly comparable – e.g., angel investors vs. investment banks. In the context of biotechnology ventures it is reasonable to focus on the impact of venture capital firms, as both practitioners and academics are concerned with the effects of this type of investors on firm performance (e.g. Gompers and Lerner, 2004). Within the sample there are both venture capital-backed firms (544) and non-VC-backed firms (153), funded by financial institutions, corporate venture capital, or government-sponsored programs. This research setting allows me to assess the impact of having successful VC investors in excess of the impact of having a VC investor *per se*, contributing to those studies that focus on only venture capital-backed firms (e.g. Bottazzi *et al.*, forthcoming; e.g. Sørensen, 2006).

Analyses

The main empirical challenge in this paper lies in separating the *ex ante* two-sided matching from the *ex post* influence on firm performance. Different identification strategies have been used in the literature, such as a two-sided matching model that exploits the characteristics of other agents in the market to identify the sorting (Sørensen, 2007), or the estimation of the matching model in the first stage considering all potential matches between investors and invested firms and using the availability of funding as an instrument (Bottazzi *et al.*,

forthcoming). Building on this latter model, I generate all potential matches between ventures and syndicates, taking into account all ventures that are active for each period and all syndicates that invested in that same year; I also allow for the possibility that a venture does not obtain funding in that year. It is important to note that taking the syndicates as a whole is necessary to have the same unit of analysis (venture-year) in both stages, and is justified by the finding that investors invite partners to the deal partly to get a second opinion on the attractiveness of the investment (Brander, Amit, and Antweiler, 2002; Lerner, 1994).

Because there is a matching on both observable and unobservable characteristics (Sørensen, 2007), it is necessary to include an instrument that is related to the matching process but not to the likelihood of a venture going public or being acquired. Previous research has used the availability of funding in a geographical area (Berger *et al.*, 2005; Bottazzi *et al.*, forthcoming). Building on this idea, I use the number of foreign investors as an instrument, which is related to the matching process (i.e., the more investors, the more likely a match). This instrument satisfies the exclusion restriction if investors do not anticipate investment opportunities based on unobservables; in other words, it has to be true that after controlling for observable characteristics, the number of foreign investors in a country is not correlated with the quality of the investment opportunities. Even if we assume that some investors, such as venture capital firms, are better at identifying business opportunities, investing across borders requires local knowledge and local contacts, thus delaying this response to unobservable variables. The instrument also includes all types of investors in all industries, and not just biotechnology, strengthening its exogenous relation to the outcome.

Therefore, the probability of a matching between firm i with investor syndicate j at time t is estimated by the following probit model:

$$\Phi^{-1}(p_{ijt}) = \beta_0 + \beta_1 \delta_{jt} + \beta_2 \lambda_{jt} + \beta_3 \xi_{it} + \beta_4 \varphi_{ct} + \beta_5 \mathbf{Z}_{ct} + \eta_{ijt}[1],$$

where δ_{jt} describes the incoming syndicate (presence of a VC, IPO experience of VCs in the syndicate) and λ_{jt} the current syndicate of investors (presence of a VC firm, deal experience, IPO experience, and syndicate size). Including characteristics of both the current and incoming syndicates addresses concerns about the similarity/dissimilarity of the experience of the syndicate (Lerner, 1994). In addition, the equation includes firm and investment characteristics (ξ_{it}), such as the patents and publications per year, patents and publications at founding, round of investment, and year of founding, and a vector of country controls (φ_{ct}). Finally, \mathbf{Z}_{ct} is the instrument.

Because the data is right censored, there is not a rigorous method to estimate the matching equation in a first stage and to incorporate it in a second stage. A Heckman probit model is the most straightforward way to solve the endogeneity problem; however, it does not account for the right censoring in the data,⁹ which may introduce systematic biases that are difficult to assess (Allison, 1995). In particular, it may underestimate the effect of first round investors, because for those firms that are founded near the end of the observation period there may be only one round and no events. Furthermore, it may systematically overestimate the effect of investors in second and subsequent rounds. Research has documented that moving to a subsequent round of investment is per se a signal of success (Gompers, 1995); in fact, the experience of investors in later rounds is not a random variable, but a choice of whom first round investors invite. Because the probit model does not deal with these mechanisms, one would

⁹ The ventures are founded between 1990 and 2004, and are followed until they experience a liquidity event (when they drop from the sample) or until 2005 (censored observations).

expect the effect of later rounds of investors to be biased upwards. In sum, while a Heckman probit estimation introduces a rigorous endogeneity correction, it poses problems related to the panel structure of the data and the right censoring of the sample.

A duration model such as Cox regression deals with the panel structure and the right censoring in the data, but it lacks a closed econometric solution to the endogeneity problem. In this paper, I estimate the matching equation in the first stage and compute a control function that more heavily weights those observations that are less likely, such as the inverse Mill's ratio, and then I add such control function as an additional regressor on the second stage (CITE). While this procedure does not ensure the consistency of the estimators, nor does it correct the standard errors, it may point out the extent to which selection is driving the results.

In short, there is a trade-off between a Heckman probit and a Cox model: while the first implements a well-known correction for endogeneity, it may introduce a systematic bias in the estimation due to the right censoring and the panel structure in the data; the Cox model, however, deals with the right censoring and the panel structure in the data, at the expense of a rigorous endogeneity correction. The choice between the models depends on which bias seems to be more prevalent in the data. It is, then, an empirical question that is addressed in the results section.

Dependent variable

The dependent variable is the occurrence of a liquidity event, measured as an IPO in any stock exchange around the world or as an acquisition. Including the latter is necessary to ensure that ventures have homogeneous access to liquidity events, since in many countries taking a company public is especially difficult and both investors and firms prefer a private sale. To determine the existence of an event and its date, I triangulate information from various sources, including Venture Economics, SDC Platinum (Global Issues and M&A Databases), Zephyr,

stock exchanges' websites, and company websites (when available). All potential IPOs and acquisitions were confirmed with the Dow Jones Factiva database, which compiles news from a variety of sources, distinguishing real acquisitions from a sale of assets after bankruptcy.

Independent variables

Investment syndicate. Though experience is often measured as a count of deals (e.g. Hsu, 2004; e.g. Sørensen, 2007), these are necessary but do not guarantee that the firm builds a reputation or accumulates know-how. Thus, to test hypothesis 1 I measure the experience of the syndicate as the prior number of IPOs. Because the consequences of prior experience for different types of investors may be very different (e.g., angels and institutional investors are most likely have different volumes, and so different learning curves), the measure considers only the experience of venture capital firms in the syndicate.¹⁰ I take averages to aggregate to the syndicate level. Though not reported, all results are also tested with the maximum experience in the syndicate, finding the same qualitative results. To test hypothesis 2, I compute annually the average IPO experience of those venture capital investors present in the first round, and the average IPO experience of those venture capital firms that join the syndicate in subsequent rounds (*Round 1 synd IPO exp* and *Round 2+ synd IPO exp*, respectively).

Besides including the experience of the syndicate, I include a variable to indicate the presence of a venture capital firm, the size of the syndicate, and the number of the round. Table 1 presents a summary of the independent variables.

[Insert Table 1 around here]

¹⁰ As a consequence, experience variables have a high number of zeros. A log transformation is made in order to make the variables smoother.

Venture level. It is necessary to control for the quality of the venture, as this is one of the main variables used in the matching (Amit *et al.*, 1998; Baum *et al.*, 2004). For biotechnology firms, the number of patents and the number of publications are typical indicators of quality. I compile the information from the U.S. Patent and Trademark Office, considering only those patents that have already been granted, but using the application date to compute the measure. In an interview,¹¹ a patent lawyer explained that “in the biotechnology industry firms usually patent in the most relevant countries at the same time in order to ensure protection.” Then, U.S. patents are a homogenous measure of quality across biotechnology firms from different countries. Information on publications is collected from ISI Citation Index.

I compute the number of patents and publications at the time the firm is founded, and also the patents and publications normalized by the age of the company. Results are robust to including the count of patents and publications, but the normalized measure includes more information about the rate at which the firms are innovating.

Finally, including the year of founding as a covariate both tests and corrects for random censoring, assuming this is uninformative (Allison, 1995). To better account for the evolution of investments in high-technology firms in the period, I break the period of observation into three subperiods: pre-bubble (1990-1997), bubble (1998-2000), and post-bubble (2001-2004).

