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Mitigation of Moral Hazard and Adverse Selection in Venture Capital Financing:

The Influence of the Country's Institutional Setting

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Abstract

A venture capitalist (VC) needs to trade off benefits and costs when attempting to mitigate agency problems in their investor-investee relationship. We argue that signals of ventures complement the VC's capacity to screen and conduct a due diligence during the pre-investment phase, but its attractiveness may diminish in institutional settings supporting greater transparency. Similarly, whereas a VC may opt for contractual covenants to curb potential opportunism by ventures in the post-investment phase, this may only be effective in settings supportive of shareholder rights enforcement. Using an international sample of VC contracts, our study finds broad support for these conjectures. It delineates theoretical and practical implications for how investors can best deploy their capital in different institutional settings whilst nurturing their relationships with entrepreneurs.

INTRODUCTION

VC governance structures are designed to address information asymmetry problems in the financial intermediation process between venture capital (VC) investors and entrepreneurs (representing new ventures in need of funding) (e.g. Jensen and Meckling, 1976). Governance structures, however, tend to differ from country to country, mainly because of the impact of legal and institutional differences (e.g. Cumming, Schmidt and Walz, 2010). Our study examines these aspects empirically, i.e., the extent to which agency conflicts between entrepreneurs and VCs are resolved by the employment of mitigating mechanisms, and how the use of these mechanisms varies across different institutional settings in our multi-country sample.

Extant empirical research on these topics exists, but has so far been either descriptive in nature (e.g. Kaplan and Strömberg, 2003; Norton and Tenenbaum 1992, 1993) or has only focused on the positive impact of certain practices such as security design and syndication (e.g. Cumming, 2006), board controls (e.g. Cumming et al., 2010), or on how these practices are used to address agency issues (e.g. Bellavitis, Filatotchev and Souitaris, 2017; Manigart, et al., 2006). Previous research, whilst mainly emphasizing the advantages of these mechanisms, has ignored the effect of the associated costs. Recent work on this topic has also relied more within rather than cross country samples (e.g. Straling, Wijbenga and Dietz, 2011).

This study provides a trade-off framework for the use of mitigating mechanisms in different contexts. Our analysis builds on this literature by examining the extent to which effective signaling mechanisms (specifically founders' education and venture patents) are employed to address adverse selection. We further investigate the use of control rights

(specifically board rights and veto rights) in mitigating moral hazard and how these practices differ across different VC markets and institutional environments.

In the pre-investment phase, VCs begin to address information asymmetries with screening and due diligence procedures. Prospective entrepreneurs can mitigate these asymmetries with complementary signaling efforts, which will ideally separate high-quality ventures from their poor-quality counterparts (e.g. Connelly et al., 2011; Mas-Colell, Whinston and Green, 1995). A separate stream of research has also established that signaling by prospective entrepreneurs is effective in attracting investors in the presence of adverse selection (e.g. Connelly et al., 2011). Previous works of Cumming, Schmidt and Walz (2010) and La Porta et al. (1998) have studied the effect of corporate transparency laws on the use and impact of screening and due diligence mechanisms. Jia (2015) investigated the relationship between banking regulations and VC control rights, considering the impact of information asymmetries. Other studies (e.g. Nahata, Hazarika and Tandon, 2014; Schwienbacher, 2008) have evidenced links between VC activity, practices as well as performance, and institutional differences. However, prior research has so far failed to investigate how cross-country institutional differences affect the use of mitigating mechanisms (e.g. signaling) in the presence of adverse selection. One objective of this paper is to fill this gap. To do so, we examine how cross-country institutional differences affect the interaction between the perceived degree of adverse selection and the importance assigned to signals from prospective entrepreneurs.

In the post-investment phase, VCs utilize mechanisms affecting the allocation of cash flow and control rights to protect themselves from the entrepreneurs' opportunistic behavior (e.g. Hart, 2001). A large stream of literature explains how VCs can mitigate these risks by employing mechanisms that align the entrepreneurs' interests with those of investors to ensure the optimal deployment of resources and the realization of maximum financial returns

(Amit, Brander, and Zott, 1998; Amit, Glosten, and Muller, 1990; Bohren, 1998; Drover, Wood, and Payne, 2014). Moral hazard varies across countries depending on the extent to which shareholder rights are protected and enforced by national laws (e.g. Cumming, Schmidt and Walz, 2010; La Porta et al., 1998; LaPorta et al., 2000). Recent studies on international differences about control rights of VC investors have focused on board rights at the expense of other important provisions such as veto rights (Burchardt et al., 2016; Cumming and Johan, 2009). Our study builds on these contributions and examines the extent to which agency costs are mitigated by a broad range of different control rights while considering cross-country legal differences.

A key strength of our study is its multi-country nature and the richness of the data employed for the empirical analysis. We test our hypotheses with a proprietary, hand-collected dataset of contractual practices used in a unique sample of 265 VC investments with 127 portfolio companies and 40 different lead VCs in 12 countries (US, UK, Israel, Europe). The dataset is comprised of contractual details for each investment as well as the characteristics of the respective investors and founders, which allow us to examine a wide range of mitigating practices.

Our study makes important contributions to the entrepreneurial finance and agency literature that, according to Manigart and Wright (2013), still lacks evidence on the nature, extent and impact of formal and informal monitoring activities of VCs. First, we show that VCs increasingly observe signals to screen investments when adverse selection is more intense. However, we also find that the importance of these signals varies with the quality of corporate transparency institutions across countries. Second, we show that VCs actively use control rights to mitigate moral hazard risks. We find that the use of control rights appears more valuable in institutions where these rights are enforceable, namely where shareholder protection is stronger. Third, our study is among the first to disentangle adverse selection

from moral hazard risks and associate them to mitigating mechanisms that VCs employ in their investment cycle – from deal origination through monitoring. We conclude by deriving practical recommendations how VCs can mitigate agency problems in the presence of typical information asymmetries.

THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

The need to cope with information asymmetries is underpinning our understanding of how VCs approach the pre-investment (selection) and post-investment (contracting and monitoring) interaction with prospective entrepreneurs. Inherent performance uncertainties and incentive problems associated with the funding of companies in the early phase of their development give rise to contractual inefficiencies related to the well-known concepts of adverse selection and moral hazard (Cumming and Johan, 2009).

Pre-investment adverse selection

In the pre-investment phase, potential inefficiencies can result from VCs allocating funds to sub-optimal entrepreneurial ventures, e.g. because entrepreneurs choose to withhold good projects (and instead only grant access to sub-standard projects to outsiders). Mas-Colell et al. (1995: 436) theorize that such "adverse selection arises when an informed individual's [e.g. the entrepreneur] trading decisions depend on her privately held information in a manner that adversely affects uninformed market participants [e.g. investors]." Entrepreneurs might decide to sell a portion of their start-ups to financial investors only after learning that they are not very valuable. VCs can address this problem with well-developed deal origination (screening and due diligence) capabilities (e.g. Cumming et al., 2010). These capabilities are often augmented by syndication, which leads to a broadening of the pool of skills and knowledge relevant for evaluating early-stage venture (e.g. Carter and Van Auken, 1994; Manigart et al., 2006; Brander et al., 2002).

Adverse selection due to information asymmetries between VCs and entrepreneurs results in agency costs to be borne by VCs as the principals. These come in the form of search and screening costs. VCs can mitigate these costs by utilizing signals from investment targets to gauge entrepreneurial capabilities (e.g. Connelly et al., 2011). Entrepreneurs can facilitate this process by "signaling information about their unobservable knowledge or quality through observable actions" (Mass-Colell et al., 1995: 437). These signals include the board profile (e.g. Filatotchev and Bishop, 2002), the investment track record (Janney and Folta, 2006) as well as ownership structure (Busenitz et al., 2005; Jain et al., 2008; Bruton et al., 2009). Observing these signals during the investment selection phase is particularly relevant for start-ups that are more difficult to evaluate and inspect, for example because they lack a finished product and validated company information. Akerlof's (1970) well-known lemons problem figures prominently in this context implying that a company's attractiveness as a target for VC financing depends on the degree to which the uncertainty surrounding its economic prospects can be resolved by venture management (e.g. Podolny, 2001).