Country level. I include several country controls to account for cross-country institutional variation (Guler and Guillen, 2006). I measure the development of financial markets as the natural logarithm of the local stock market capitalization standardized by the country’s GDP, annually, using the World Bank data. For robustness analysis in H3, I compiled the annual number of new listings in stock markets from the World Federation of Exchanges (available

¹¹ Philadelphia (PA), September 2007.

since 1995). Other country controls are the legal traditions and language, the level of economic development (from the World Bank), and the level of political constraints as measured by the Polcon index (Henisz, 2002).

Instrument. Finally, the instrument for the matching equation is specified as the number of foreign investors that invested in a given country-year, as reported by Venture Economics. Because the goal is to capture the supply of funds, I have considered all types of investors (e.g., financial entities or strategic investors) and investments in all sectors. Only foreign investors (i.e., whose country of origin is different from the country of investment) were considered, so that they face country barriers in their investment that limit the movement of capital towards the best opportunities.

RESULTS

The sample shows variation in investor mix and characteristics, with only half of the firm-years being VC-backed (table 1). Despite the fact that 70% of the firms obtain funding from a venture capital firm on the first round, only 26% of the biotech firms obtain funding in the first year of funding. In addition, 153 firms (22% of the total) did not obtain VC funding within the period of observation. Among the venture capital firms, there is also a noticeable variation in terms of size and IPO experience. The correlation between the average number of deals (Syndicate past deals) and of IPOs (Syndicate IPO experience) by venture capital firms in the syndicate is high (0.66, table 2). Besides, the IPO experience of investors in the first round is similar in mean and range to the IPO experience of investors in subsequent rounds, with a 61% correlation (table 2). In other words, the average experience of the syndicate in the first and subsequent rounds is similar and also related, which is consistent with experienced investors inviting investors with similar characteristics. Interestingly, the correlation of the syndicate's

experience with the biotech patents and publications ranges from 0.20 to 0.26, depending on the measure, while the correlation with the patents and publications at founding is not significantly different from zero.¹² These raw results point to a matching based on the unobserved quality of the firm or to an effect of investors on the innovative outcomes of entrepreneurial ventures. Finally, consistent with previous findings (Agrawal and Henderson, 2002; Cockburn, Henderson, and Stern, 2002), patent and publication measures are positively but not highly correlated.

[Insert Table 2 around here]

Table 3 shows the distribution of the liquidity events and duration by cohort. Out of the 697 firms in the sample,¹³ 74 firms went public (69 in the local stock exchange), 67 were acquired, and 4 firms had a reverse merger (i.e., acquisition of a public company in order to bypass the process of going public). It takes a firm an average of 6 years to be acquired or to go public. This average duration seems low for a biotechnology industry, and it is more likely driven by the right censoring in the sample. Indeed, 40% of the firms are founded in 2000 or after, and so are being observed less than six years, with a lower rate of events and, naturally, a lower duration. In sum, the right censoring in the data affects a considerable proportion of the observations and may introduce a significant bias in the estimation if not corrected for.

[Insert Table 3 around here]

It is difficult to know *a priori* the direction and magnitude of the bias. However, it suffices for now to compare the results of a probit and a hazard model. Because a probit model offers a straightforward correction for endogeneity, if the bias caused by the right censoring

¹² When I consider only the venture-years at the time the first round of investment is obtained, the correlation is similar.

¹³ N=697. Because in regressions I take a lag, the final number of firms used is 689.

problems is economically unimportant, then the probit specification would be chosen. Results for a probit and a Cox hazard model are presented in tables A1 (appendix) and table 4, respectively. Consider the effect of the presence of a venture capital firm. The previous literature has established a positive and economically relevant association, either through the matching process or by adding value ex post (e.g. Baum *et al.*, 2004; e.g. Megginson *et al.*, 1991). In the Cox regression models, the VC effect is significant and economically relevant across specifications, while in the probit estimation it is not (or marginally significant for some specifications), even when investor experience is not accounted for. Hence, the bias caused by the right censoring is economically significant, for which the Cox model is preferred over the probit. However, choosing between the hazard and probit frameworks requires a more careful examination of the endogeneity problem in the sample, starting with a closer look at the instrument.

The instrument should be correlated with the potentially endogenous variables, which in this case is the experience of the investors, because firms select reputed investors (Hsu, 2004), and experienced investors pick the best firms. The correlation between the foreign fund availability and the different experience variables is high, ranging between 0.25 and 0.31. In addition, the instrument should meet the exclusion restriction, i.e., investors should not enter the country anticipating the business opportunities once the observables are controlled for. Although there is not an empirical test to validate the exogeneity of an instrument, it should be the case that the future business opportunities of a country should not predict the foreign investors in such country. In an unreported regression I analyze at the country-year of analysis whether the number of foreign investors is predicted by the number of business registrations in $t+1$, controlling for the present rate of new businesses, number of local investors, GDP, market capitalization, and country fixed effects. I find that the number of business opportunities in $t+1$

does not predict the present entry of foreign investors, further supporting the exogeneity of the instrument.

The results for the Heckman probit estimation are shown in table A3. The probability of a matching is estimated on a first stage, finding that the foreign fund availability is positive and both statistically and economically significant. The presence of a venture capital firm in the incumbent and incoming syndicates decreases the likelihood of a matching, which may indicate that venture capital firms are more careful in adding partners to the syndicate than are other types of investors. Having more experienced investors (measured both as deals and IPOs) in the incoming syndicate has a positive effect. The experience of investors in the incoming syndicate has a negative, though economically insignificant, effect. In sum, the composition of the syndicate is relevant in estimating the probability of a matching. However, the coefficient estimates for the main independent variables in the second stage are remarkably similar to a probit estimation. Even if the bias caused by endogeneity is statistically significant, the magnitude is not economically relevant. Note that the problems derived from right censoring still hold in the Heckman probit estimation. In sum, in this research setting the bias caused by right censoring seems to be more prominent than the bias caused by endogeneity. Hence, a Cox hazard model is preferred.

Table 4 presents the results for a Cox model without any endogeneity correction. As described in the methods section, an ad hoc endogeneity correction is offered: table 5 presents the results of the matching equation, which are used to compute a control function that is incorporated as an additional regressor in table 6. The estimation of the matching equation in table 5 is remarkably similar to the results from the joint estimation in the Heckman probit framework (table A3), with a pseudo- R^2 of 16%.

[Insert tables 4, 5 and 6 around here]

Hypothesis 1 predicts that the IPO experience of the syndicate increases the odds of an IPO or an acquisition. The coefficient for the syndicate IPO experience is positive and significant in all models, both in the Cox and probit specifications, with and without correcting for endogeneity. In addition, the magnitude is economically relevant; accounting for the matching process, a 1% increase in the average IPO experience of the syndicate raises the hazard of an IPO or an acquisition by 0.29% (table 6, model 6.1). As pointed out before, this effect accounts for the presence of a venture capital firm and for the experience as measured by the number of deals. Using different control functions in the first stage, such as the propensity score or the inverse of the propensity score, does not alter the results qualitatively. Hypothesis 1 is, then, supported across specifications.

Hypothesis 2 predicts that the effect of investor experience is greater for investors in the first round than for investors in subsequent rounds. In fact, the coefficient for the experience of first-round investors is positive and significant, while that for investors in subsequent rounds is positive but not statistically significant from zero (model 4.2). This result holds when the probability of a matching is accounted for (model 6.2). Furthermore, the effect is economically significant: increasing the IPO experience of the first-round investors by 10% increases the hazard of an event by 1.8%. In sum, hypothesis 2 is supported.

Interestingly, the probit and Heckman probit models do not find a significant effect of first-round investors. As pointed out in the methods section, this could be an artifact of the probit model, which does not take into consideration the panel structure and does not correct for right censoring. In fact, the experience of the investors in the first round strongly predicts the experience of investors in subsequent rounds (table A2 in the appendix). Therefore, right

censoring is introducing a systematic bias in the estimation of these variables. If this is the case, the magnitude of the bias should be smaller when considering the set of firms founded before 2000, such that all firms are observed for at least 6 years. When restricting the sample to these firms, both the probit (model i.4) and the Heckman probit (model iii.4) find that the effect of first-round investors is positive and significant, while the effect of subsequent-round investors is positive but not significant. Hence, hypothesis 2 is supported both in the Cox and Heckman probit models, i.e. once the right censoring in the data is taken into account.