Founder's characteristics serve as proxies for the quality of venture management. These characteristics represent important quality signals for investors faced with significant agency costs arising from information asymmetries via the venture and its management (e.g., Coff, 2002; Cohen and Dean, 2005; Jain et al., 2008; Zimmerman, 2008). A broad range of VC contracting literature has looked at this issue already (see Gilbert, McDougall, and Audretsch, 2006 for a review). Interestingly, VCs often appear to back the 'jockey' rather than 'horse', in the sense that founder characteristics are treated as informative signals about the prospects of the venture (Kaplan, Sensoy and Strömberg, 2009). Earlier studies have traced venture problems to a lack of depth in human capital (e.g. Bruderl et al., 1992) or other people issues (e.g. Gorman and Sahlman, 1989; Kaplan and Strömberg, 2004). Personal traits of entrepreneurs, such as the educational background (e.g. Sapienza and Grimm, 1997), are

de facto treated as proxy measures for venture quality and growth prospects (Gilbert, McDougall, and Audretsch, 2006).

Education is considered an enabler for the identification and interpretation of information relevant for the venture as well as for the decision regarding how to deploy resources most effectively. Davidson and Honig (2003) for example show that a PhD qualification raises the likelihood of becoming an entrepreneur by 16.7%, suggesting that the link is due to the technical expertise acquired during the doctoral studies. In other words, education is treated as a formative element of the founder's human capital in combination with prior professional experience (e.g. Gimeno et al., 1997). Educational attainment has a potentially wide impact since it shapes the entrepreneur's career progression, which, in turn, leads to industry experience, social capital and ultimately financial capital.

Signals based on venture characteristics can also mitigate agency costs when dealing with adverse selection problems during the pre-investment phase. Patents are particularly relevant in this context. They act as a quality signal to the market and potentially justify a value premium (e.g. Long, 2002; Hsu and Ziedonis, 2008), i.e., patents raise the venture's attractiveness as an acquisition or investment target (e.g. Ali-Yrkkö et al., 2005). Hurdle rates for achieving patent awards are generally significant so that only firms with superior scientific or technological capabilities succeed (e.g. Powell et al., 1996). Patents can also be monetized via out-licensing, which contributes directly to venture growth (Helmers and Rogers, 2005; Pisano, 1990; Powell et al., 1996).

Educated founders and patents make ventures more attractive investment targets implying higher valuations and more competition for VCs. Previous studies have shown a positive impact of patents on the amount of VC funding received (e.g., Baum and Silverman, 2004; Mann and Sager, 2007), VC valuations (Lerner, 1994) and the likelihood of attracting

prominent VC investors (Hsu and Ziedonis, 2008). On the margin, the net benefits of these mitigating mechanisms increase when other information on venture prospects is scarce (e.g. Bruton et al., 2009). In other words, investors are willing to pay the value premium associated with these signals only when the information asymmetries are sufficiently substantial to raise the benefits gained from these signals above the costs associated with them.

Summarizing the discussion so far, founder education and patents offer strong signals of venture quality. These signals, in turn, reduce information asymmetries between entrepreneurs and investors encouraging VCs to invest in a venture despite the presence of adverse selection problems, especially when the venture still is difficult to evaluate or lacks proof of concept such as a product to showcase to investors. Hence, we posit the baseline hypothesis that:

H1: As the perceived degree of adverse selection risk increases, VCs are more likely to invest in ventures with positive quality signals such as founder education and patents owned by the target company.

The cost-benefit trade-off of using different mitigating mechanisms also depends on the institutional environment such as differences in legal and accounting standards (Cumming and Walz, 2010). Financial reporting should be enforceable (La Porta et al., 1997, 1998) and value informative (Armstrong et al., 2005; Hand, 2005) to be relevant for investors. Even if privately held ventures are not mandated to make their financial statements public, they may do so voluntarily to build up credibility for future fundraising (Cumming and Walz, 2010).

The literature supports the view that stronger regulations and accounting standards significantly and positively impact the extent and quality of voluntary reporting across countries (e.g. Chen, 2006). This means that in contexts with, in relative terms, stronger regulations and stricter accounting standards, one should also be able to observe higher levels

of corporate transparency or disclosures voluntarily offered by private ventures. There should be a greater abundance of publicly available information that investors can utilize during deal origination (e.g. La Porta et al., 1998), which helps to reduce information asymmetries between entrepreneurs and investors and thereby search as well as screening costs.

Financing arrangements can contain fair-valuation clauses to regulate the terms of how assets and liabilities are to be exchanged between transacting parties. They tend to be more widely used in countries with stricter legal environments (Cumming and Johan, 2009; Cumming and Walz, 2010) and therefore with better enforceability of these provisions (La Porta et al., 1997, 1998). In more opaque contexts, where institutions are not as supportive of corporate transparency and where disclosure standards, as well as their enforcement, are perceived to be weak, VCs need to rely more heavily on indirect signals of venture quality.

Therefore, in institutional environments that support greater corporate transparency, the net marginal benefits of investing in ventures carrying positive but costly signals are lowered. Conversely, VC screening and due diligence mechanisms are probably costlier to deploy in more opaque contexts, for instance because VCs need to rely more on personal networks for gathering investment-relevant information (e.g. Bruton et al., 2009). These arguments are summarized with the following hypothesis:

H2: The higher the quality of a country's institutions in support of corporate transparency, the less likely it is that VC investors will rely on signaling by prospective ventures seeking investment funding.

Post-investment moral hazard

When entrepreneurs are no longer the sole owners of the venture, they may engage in post-investment opportunism which constitute moral hazard[1] problems for VCs (e.g. Dobrev and Barnett, 2005). Lower degrees of psychological (Guth and MacMillan, 1986) and formal ownership (e.g. Barney, Busenitz, Fiet, and Moesel, 1996) increase the likelihood that founders prioritize individual self-interest over the interests of their venture (and the VCs) and start behaving as "agents" (e.g. Wasserman, 2006).[2] This may, for instance, result in "window dressing" activities, thereby biasing the venture's performance (Burchardt et al., 2014). Alternatively, entrepreneurs may divert company funds and effort to self-serving activities not directly observable by the investor (Bergemann and Hege, 1998).

These problems lead to an increase of agency costs by forcing VCs to intensify the monitoring and active controlling of venture management. By not being involved in the day-to-day operations of their portfolio companies, VCs face difficulties in tracking the entrepreneur's efforts and the efficiency of capital deployment. Resource constraints of new ventures leading to small management teams and underdeveloped internal control systems can exacerbate this issue (Katila and Shane, 2005; Bingham and Eisenhardt, 2011).

VCs address the resulting risks associated with moral hazard in mainly two ways. First, they fill board seats and use board representation for direct monitoring (Bagley and Dauchy, 2008). Monitoring acts as a pre-emptive mechanism in case of moral hazard and helps VCs to better understand the venture. Venture monitoring often extends to operational

[1] Mas-Colell et al. (1995) explain that in many real-world situations, post-investment agency risks not only involve moral hazard (also referred to as hidden actions), but also elements of hidden information (post-contractual information asymmetry). However, in this paper, we simply refer to post-investment agency risks in the form of moral hazard. This is because in our study, we cannot empirically delineate between the two elements of post-contractual agency risk. However, we believe this to be an opportunity for future studies.