Hypothesis 3 predicts a negative sign for the interaction between the syndicate's IPO experience and the strength of the financial markets. Model 3 in tables 4 and 6 estimates the effect of the interaction term in a Cox model without and with correcting for the matching process, respectively, finding that the interaction term is negative and significant at the 10% level. This effect is more significant, both economically and statistically, when we estimate the competing risk model on the hazard of an IPO (instead of the hazard of both IPO and acquisitions). In unreported regressions I found similar results when considering only those ventures from countries in common law environments, or with a lower political risk, suggesting that the noise may be increasing the standard errors. To assess the robustness of this result, I considered two alternative measures for the development of financial markets: the number of new listings in the stock exchange (from the World Federation of Exchanges, available only since 1995); and turnover ratio (from the World Development Indicators). Overall, I obtained similar results. Finally, both a probit and a Heckman probit yield similar findings. When the dependent variable is the occurrence of either an IPO or an acquisition, the coefficient estimate is

negative, but not significant. However, when the dependent variable is the occurrence of an IPO,¹⁴ the coefficient is negative and highly significant.

Taken together, the evidence supports hypothesis 3. The impact of investors' experience on the hazard of a liquidity event is greater as financial markets weaken. Figure 1 depicts the interaction effect for a Cox regression model on the hazard of an IPO or an acquisition, correcting for the matching model (model 6.3, table 6). When stock exchange market capitalization is half a standard deviation below the sample mean, and syndicate experience is two standard deviations above the sample mean, a 1% increase in experience may lead to more than a 0.7% increase in the hazard of a liquidity event. This effect is positive but much lower when the stock market is more developed.

[Insert Figure 1 around here]

DISCUSSION AND CONCLUSION

The empirical evidence reported in the paper indicate that investors with past successful exit experience increase the odds that a venture will go public or will be acquired, which is one of the major performance milestones for entrepreneurial firms. This effect of investors' experience is heterogeneous across investors: at any point in time, the experience of investors that joined the firm in the first round has a greater effect on the chances of a liquidity event than the experience of investors that joined after the first round. The effect is also heterogeneous

¹⁴ In these models I consider that firms that were acquired have a 0 on the dependent variable. This makes additional assumptions, such as acquisitions being a worse outcome than IPOs. Although not necessarily true in this context, it may be a reasonable assumption here given the challenges of controlling for endogeneity in a multinomial logit framework.

across different financial environments, with the effect of investors' past successful experience at exit on the chances of a liquidity event much greater in less developed financial markets.

Consistent with previous studies, these effects are not driven solely by the matching of the most promising firms to the most capable investors (Baum *et al.*, 2004; Fitza *et al.*, 2008; Sørensen, 2007). Interestingly, after controlling for the matching process, I find a greater effect of investors' experience on the likelihood of a liquidity event compared to other studies (Sørensen, 2007). One explanation for this difference lies in the measures for the resources and reputation of investors. Consistent with other research studies (Hsu, 2004), I find that the matching process is driven partly by investors' past number of investments, which is also a proxy for size and tenure. Although size and tenure may be good a priori predictors of the reputation of an investor, they do not guarantee that the investor has accumulated valuable resources, developed the capabilities, or built a reputation in the market that will impact firm performance ex post. I find that the past experiences of the investors have no significant effect on the chances of a liquidity event; this finding is robust throughout all specifications, even when the past successful experience is not accounted for. Past successful experience, however, *is* significant both in the matching process and in the ex post influence. In consequence, further research that seeks to separate the ex ante matching from the ex post influence should incorporate a measure of the resources and reputation of investors.

The theoretical and empirical analysis in the paper speaks to previous research that analyzes the impact of investors on firm performance by incorporating a missing element, namely, the costs of realizing the potential for rents in the partnership. The relational view of the firm posits that to realize the synergies from complementary resources in an alliance, firms have to develop an organizational complementarity (Dyer *et al.*, 1998; Kale *et al.*, 2002). Qualitative

evidence supports this point, since partnering with an investor is not a guarantee that there will be synergies from complementary resources. On the contrary, some firms take the steps necessary to exploit these synergies, while others do not. Consider for instance the global network of contacts of an investor; it is only useful for firms when the investor puts in place the necessary mechanisms. In interviews, I found that some firms could not take advantage of the global network of investors,¹⁵ while in other cases investors claimed they proactively used their global network of contacts to help their portfolio firms.¹⁶ To fully realize the synergies from resources and reputation of investors, firms need to invest in organizational complementarities. In consequence, firms in the partnership will engage in such behavior only when the potential benefits exceed the potential costs.

Although I could not directly observe the development of organizational complementarities, my findings are consistent with the argument that relational rents are fully realized when firms invest in complementary assets and skills. The impact of investors' past successful exit experience is greater for those investors in the first round than for investors that joined in the second and subsequent rounds. This difference holds across the different rounds of investments, a finding that is consistent with greater incentives to develop organizational complementarities in the early rounds and, in turn, greater relational rents. It is important to note that this interpretation implicitly assumes that the immediate benefits that accrue to the firm from partnering with an investor do not vary across investors in different rounds. In other words, the immediate benefits from endorsement are assumed to be the same for an investor that joined in the first round and an investor that joined in the third round at a given point in time. This

¹⁵ Interview with the CEO of a Spanish biotechnology firm, Madrid (Spain), December 2005.

¹⁶ Interview with the director of the Madrid office of a U.S. venture capital firm, Madrid (Spain), December 2005.

assumption is consistent with an effect of endorsement by investment banks, which partner with the firm just before the IPO (Stuart *et al.*, 1999). It is important to note that this assumption is consistent with a greater endorsement effect for young firms or for firms close to the liquidity event. In sum, the impact of investors on firm performance depends not only on the ability of investors to enhance firm performance, but also on the incentives to exploit such potential for relational rents.

Finally, this paper also speaks to the implications of variations in governance structure across firms, industries, and countries (Berglof, 1990; La Porta *et al.*, 1999). I developed and tested the prediction that investors have a greater impact on firm performance in countries with less developed financial markets, partly because the market values the endorsement more than if the market were more developed. This is consistent with the finding that investors' reputation is transferable across borders (Guler and Guillen, 2007).

This paper is not without limitations. The matching model estimated in the first stage takes into account all possible matches between firms and investors; this model may be naïve, because investors tend to focus on those geographical areas that are close to them or to their partners (Sorenson *et al.*, 2001). In addition, there is not a preferred analysis in this research setting, because a probit model does not correct for the bias and a hazard model does not correct for the censoring. Despite the efforts to choose the lesser of the problems, results should be interpreted with caution. Another limitation is the extent to which results may be generalizable to industries other than biotechnology, whose capital requirements are big and whose maturity cycles are long. Nevertheless, the biotechnology industry has been used extensively both in the strategy and the entrepreneurship research (Baum *et al.*, 2004; e.g. Danzon, Epstein, and

Nicholson, 2004; Gittelman and Kogut, 2003; Gulati *et al.*, 2003). Finally, the international coverage of Venture Economics has not yet been assessed, raising issues of external validity.

The findings in this paper have implications for both entrepreneurs and managers. Entrepreneurial ventures should look for partners that have a track of past successes in the industry, and not just vast deal experience, especially in the earlier rounds where they may be capable of influencing the firm's strategy. In particular, entrepreneurs should seek reputed investors especially in the early rounds and when financial markets are less developed, because the potential impact on the firm's performance is greater. Finally, in managing their investment portfolio, investors should weight the potential synergies with the costs involved in extracting those synergies. In particular, the benefits from focusing on firms are greater in the early stages, while in later stages it may be more sensible to commit less to the relationship.