[2] In some cases, the founders are replaced as CEOs (Hellman and Puri, 2002) in which case three kinds of players are involved: Managers, founders and VCs. Given that this exacerbates moral hazard issues, it does not affect the conclusions following from this study's empirical results.

activities (Ehrlich, De Noble, Moore, and Weaver, 1994), product introductions (Hellmann and Puri, 2000), as well as the recruitment and dismissal of even relatively low-level staff (Boeker and Wiltbank, 2005).

Second, VCs can require contractual covenants such as veto rights to cap downside risks. Contracts play a complementary role in shaping the entrepreneur's behavior and reduce the VCs vulnerability to hold-ups and renegotiation problems in situations where direct monitoring does not suffice. This aspect is particularly relevant in cases where the VC does not control the board majority (Bengtsson, 2011). Veto rights can prevent opportunistic actions such as claim dilution, asset substitution, and overinvestment (Bengtsson, 2011). They typically cover asset sales, asset purchases, changes in control of the firm and issuances of new equity; they can also affect strategic decision-making including the hiring of key personnel, external consultants, legal and accounting advisors, as well as the release of information to the public (e.g. Cumming and Johan, 2008). Altogether, they have the power to prevent entrepreneurs from behaving self-servingly to avoid loss of control over the ventures' decision making.

Direct monitoring and the provision of strategic advice require effort. The implementation of these mechanisms is generally time consuming, because venture strategies have a tendency of changing frequently and potentially even fundamentally (Aldrich and Fiol, 1994). Burdensome conflicts with other investors can exacerbate this issue (Garg, 2013). Considering that VCs generally oversee multiple investments, their capacity to engage in venture monitoring and consulting may be limited (Kanniainen and Keuschnigg, 2003). Demanding more veto rights *ex ante* and engaging in more monitoring *ex post* may also lead to a deterioration of the relationship between the VCs and the entrepreneur with the consequence of distorting the entrepreneur's focus away from managing the venture. VCs

may also face costly tradeoffs if board seats and contractual rights are obtained at the expense of cash flow rights.

In sum, board seats and contractual covenants protect investors against post-investment agency risks such as moral hazard, but are costly to negotiate and implement. Hence, we expect that investors are more likely to demand board seats and contractual covenants when these risks are higher.

H3: As the perceived degree of moral hazard risk increases, VCs are more likely to use risk mitigating mechanisms such as board seats and veto rights.

Everything being equal, the mitigation of post-investment moral hazard is shaped by cross-country institutional differences (e.g. Cumming, 2008; La Porta et al., 1998). Provisions targeting the protection of minority shareholders' and creditors' rights are generally assumed to improve legal quality by making agency risk mitigation more effective and less costly to implement (e.g. Bruton et al., 2009). Examples include minimum dividend guarantees, low equity support thresholds for requesting extraordinary shareholder meetings, creditor consent provisions (e.g. when filing for bankruptcy reorganization) or guarantees of priority in the distribution of the proceeds following the disposal of a firm's assets in case of bankruptcy.

Considering the costs involved in negotiating mechanisms such as board oversight and veto rights, these are more likely to be deployed in legal environments where their efficacy is high (i.e. where shareholder protection is prominent) and the opposite holds when legal standards are weak. In the latter case, there are few incentives for investors to negotiate contractual mechanisms that they might not be able to enforce. The next hypothesis follows.

H4: The higher the quality of a country's legal standards in support of shareholder protection, the more likely it is that VC investors will rely on mechanisms such as board seats and veto rights.

Figure 1 summarizes our theoretical framework.

------ Insert Figure 1 about here ------

METHODS

Sample and Data Collection

The dataset used in this study represents a hand-collected sample of 265 international VC investments in 127 portfolio companies carried out between 1997 and 2008.[3] Our objective was to assemble a diversified cross-country sample with the representation of different legal systems and market maturities. Among European countries, Germany has the highest number of investments (81), followed by United Kingdom (37), the Nordic countries (30), France (19) as well as other countries such as the Netherlands, Switzerland, Belgium and Austria (9). The remaining investments are in the US (65) and Israel (24). While these countries are similarly developed, they differ with respect to institutional traditions and current standards.