TABLE 1. Variable description and descriptive statistics

| | Variable | Description | Mean | SD | Min | Max |
|--------------------------|-----------------------------------|--|-------------|-----------|------------|------------|
| <i>SYNDICATE</i> | | | | | | |
| 1 | Syndicate IPO experience | L Syndicate avg IPO experience, C t-1 | -0.06 | 1.05 | -0.56 | 3.99 |
| 2 | Round 1 syndicate IPO experience | L First round investors avg IPO experience, C t-1 | -0.05 | 1.02 | -0.48 | 4.08 |
| 3 | Round 2+ syndicate IPO experience | L Subsequent round investors avg IPO experience, C t-1 | -0.06 | 0.95 | -0.41 | 4.30 |
| 4 | IPO exp*Stock Market Cap | Syndicate IPO experience * Stock Market Cap | 0.12 | 0.59 | -5.00 | 3.67 |
| 5 | VC | 1 if VC in the syndicate, t-1 | 0.49 | 0.50 | 0 | 1 |
| 6 | Syndicate past deals | L Syndicate avg DEAL experience, C t-1 | -0.20 | 3.02 | -2.43 | 6.78 |
| 7 | Round | Round of investment, t-1 | 1.08 | 1.47 | 0 | 15 |
| 8 | Size | # investors in the syndicate, t-1 | 1.81 | 2.63 | 0 | 23 |
| <i>VENTURE</i> | | | | | | |
| 9 | Patents/age | # patents/age, t-1 | 0.24 | 0.55 | 0 | 10 |
| 10 | Patents at founding | # patents at founding | 0.08 | 0.48 | 0 | 8 |
| 11 | Publications/age | # publications/age, t-1 | 0.47 | 1.75 | 0 | 27.33 |
| 12 | Publications at founding | # publications at founding | 0.78 | 9.28 | 0 | 175 |
| | Founded 1990-1997 | 1 if venture founded pre-bubble (reference) | 0.51 | 0.50 | 0 | 1 |
| 13 | Founded 1998-2000 | 1 if venture founded during bubble | 0.40 | 0.49 | 0 | 1 |
| 14 | Founded 2001-2004 | 1 if venture founded post-bubble | 0.10 | 0.29 | 0 | 1 |
| <i>VENTURE'S COUNTRY</i> | | | | | | |
| 15 | English language | English-language country | 0.37 | 0.48 | 0 | 1 |
| 16 | Common law | Common law country | 0.41 | 0.49 | 0 | 1 |
| 17 | GDP | L GDP per capita, C t-1 | -0.02 | 0.40 | -2.71 | 0.37 |
| 18 | Stock Market Cap | L Stock market capitalization/GDP, C t-1 | -0.04 | 0.59 | -2.82 | 1.44 |
| 19 | Polcon | Political constraints, t-1 ^a | 0.46 | 0.08 | 0 | 0.71 |
| 20 | U.S. | 1 if venture's home country is U.S. | 0.12 | 0.33 | 0 | 1 |
| 21 | Germany | 1 if venture's home country is Germany | 0.22 | 0.42 | 0 | 1 |
| 22 | U.K. | 1 if venture's home country is U.K. | 0.10 | 0.30 | 0 | 1 |
| 23 | France | 1 if venture's home country is France | 0.09 | 0.28 | 0 | 1 |
| 24 | Korea | 1 if venture's home country is Korea | 0.08 | 0.27 | 0 | 1 |
| 25 | Canada | 1 if venture's home country is Canada | 0.07 | 0.26 | 0 | 1 |
| 26 | Australia | 1 if venture's home country is Australia | 0.04 | 0.19 | 0 | 1 |
| 27 | Foreign fund availability | Foreign investors in venture's country, t-1 | 271 | 186 | 8 | 798 |

a Henisz (2002)

L X indicates the natural logarithm of X+1.

C indicates the variable was mean-centered before taking the lag, in order to reduce multicollinearity when computing the interactions.

Sample: 3,479 venture-years from both non-U.S. and U.S. data (random sample). I present non-weighted data, because for panel data, statistical packages such as STATA do not adjust by sampling weights.

TABLE 2. Correlation table

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | |
|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--|
| 2. | <i>.87</i> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. | <i>.79</i> | <i>.61</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. | <i>.27</i> | <i>.24</i> | <i>.26</i> | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. | <i>.49</i> | <i>.44</i> | <i>.38</i> | <i>.11</i> | | | | | | | | | | | | | | | | | | | | | | | |
| 6. | <i>.66</i> | <i>.58</i> | <i>.56</i> | <i>.17</i> | <i>.76</i> | | | | | | | | | | | | | | | | | | | | | | |
| 7. | <i>.56</i> | <i>.49</i> | <i>.65</i> | <i>.19</i> | <i>.58</i> | <i>.64</i> | | | | | | | | | | | | | | | | | | | | | |
| 8. | <i>.59</i> | <i>.52</i> | <i>.62</i> | <i>.15</i> | <i>.59</i> | <i>.68</i> | <i>.76</i> | | | | | | | | | | | | | | | | | | | | |
| 9. | <i>.26</i> | <i>.26</i> | <i>.23</i> | <i>.04</i> | <i>.19</i> | <i>.24</i> | <i>.27</i> | <i>.29</i> | | | | | | | | | | | | | | | | | | | |
| 10. | <i>.01</i> | <i>.03</i> | <i>-.01</i> | <i>-.01</i> | <i>.01</i> | <i>.02</i> | <i>.01</i> | <i>.02</i> | <i>.18</i> | | | | | | | | | | | | | | | | | | |
| 11. | <i>.20</i> | <i>.20</i> | <i>.18</i> | <i>-.01</i> | <i>.19</i> | <i>.19</i> | <i>.19</i> | <i>.22</i> | <i>.14</i> | <i>.04</i> | | | | | | | | | | | | | | | | | |
| 12. | <i>.03</i> | <i>.04</i> | <i>-.01</i> | <i>-.06</i> | <i>.05</i> | <i>.02</i> | <i>.00</i> | <i>-.01</i> | <i>.03</i> | <i>.27</i> | <i>.74</i> | | | | | | | | | | | | | | | | |
| 13. | <i>-.08</i> | <i>-.11</i> | <i>-.07</i> | <i>-.09</i> | <i>.08</i> | <i>-.01</i> | <i>-.02</i> | <i>.00</i> | <i>-.06</i> | <i>-.02</i> | <i>-.01</i> | <i>.01</i> | | | | | | | | | | | | | | | |
| 14. | <i>-.05</i> | <i>-.04</i> | <i>-.06</i> | <i>-.03</i> | <i>-.06</i> | <i>-.07</i> | <i>-.07</i> | <i>-.06</i> | <i>-.08</i> | <i>.04</i> | <i>-.06</i> | <i>-.02</i> | <i>-.26</i> | | | | | | | | | | | | | | |
| 15. | <i>.19</i> | <i>.19</i> | <i>.15</i> | <i>.08</i> | <i>.02</i> | <i>.12</i> | <i>.17</i> | <i>.11</i> | <i>.15</i> | <i>.08</i> | <i>.03</i> | <i>.03</i> | <i>-.13</i> | <i>.01</i> | | | | | | | | | | | | | |
| 16. | <i>.19</i> | <i>.18</i> | <i>.13</i> | <i>.07</i> | <i>.01</i> | <i>.11</i> | <i>.15</i> | <i>.10</i> | <i>.17</i> | <i>.08</i> | <i>.03</i> | <i>.02</i> | <i>-.12</i> | <i>.01</i> | <i>.92</i> | | | | | | | | | | | | |
| 17. | <i>.19</i> | <i>.16</i> | <i>.17</i> | <i>-.07</i> | <i>.17</i> | <i>.19</i> | <i>.18</i> | <i>.17</i> | <i>.12</i> | <i>.07</i> | <i>.04</i> | <i>-.03</i> | <i>.00</i> | <i>.09</i> | <i>.11</i> | <i>.08</i> | | | | | | | | | | | |
| 18. | <i>.19</i> | <i>.17</i> | <i>.16</i> | <i>-.08</i> | <i>.09</i> | <i>.14</i> | <i>.17</i> | <i>.13</i> | <i>.16</i> | <i>.05</i> | <i>.03</i> | <i>-.02</i> | <i>.03</i> | <i>.05</i> | <i>.53</i> | <i>.48</i> | <i>.43</i> | | | | | | | | | | |
| 19. | <i>-.14</i> | <i>-.15</i> | <i>-.10</i> | <i>-.11</i> | <i>-.05</i> | <i>-.10</i> | <i>-.09</i> | <i>-.04</i> | <i>-.04</i> | <i>-.02</i> | <i>-.05</i> | <i>-.04</i> | <i>.02</i> | <i>.07</i> | <i>-.39</i> | <i>-.27</i> | <i>.01</i> | <i>-.15</i> | | | | | | | | | |
| 20. | <i>.34</i> | <i>.32</i> | <i>.29</i> | <i>.21</i> | <i>.16</i> | <i>.26</i> | <i>.31</i> | <i>.20</i> | <i>.13</i> | <i>.12</i> | <i>.01</i> | <i>.03</i> | <i>-.11</i> | <i>-.01</i> | <i>.49</i> | <i>.46</i> | <i>.30</i> | <i>.33</i> | <i>-.26</i> | | | | | | | | |
| 21. | <i>-.06</i> | <i>-.08</i> | <i>-.05</i> | <i>-.01</i> | <i>.11</i> | <i>.01</i> | <i>-.04</i> | <i>-.02</i> | <i>-.10</i> | <i>-.02</i> | <i>.00</i> | <i>-.04</i> | <i>.08</i> | <i>-.09</i> | <i>-.41</i> | <i>-.44</i> | <i>.05</i> | <i>-.40</i> | <i>.07</i> | <i>-.20</i> | | | | | | | |
| 22. | <i>.08</i> | <i>.06</i> | <i>.04</i> | <i>.00</i> | <i>.00</i> | <i>.03</i> | <i>.01</i> | <i>.02</i> | <i>.05</i> | <i>-.01</i> | <i>.10</i> | <i>.05</i> | <i>-.04</i> | <i>-.01</i> | <i>.44</i> | <i>.41</i> | <i>.08</i> | <i>.41</i> | <i>-.40</i> | <i>-.13</i> | <i>-.18</i> | | | | | | |
| 23. | <i>.05</i> | <i>.07</i> | <i>.06</i> | <i>-.05</i> | <i>-.03</i> | <i>.02</i> | <i>.00</i> | <i>.04</i> | <i>.00</i> | <i>-.04</i> | <i>-.01</i> | <i>-.02</i> | <i>-.04</i> | <i>.03</i> | <i>-.24</i> | <i>-.26</i> | <i>.04</i> | <i>-.02</i> | <i>-.14</i> | <i>-.12</i> | <i>-.17</i> | <i>-.11</i> | | | | | |
| 24. | <i>-.14</i> | <i>-.13</i> | <i>-.10</i> | <i>.09</i> | <i>.00</i> | <i>-.04</i> | <i>-.05</i> | <i>-.06</i> | <i>-.08</i> | <i>-.05</i> | <i>-.06</i> | <i>-.02</i> | <i>.17</i> | <i>-.08</i> | <i>-.23</i> | <i>-.25</i> | <i>-.29</i> | <i>-.26</i> | <i>-.14</i> | <i>-.11</i> | <i>-.16</i> | <i>-.10</i> | <i>-.09</i> | | | | |
| 25. | <i>-.05</i> | <i>-.05</i> | <i>-.05</i> | <i>-.07</i> | <i>-.06</i> | <i>-.05</i> | <i>-.05</i> | <i>.00</i> | <i>.13</i> | <i>.05</i> | <i>-.03</i> | <i>-.02</i> | <i>-.01</i> | <i>-.01</i> | <i>.37</i> | <i>.34</i> | <i>.07</i> | <i>.11</i> | <i>.02</i> | <i>-.11</i> | <i>-.15</i> | <i>-.09</i> | <i>-.09</i> | <i>-.08</i> | | | |
| 26. | <i>-.09</i> | <i>-.07</i> | <i>-.06</i> | <i>-.07</i> | <i>-.08</i> | <i>-.06</i> | <i>.00</i> | <i>-.04</i> | <i>-.05</i> | <i>-.03</i> | <i>-.02</i> | <i>-.02</i> | <i>-.03</i> | <i>.09</i> | <i>.25</i> | <i>.23</i> | <i>.03</i> | <i>.08</i> | <i>.14</i> | <i>-.07</i> | <i>-.10</i> | <i>-.07</i> | <i>-.06</i> | <i>-.06</i> | <i>-.05</i> | | |
| 27. | <i>.31</i> | <i>.25</i> | <i>.28</i> | <i>.12</i> | <i>.26</i> | <i>.29</i> | <i>.31</i> | <i>.29</i> | <i>.16</i> | <i>.04</i> | <i>.07</i> | <i>-.02</i> | <i>.11</i> | <i>.04</i> | <i>.48</i> | <i>.44</i> | <i>.39</i> | <i>.51</i> | <i>-.38</i> | <i>.43</i> | <i>.07</i> | <i>.39</i> | <i>.02</i> | <i>-.30</i> | <i>.13</i> | <i>-.19</i> | |

Sample: 3,479 venture-years from both non-U.S. and U.S. data (random sample). I present non-weighted data, because for panel data statistical packages such as STATA do not adjust by sampling weights.

Correlations in italics are significant at the 5% level.

| Founded in | # Firms | # Firm liquidity events | | | | Avg age (years) at time of event | | | |
|------------|---------|-------------------------|--------|-----|----|----------------------------------|--------|-----|-----|
| | | Censor | Acquis | IPO | RM | Censor | Acquis | IPO | RM |
| 1990 | 21 | 12 | 4 | 5 | | 14 | 12.5 | 7.8 | |
| 1991 | 7 | 4 | | 3 | | 14 | 5.7 | | |
| 1992 | 20 | 10 | 5 | 5 | | 13 | 6.6 | 6.4 | |
| 1993 | 30 | 13 | 4 | 12 | 1 | 11.9 | 7.3 | 5.6 | 12 |
| 1994 | 21 | 9 | 1 | 11 | | 10.8 | 7 | 8 | |
| 1995 | 19 | 12 | 3 | 3 | 1 | 9.9 | 7.7 | 6.7 | 7 |
| 1996 | 48 | 27 | 11 | 10 | | 8.8 | 5.2 | 4.2 | |
| 1997 | 69 | 55 | 6 | 8 | | 7.95 | 6.3 | 5.5 | |
| 1998 | 83 | 68 | 9 | 6 | | 6.8 | 5.2 | 5.3 | |
| 1999 | 91 | 79 | 5 | 5 | 2 | 6 | 4.4 | 4 | 4 |
| 2000 | 125 | 111 | 9 | 5 | | 5 | 4.2 | 4.6 | |
| 2001 | 79 | 69 | 9 | 1 | | 4 | 3.2 | 4 | |
| 2002 | 40 | 40 | | | | 3 | | | |
| 2003 | 25 | 24 | 1 | | | 2 | 2 | | |
| 2004 | 19 | 18 | | | | 1 | | | |
| Overall | 697 | 551 | 67 | 74 | 4 | 6.1 | 6 | 5.7 | 6.8 |

Censor=Censored observation
Acquis=Acquisition
IPO=Initial Public Offering
RM=Reverse Merger
N= 697 firms. In regressions, because of the lag, the number drops to 687 firms.

| TABLE 4. Cox model on the hazard of a liquidity event (IPO and acquisition) | | | | | | |
|--|--------------------------------|---------------------|-------------------|-------------------|--------------------|------------------|
| Event: IPO and Acquisition (I+A), or IPO | | I+A | I+A | I+A | IPO Only | |
| | | (4.1) | (4.2) | (4.3) | (4.4) | |
| SYNDICATE | Synd IPO experience (H1) | 0.29*** (0.09) | 0.33*** (0.09) | | 0.47*** (0.13) | |
| | IPO experience*Market Cap (H3) | | -0.20* (0.12) | | -0.44*** (0.16) | |
| | Round 1 synd IPO exper (H2) | | | 0.18** (0.09) | | |
| | Round 2+ synd IPO exper (H2) | | | 0.08 (0.10) | | |
| | VC | 0.83*** (0.29) | 0.83*** (0.28) | 0.87*** (0.29) | 0.84** (0.41) | |
| | Syndicate past deals | -0.03 (0.05) | -0.04 (0.05) | -0.02 (0.04) | -0.11 (0.07) | |
| | Round | -0.00 (0.06) | 0.00 (0.06) | -0.01 (0.06) | -0.02 (0.10) | |
| | Size | 0.06* (0.03) | 0.06* (0.03) | 0.06* (0.03) | 0.12*** (0.04) | |
| | FIRM | Patents/age | 0.21** (0.10) | 0.21** (0.10) | 0.20* (0.10) | 0.25** (0.13) |
| | | Patents at founding | 0.46*** (0.16) | 0.46*** (0.16) | 0.45*** (0.16) | 0.59** (0.28) |
| Publications/age | | 0.08** (0.04) | 0.09** (0.04) | 0.08* (0.04) | 0.10* (0.05) | |
| Publications at founding | | -0.03* (0.02) | -0.03* (0.02) | -0.03* (0.02) | -0.23 (0.33) | |
| Founded 1998-2000 | | 0.29 (0.22) | 0.28 (0.22) | 0.31 (0.22) | -0.34 (0.32) | |
| Founded 2001-2004 | | 1.21*** (0.38) | 1.22*** (0.38) | 1.24*** (0.38) | -0.74 (1.04) | |
| COUNTRY | | English language | -0.91 (1.20) | -0.96 (1.23) | -0.99 (1.19) | -2.59* (1.50) |
| | Common law | -0.63 (0.63) | -0.67 (0.63) | -0.60 (0.63) | -0.25 (0.67) | |
| | GDP | -0.62 (0.43) | -0.72 (0.45) | -0.62 (0.43) | -1.62*** (0.58) | |
| | Stock market capitalization | 0.19 (0.24) | 0.28 (0.25) | 0.19 (0.24) | 0.25 (0.36) | |
| | Polcon | -0.06 (1.72) | -0.07 (1.73) | -0.06 (1.73) | 0.51 (2.00) | |
| | Country dummies | Yes | Yes | Yes | Yes | |
| Observations | | 3479 | 3479 | 3479 | 3479 | |