During the data collection, the authors approached VC investors with which they had a prior connection (directly or through the university network). VC firms were requested to provide various documents. Investment contracts were made available in 100% of the cases. Other documents included shareholder agreements (81.51%), articles of association (84.91%), term sheets (24.53%) business plans (48.11%) and subsequent performance

[3] The dataset does not cover the full range of variables for each observation implying that the number of observations in each model may vary.

information (36.23%).

The sample included a diverse set of VCs, both small and large as well as investors with a national and/or international investment focus. Like past work (e.g. Ljungqvist and Richardson, 2003), the VC selection is not random and limited to VCs to which the authors had a prior link and with sufficient interest in academic research. This may imply a selection bias (e.g. towards more sophisticated investors), but its scale promises to be negligible given the large number of lead investors (40) and VCs (314, including all syndicate members) in the sample. Another selection bias may result from the fact that the contracts have been provided by only 12 VCs with one secondary investor providing 142 of the 265 contracts that have been acquired from 4 different corporate venture capitalists. Again, this does not present a serious issue. 110 of these investments were carried out before the portfolio acquisition by the VC in question and, of those, only 93 involved the investment of one of the corporate VCs. In addition, corporate VCs were generally not lead investors and divested of their portfolios because of a change of strategic direction of the parent corporation. This also reduces the potential for performance bias. Table 1 summarizes the sample based on geography, year, stage of investment and round number.

---------- Insert Table 1 about here ----------

The data collection process itself considered a wide range of information in four broad areas: (1) general investment information (such as round number, date of investment, financing phase), (2) portfolio firm information (i.e., country and industry), (3) investment details (such as timing, staging and syndication), as well as (4) security design and control rights (such as management incentives and veto rights).

Due to the sensitive nature of the VC industry, only very few researchers have so far been able to analyze contracting practices with hand-collected cross-country samples (for

notable exceptions see Cumming, 2008; and Cumming and Johan, 2008). The dataset has several advantages over those used in previous studies. First, data collection by hand eliminates a common response bias from survey-based studies, which implies high-quality data and a large degree of detail. Second, the comprehensiveness of the information used in this study goes beyond what is customarily analyzed in the literature. Third, we are the first to access this kind of in-depth information across the largest VC markets in Europe and the US, including macro-information of each country. Few studies have had the opportunity to test their arguments with data offering a similar level of richness (e.g. Bienz and Walz, 2010; Kaplan and Stromberg, 2003; Kaplan and Stromberg, 2004; Kaplan, Martel and Stromberg, 2007; Lerner and Schoar, 2005). However, despite its merits, our dataset may raise concerns of generalizability, which can be addressed by comparing the sample with those used in similar studies. Therefore, we compared our dataset with those analyzed by Podolny (2001), Bellavitis, Filatotchev and Kamuriwo (2014), Manigart et al. (2006), as well as Sapienza, Manigart and Vermeir (1996). Our descriptive statistics show only marginal differences that should not significantly endanger the generalizability of our results.

Measures

Pre-investment adverse selection risk reduction mechanisms

As previously argued, investors need to rely on alternative signals if the venture's information environment is opaque. They can look at founders' quality, which can be proxied by educational background. Alternatively, they can evaluate the intrinsic quality of the venture's technology, e.g. by patents granted to the venture.

Founders' education. In line with Franke, Gruber, Harhoff, and Henkel (2008), we account for the founders' skills by measuring the highest education level attained by a member of the founding team. It takes values from 1 to 3 where '1' represents Bachelor, '2' Master, and '3' PhD. In line with the recommendation of Agresti and Kateri (2011), this

measure is treated as an ordinal variable.

Patents. This measure captures the existence of patents within the company. It takes the value of '1' if patents are available, and '0' if not.

Post-investment moral hazard risk reduction mechanisms

In line with the previous discussion, investors mitigate moral hazard risk by demanding a larger number of board seats or by being granted more extensive veto rights.

VC board seats. This measure represents the percentage of board seats taken by VC investors. It ranges from 0 to 1 where 1 indicates that VCs control 100% of the board.

Veto rights. This measure captures the existence of a veto right in favor of investors. We collected data on the ability of investors to control changes in the venture's core business. The measure takes on the value of '1' if such a veto right exists, implying that management cannot undertake significant changes to the core business without prior investor approval. It is set to '0' otherwise.

Agency conflicts measures

Pre-investment adverse selection risk. Adverse selection can arise in the presence of pre-contracting information asymmetries between investors and founders, which are particularly pronounced if opportunities for venture inspection and monitoring are in some form restricted. To capture this effect, we define a dummy variable with a value of 1 if investors do not have the "right to inspect" the venture's premises and its financial documents before and after the investment, and 0 otherwise. Investment uncertainty is also high when a venture has not yet developed a prototype. Therefore, as a robustness check, we consider an alternative proxy for adverse selection; it is a dummy variable which takes on the value of 1 if the venture did not develop a finished product yet and 0 otherwise.

Moral hazard. Few empirical studies have investigated the effect of management opportunism related to VC investments due to the lack of adequate proxy measures. We can circumvent this problem by relying on the judgment of VCs directly. Risk assessments from investment memoranda and other VC internal documents were used to capture concerns regarding the quality of venture management (scored as either a "risk" or a "strength" at the time of data collection). This measure directly captures perceived moral hazard risks (or lack thereof) with values ranging from 0 to 2: a value of '0' suggests that a good management is in place (i.e. low moral hazard risk), a value of '1' indicates that management risk is irrelevant and '2' that management risk exists (i.e. high moral hazard risk). Hence, higher values imply higher risks. Considering that the dataset captures the prevalence and severity of perceived risks before VCs draft contracts and take measures against management risks, endogeneity is of no concern.

Country differences

The sample includes 12 countries. To test our country-related hypotheses, we use two indexes of cross-country legal differences included in the World Bank database.[4] Although all countries are similarly developed, they have different institutional standards.

Country adverse selection standards. We approximate country-specific legal standards related to adverse selection with the "extent of corporate transparency index" developed by the World Bank. This index evaluates transparency standards with respect to ownership stakes, compensation, audits and financial prospects, which form the basis for gauging a venture's problems and prospects. Its value ranges from '0' to '10' with larger values

[4] We utilize the 2014 values of both indices as earlier measures are not available. The time discrepancy between investments and index values should not pose a serious issue given that legal systems are only changing very gradually, especially in mature countries like the ones covered in this study.

implying stricter corporate transparency standards. Although the transparency index might be more appropriate to capture dynamics related to listed companies, it is still a valid proxy for information asymmetries between entrepreneurs and VC investors (Kumar and Orlek, 2002) given that VC-backed ventures usually aim to go public. Within the countries under study, not surprisingly, Switzerland has the lowest transparency index with a value of 3, while the highest standards are in the United Kingdom (index value of 8). Country level data is linked to portfolio companies based on their country of incorporation, which defines the relevant judicial space.

Country moral hazard standards. The World Bank's "extent of shareholder rights index" is used to measure how well a country's legal environment protects investors against moral hazard risks. It is an index that evaluates shareholder rights and role in major corporate decisions with a scale from '0' to '10'. Higher index values reflect more extensive shareholder influence (i.e., the ability to prevent and deal with opportunistic behavior). Within the set of sample countries, Belgium has the lowest shareholder index with a value of 4, while the country with the highest standards is Sweden (index value of 9). As before, the use of country-level data is linked to where the venture is legally established.