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Country dummies for U.S., Germany, U.K., France, Korea, Canada, Australia.

Sample: 3,479 venture-years from both non-U.S. and U.S. data (random sample). I present non-weighted data, because for panel data, statistical packages such as STATA do not adjust by sampling weights.

TABLE 5. Matching equation: probit on the probability of matching

| | | (5.1) |
|---------------------|------------------------------|-----------------------|
| INSTRUMENT | Foreign funding availability | 0.33*** (0.03) |
| INCOMING SYNDICATE | New synd: VC | -0.94*** (0.02) |
| | New synd: IPO experience | -0.00*** (0.00) |
| INCUMBENT SYNDICATE | Syndicate past deals | 0.00* (0.00) |
| | Synd IPO experience | 0.00*** (0.00) |
| | VC | 0.05*** (0.00) |
| | Round | 0.00** (0.00) |
| | Size | 0.00** (0.00) |
| FIRM | Patents/age | -0.00*** (0.00) |
| | Patents at founding | 0.00 (0.00) |
| | Publications/age | -0.00*** (0.00) |
| | Publications at founding | 0.00 (0.00) |
| COUNTRY | English language | 18.60*** (2.21) |
| | Common law | 88.82*** (9.10) |
| | GDP | -17.10*** (4.80) |
| | Stock market capitalization | 0.27 (0.56) |
| | Polcon | -8.84*** (2.60) |
| | Constant | -114.98*** (11.20) |
| | | Country-year dummies |
| | Observations | 605,193 |
| | Pseudo R ² | 0.16 |

Standard errors in parentheses.
 *** p<0.01, ** p<0.05, * p<0.1

| TABLE 6. Cox model on the hazard of a liquidity event, correcting for matching equation | | | | | | |
|--|--------------------------------|---------------------|-------------------|-------------------|--------------------|-------------------|
| Event: IPO and Acquisition (I+A), or IPO | | I+A | I+A | I+A | IPO | |
| | | (6.1) | (6.2) | (6.3) | (6.4) | |
| SYNDICATE | Synd IPO experience (H1) | 0.29*** (0.09) | | 0.33*** (0.09) | 0.47*** (0.13) | |
| | IPO experience*Market Cap (H3) | | | -0.21* (0.12) | -0.48*** (0.16) | |
| | Round 1 synd IPO exper (H2) | | 0.18** (0.09) | | | |
| | Round 2+ synd IPO exper (H2) | | 0.08 (0.10) | | | |
| | VC | 0.85*** (0.29) | 0.89*** (0.29) | 0.85*** (0.29) | 0.93** (0.41) | |
| | Syndicate past deals | -0.03 (0.05) | -0.02 (0.04) | -0.04 (0.05) | -0.11 (0.07) | |
| | Round | -0.00 (0.06) | -0.01 (0.06) | 0.01 (0.06) | -0.01 (0.10) | |
| | Size | 0.06* (0.03) | 0.06* (0.03) | 0.06* (0.03) | 0.13*** (0.04) | |
| | FIRM | Patents/age | 0.21** (0.10) | 0.20* (0.10) | 0.21** (0.10) | 0.25* (0.13) |
| | | Patents at founding | 0.46*** (0.16) | 0.45*** (0.16) | 0.46*** (0.16) | 0.60*** (0.28) |
| Publications/age | | 0.08** (0.04) | 0.08* (0.04) | 0.08** (0.04) | 0.10* (0.05) | |
| Publications at founding | | -0.03* (0.02) | -0.03* (0.02) | -0.03* (0.02) | -0.24 (0.33) | |
| Founded 1998-2000 | | 0.31 (0.22) | 0.33 (0.22) | 0.30 (0.22) | -0.27 (0.33) | |
| Founded 2001-2004 | | 1.23*** (0.39) | 1.26*** (0.38) | 1.25*** (0.39) | -0.66 (1.04) | |
| COUNTRY | | English language | -0.90 (1.20) | -0.98 (1.20) | -0.95 (1.23) | -2.65* (1.54) |
| | Common law | -0.61 (0.63) | -0.58 (0.63) | -0.64 (0.63) | -0.19 (0.67) | |
| | GDP | -0.60 (0.44) | -0.61 (0.43) | -0.71 (0.46) | -1.62*** (0.60) | |
| | Stock market capitalization | 0.22 (0.26) | 0.23 (0.26) | 0.33 (0.26) | 0.43 (0.38) | |
| | Polcon | -0.13 (1.74) | -0.12 (1.74) | -0.17 (1.75) | 0.21 (2.05) | |
| | Country dummies | Yes | Yes | Yes | Yes | |
| CONTROL F. | Inverse Mill's ratio | -1.31 (2.95) | -1.27 (2.96) | -1.84 (2.94) | -4.77 (3.34) | |
| Observations | | 3479 | 3479 | 3479 | 3479 | |

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Country dummies for U.S., Germany, U.K., France, Korea, Canada, Australia.

Control function: inverse Mill's ratio from matching equation (table 5). Results are robust to using propensity scores and inverse propensity scores.

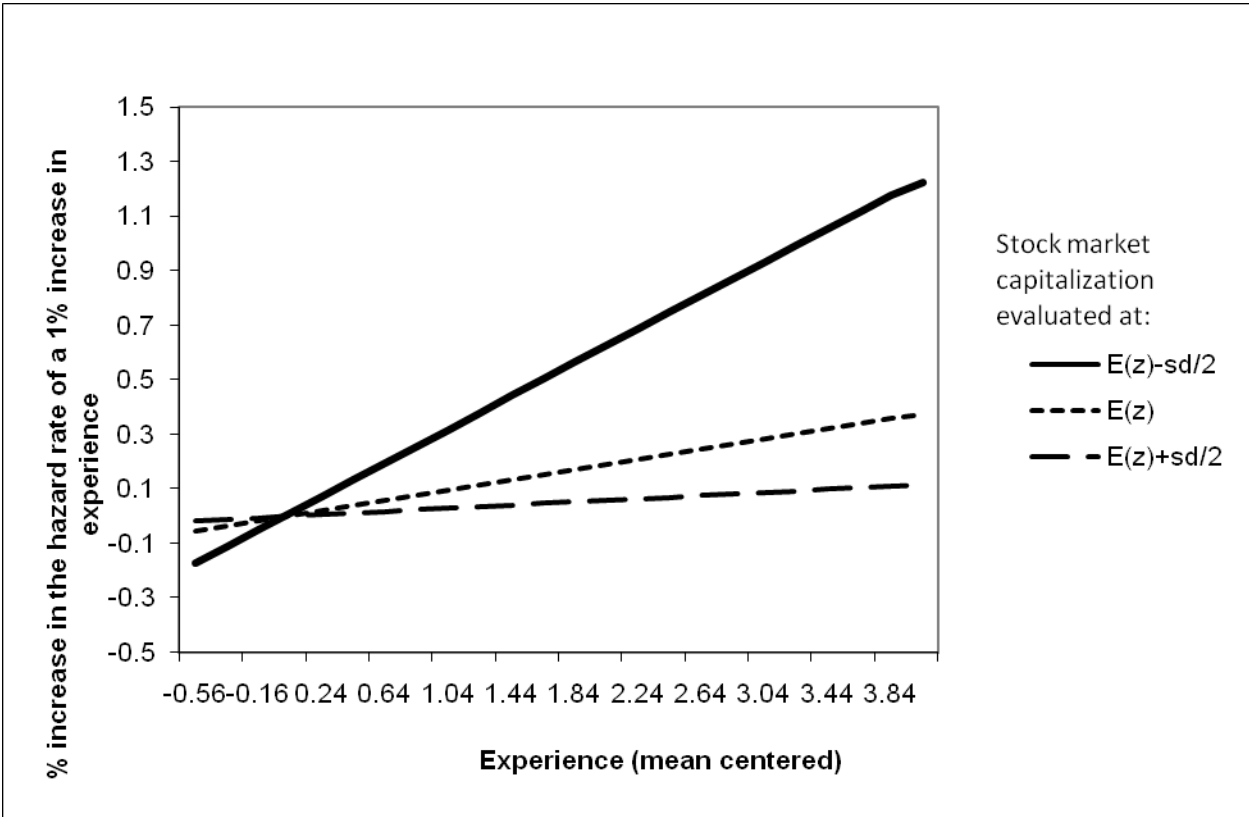


Figure 1. Interaction of syndicate IPO experience and stock market capitalization (H3), based on Cox two-stage estimation (model 6.3)

Appendix. Robustness analyses

Sample of U.S. firms. Out of the 848 U.S. firms identified in Venture Economics, I randomly sampled 85 firms. In addition, I collected a sample of 85 firms clustered by firm size (as proxied by the number of rounds of investment) and firm region, over-sampling small firms and under-sampling California and Massachusetts, replacing with a firm in the same cluster when necessary. Results were similar across all specifications. Nevertheless, I prefer to show the random sample results, because there is no a clear way to deal with sampling weights using longitudinal data.

Only VC-backed data. Because most of the literature uses only VC-backed data, I repeat all the analyses using only those ventures that obtain venture capital funding at some point in time. Results are confirmed for hypothesis 1 and 2; however, the interaction of the development of capital markets and the IPO experience of the investors is not significant in most specifications. This may be a consequence of selection, because venture capital firms prefer not to invest in countries with less developed financial institutions (Guler and Guillen, 2006), hence making the estimation of this effect more difficult.

Measures of experience. The paper aggregates the investors to the level of the syndicate by using the average, which is the more parsimonious way. However, one could argue that it is not the average but the maximum of the experience in the syndicate that really matters. In the sample the correlation tends to be high between the two, because the number of venture capital firms in each syndicate is on average small and because firms tend to syndicate with similar peers. Nonetheless, the main results of the paper hold when using the maximum.

Results are presented for the general experience of investors, regardless of the industry. When I include only the experience in the industry, results hold. In addition, results hold when

instead of the count of IPOs the experience measure is computed as the percentage of IPOs relative to the number of deals.

Finally, earlier versions of the paper used a dummy transformation of experience instead of the log. Results were generally the same, but the log was preferred because it is richer in information. It is important to note that a transformation is necessary, because there is a high spike in the zero that distorts the estimation based on average effects that most models use.

Measures of firm quality. The main results of the paper hold when different measures of patents and publications are used, such as a mere count of patents and of publications.

Nevertheless, a rate of patents and publications was preferred to a simple count, to favor a flow measure rather than a stock measure. An alternative would be to use only the number of patents or publications obtained that same year; however, because the number of patents tends to be very low, this variable had too many zeros and provided less information.

Characteristics of the investment syndicate. In unreported regressions, I included other characteristics of the investment syndicate, such as the number of VC firms in the syndicate, presence of a local venture capital firm or an international venture capital firm, presence of a corporate venture capitalist in the syndicate, or presence of a financial institution. The main results of the paper were unaltered. I chose not to include these characteristics, to keep the reference category simpler.

Matching equation. For robustness analyses I considered different specifications of the matching equation, such as including an interaction of the syndicate experience and the firm's patents to capture the cases in which the best investors and best firms are matched. Including firm fixed effects does not alter the main results; however, some observations were lost, so I have chosen to exclude them.

Instrument and control function. Results were repeated using different variants of the instrument, such as the number of investors in the country-year (regardless of the country of origin), number of investors that invested in biotechnology in that country-year (instead of in any sector), and different transformations of the current instrument (such as the log), with the same qualitative results.

I have presented the results using the inverse Mill's ratio as a control function. Nevertheless, results are robust when using the propensity score (i.e., the probability of a matching) or the inverse propensity score. This gives a greater weight to those observations that were less likely to match, emphasizing the off-diagonal cases (i.e., promising firm–non-reputed investor; non-promising-firm–reputed investor).

Appendix. Probit and Heckman probit tables.

| TABLE A1. Probit model on the probability of | | | | | | | |
|---|--------------------------------|---------------------|--------------------|--------------------|--------------------|--------------------|-----------------|
| Firms founded between 1990 and... | | 2004 | 2004 | 2004 | 1999 | 2004 | |
| Event: IPO and Acquisition (I+A), or IPO. | | I+A | I+A | I+A | I+A | IPO | |
| | | (i.1) | (i.2) | (i.3) | (i.4) | (i.5) | |
| SYNDICATE | Synd IPO experience (H1) | 0.21*** (0.07) | | 0.22*** (0.07) | | 0.15** (0.07) | |
| | IPO experience*Market Cap (H3) | | | -0.10 (0.08) | | -0.19*** (0.07) | |
| | Round 1 synd IPO exper (H2) | | 0.10 (0.07) | | 0.16** (0.08) | | |
| | Round 2+ synd IPO exper (H2) | | 0.11 (0.07) | | 0.08 (0.07) | | |
| | VC | 0.05 (0.13) | 0.09 (0.14) | 0.04 (0.13) | 0.09 (0.16) | 0.33* (0.18) | |
| | Syndicate past deals | -0.00 (0.03) | 0.01 (0.03) | -0.00 (0.03) | 0.00 (0.03) | -0.04 (0.03) | |
| | Round | -0.03 (0.06) | -0.05 (0.06) | -0.03 (0.06) | -0.06 (0.06) | 0.01 (0.05) | |
| | Size | 0.01 (0.03) | 0.01 (0.03) | 0.01 (0.03) | 0.01 (0.03) | 0.06** (0.03) | |
| | FIRM | Patents/age | 0.05 (0.11) | 0.06 (0.11) | 0.05 (0.11) | 0.07 (0.12) | 0.14* (0.08) |
| | | Patents at founding | 0.30** (0.13) | 0.29** (0.13) | 0.30** (0.13) | 0.25 (0.15) | 0.15 (0.15) |
| Publications/age | | 0.06 (0.05) | 0.06 (0.05) | 0.06 (0.05) | 0.05 (0.05) | 0.09*** (0.03) | |
| Publications at founding | | -0.02 (0.01) | -0.02 (0.01) | -0.02 (0.01) | -0.02 (0.01) | -0.06 (0.13) | |
| Founded 1998-2000 | | -0.77*** (0.14) | -0.77*** (0.14) | -0.78*** (0.14) | -0.71*** (0.16) | -0.43*** (0.15) | |
| Founded 2001-2004 | | -1.13*** (0.22) | -1.12*** (0.22) | -1.13*** (0.22) | | -0.86** (0.36) | |
| Age ^a | | -0.08*** (0.03) | -0.09*** (0.03) | -0.09*** (0.03) | -0.08*** (0.03) | -0.01 (0.02) | |
| COUNTRY | English language | -0.38 (0.59) | -0.42 (0.59) | -0.38 (0.59) | -0.30 (0.67) | -1.04* (0.60) | |
| | Common law | -0.44 (0.39) | -0.41 (0.39) | -0.45 (0.39) | -0.53 (0.47) | -0.12 (0.29) | |
| | GDP | -0.26 (0.24) | -0.27 (0.24) | -0.29 (0.24) | -0.26 (0.27) | -0.73*** (0.22) | |
| | Stock Market Capitalization | -0.17 (0.15) | -0.17 (0.15) | -0.18 (0.14) | -0.21 (0.15) | 0.06 (0.13) | |
| | Polcon | 0.82 (0.82) | 0.78 (0.82) | 0.84 (0.82) | 0.70 (0.94) | 1.07 (0.94) | |
| | Constant | -0.76* (0.45) | -0.73 (0.45) | -0.76* (0.45) | -0.70 (0.52) | -2.93*** (0.54) | |
| Country dummies | Yes | Yes | Yes | Yes | Yes | | |
| Observations | 3479 | 3479 | 3479 | 2657 | 3479 | | |

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

^a I also control for age because, unlike a hazard model, the probit model does not account for duration.

TABLE A2. Round 2+ syndicate partners experience (panel f.e.)

| D.V. Round 2+ synd IPO exp | | (6) |
|--|-----------------------------|--------------------|
| SYNDICATE | Round 1 synd IPO experience | 0.38*** (0.02) |
| | VC | -0.12*** (0.04) |
| | Synd past deals | 0.03*** (0.01) |
| | Round | 0.04*** (0.02) |
| | Size | 0.05*** (0.01) |
| | FIRM | Patents/age |
| | Patents at founding | 0.00 (0.00) |
| | Publications/age | 0.06*** (0.01) |
| | Publications at founding | 0.00 (0.00) |
| | Age | 0.05*** (0.01) |
| COUNTRY | English language | 0.00 (0.00) |
| | Common law | 0.00 (0.00) |
| | GDP | -1.31*** (0.34) |
| | Stock Market Capitalization | -0.06 (0.05) |
| | Polcon | -0.59** (0.28) |
| | Constant | -0.04 (0.15) |
| | Year dummies | Yes |
| | Country dummies | Yes |
| | Observations | 3479 |
| | Pseudo R ² | 0.34 |
| Robust standard errors in parentheses. | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | |

| TABLE A3. Heckman model on the probability of event, estimating the prob(matching) on a first stage | | | | | | | |
|--|--------------------------------|---------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | (iii.1) | (iii.2) | (iii.3) | (iii.4) | (iii.5) | |
| Firms founded between 1990 and... | | 2004 | 2004 | 2004 | 1999 | 2004 | |
| 2nd STAGE. Event: IPO and Acquisition (I+A), or | | I+A | I+A | I+A | I+A | IPO | |
| SYNDICATE | Synd IPO experience (H1) | 0.21*** (0.07) | | 0.22*** (0.07) | | 0.15** (0.07) | |
| | IPO experience*Market Cap (H3) | | | -0.10 (0.08) | | -0.19*** (0.07) | |
| | Round 1 synd IPO exper (H2) | | 0.10 (0.07) | | 0.16** (0.08) | | |
| | Round 2+ synd IPO exper (H2) | | 0.11 (0.07) | | 0.08 (0.07) | | |
| | VC | 0.05 (0.13) | 0.10 (0.13) | 0.04 (0.13) | 0.10 (0.16) | 0.33* (0.18) | |
| | Synd deals | -0.00 (0.03) | 0.01 (0.03) | -0.00 (0.03) | 0.00 (0.03) | -0.04 (0.03) | |
| | Round | -0.03 (0.06) | -0.05 (0.06) | -0.03 (0.06) | -0.06 (0.06) | 0.01 (0.05) | |
| | Size | 0.01 (0.03) | 0.01 (0.03) | 0.01 (0.03) | 0.01 (0.03) | 0.06** (0.03) | |
| | FIRM | Patents/age | 0.06 (0.11) | 0.06 (0.11) | 0.05 (0.11) | 0.07 (0.12) | 0.14* (0.08) |
| | | Patents at founding | 0.30** (0.13) | 0.29** (0.13) | 0.30** (0.13) | 0.25* (0.15) | 0.15 (0.15) |
| Publications/age | | 0.06 (0.05) | 0.06 (0.05) | 0.06 (0.05) | 0.06 (0.05) | 0.09*** (0.03) | |
| Publications at founding | | -0.02 (0.01) | -0.02 (0.01) | -0.02 (0.01) | -0.02 (0.01) | -0.06 (0.13) | |
| Founded 1998-2000 | | -0.75*** (0.15) | -0.75*** (0.15) | -0.76*** (0.15) | -0.68*** (0.16) | -0.43*** (0.15) | |
| Founded 2001-2004 | | -1.11*** (0.23) | -1.10*** (0.23) | -1.10*** (0.23) | | -0.86** (0.35) | |
| Age | | -0.08*** (0.03) | -0.08*** (0.03) | -0.08*** (0.03) | -0.08** (0.03) | -0.01 (0.02) | |
| COUNTRY | | English language | -0.38 (0.59) | -0.42 (0.59) | -0.38 (0.59) | -0.30 (0.67) | -1.04* (0.60) |
| | | Common law | -0.43 (0.39) | -0.41 (0.38) | -0.45 (0.39) | -0.52 (0.46) | -0.12 (0.29) |
| | | GDP | -0.26 (0.24) | -0.26 (0.24) | -0.28 (0.24) | -0.25 (0.26) | -0.73*** (0.22) |
| | Stock Market Capitalization | -0.16 (0.15) | -0.16 (0.15) | -0.16 (0.15) | -0.19 (0.16) | 0.06 (0.13) | |
| | Polcon | 0.80 (0.82) | 0.77 (0.82) | 0.83 (0.82) | 0.66 (0.94) | 1.07 (0.94) | |
| | Constant | -0.66 (0.48) | -0.65 (0.47) | -0.64 (0.48) | -0.56 (0.55) | -2.94*** (0.66) | |
| 1st STAGE. Prob(matching) | | Yes | Yes | Yes | Yes | Yes | |
| INSTRUMENT | Foreign funding availability | 0.15*** (0.04) | 0.15*** (0.04) | 0.15*** (0.04) | 0.15*** (0.04) | 0.15*** (0.04) | |
| MATCHED SYND | VC in matched syndicate | -0.92*** (0.02) | -0.92*** (0.02) | -0.92*** (0.02) | -0.97*** (0.02) | -0.92*** (0.02) | |
| | Matched synd IPO experience | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00*** | |

| | | | | | | |
|--------------|-----------------------------|-----------|-----------|-----------|-----------|-----------|
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| PRESENT SYND | Syndicate past deals | 0.01*** | 0.01*** | 0.01*** | 0.01*** | 0.01*** |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| | Syndicate IPO experience | 0.01*** | 0.01*** | 0.01*** | 0.01*** | 0.01*** |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| | VC | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| | Round | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| | Size | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00*** |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| FIRM | Patents/age | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| | Patents at founding | 0.00 | 0.00 | 0.00 | 0.01* | 0.00 |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| | Publications/age | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| | Publications at founding | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| | Firm age | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00*** |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| COUNTRY | English language | -0.36 | -0.43 | -0.30 | -0.22 | -0.71 |
| | | (12.10) | (12.10) | (12.10) | (12.00) | (11.92) |
| | Common law | 37.77*** | 37.71*** | 37.82*** | 37.46*** | 37.47*** |
| | | (9.96) | (9.95) | (9.97) | (9.90) | (9.76) |
| | GDP | -2.80 | -2.83 | -2.78 | -2.73 | -2.93 |
| | | (4.63) | (4.63) | (4.63) | (4.59) | (4.56) |
| | Stock Market Capitalization | -2.18*** | -2.18*** | -2.18*** | -2.15*** | -2.18*** |
| | | (0.16) | (0.16) | (0.16) | (0.16) | (0.15) |
| | Polcon | 6.48*** | 6.48*** | 6.48*** | 6.40*** | 6.47*** |
| | | (0.75) | (0.74) | (0.75) | (0.74) | (0.74) |
| | Constant | -58.23*** | -58.16*** | -58.30*** | -57.71*** | -57.88*** |
| | | (13.32) | (13.29) | (13.32) | (13.24) | (13.04) |
| | Country-year f.e. | Yes | Yes | Yes | Yes | Yes |
| ARTHRO | | -0.04 | -0.04 | -0.05 | -0.06 | 0.00 |
| | | (0.09) | (0.09) | (0.09) | (0.10) | (0.13) |
| | Observations | 527,567 | 527,567 | 527,567 | 372,275 | 527,567 |

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Heckprob command. Maximum likelihood estimation of probit on the probability of matching and probit on the probability of event.

Model (5) treats acquisitions as 0 (i.e., 0 if censored or acquired, 1 if IPO).

Model (4) includes only those firms founded in 1999 or earlier.

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