Control variables

The relatively small sample size limits the number of control variables that can be included in the analysis (see also Harrell, 2001). We control for the amount of *VC investments.* This measure represents the total VC investments carried out in the country of the focal company in the year when it received VC funding as reported in the Thomson One Banker database (previously Venture Expert). The Thomson database is a comprehensive source of VC information and has been extensively used in the VC literature (e.g. Bellavitis et al., 2017). We expect this measure to have a negative impact on both types of dependent

variables. First, when VCs invest in a larger number of start-ups, they will face time constraints to oversee all their investments and, therefore, will have fewer resources to monitor the start-ups.[5] Second, this is a measure of competition among investors. When more capital is chasing start-ups, VCs will compete against each other demanding less rights and becoming less selective since it will be more difficult to invest in ventures carrying strong and positive signals.

We also control for external factors with a *dot com* variable, which has been adopted by Ljungqvist and Richardson (2003) and Levis (2011) as well. This is a dummy that takes on the value 1 for investments carried out between 1999 and 2000 when the dot.com market was "hot", and 0 in other years. The underlying conjecture is that dot.com bubble was a phase of investor exuberance and munificence that led to VCs having less bargaining power. Hence, the expected impact on both mechanisms should be negative.

We further control for venture-related factors that may affect both pre- and post-investment agency risks. We include *venture age* (in months). The expectation is that venture age reduces information asymmetries and therefore should reduce the use of adverse selection (pre-investment) mechanisms such as founders' education. On the other hand, substantial resources are necessary to develop patents, and therefore we expect mature ventures to have more patents. Further, we expect a positive relationship between age and moral hazard mechanisms. The potential misallocation of effort by the founder, who has an incentive to accumulate private benefits at the expense of the VC investor, is likely to increase as the venture develops and the founder's equity share shrinks. As the venture grows, entrepreneurs have more resources under their control but own a smaller share of total equity. We also include a control that captures whether the venture operates in the *Life Science* industry (dummy variable). This measure reflects the different degree of riskiness

[5] We thank an anonymous reviewer for this suggestion.

and uncertainty that surrounds life science ventures. We further expect that more patents are granted to science-related ventures, and that these ventures are managed by more educated founders due to the research-intensive nature of the industry. As a robustness test, we also included a dummy related to ventures operating in the Information and Communications Technology space; the results were unchanged.

Finally, we control for deal-related factors, which could impact the control and supervision exercised by VC investors. We include *distance* that measures the logarithmic distance (in kilometers) between sample VC and venture. VCs can be assumed to exert control more effectively and thereby reduce agency costs when they are located closer to the venture (e.g. Devigne, Vanacker, Manigart and Paeleman, 2013). Conversely, we expect that VCs will demand more protective mechanisms when they are located further away from the venture. We also include a "*number of VCs"* measure that controls for the number of investors in the specific funding round. A higher number of investors should lead to more board seats. However, a larger syndicate has more resources to properly evaluate the venture and so there is less need for negotiated mechanisms. We also control for investment conditions such as management *incentives* and *staged financing*, which can have a positive or negative impact on the use of agency risk mechanisms. Wang and Zhou (2004) proposes complementarity between staged financing and contracting mechanisms. On the other hand, Zajac and Westphal (1994) suggest diminishing returns (i.e. substitutability) from additional governance mechanisms such as incentives and monitoring. Table 2 lists the controls variables, their operationalization and the expected impact on the dependent variables.

---------- Insert Table 2 about here ----------

Statistical model

We test our hypotheses with a generalized structural equation model (GSEM) with

Quasi Maximum Likelihood estimations. GSEM is ideal considering that we deal with multiple dependent variables. GSEM also allows for potential measurement errors (Bollen, 1989) and is more efficient in dealing with missing values, thereby helping us to preserve sample size in the light of the fairly low number of observations. The technique also allows for the use of model specifications controlling for endogeneity. Figure 2 summarizes our empirical model.

---------- Insert Figure 2 about here ----------

RESULTS

Table 3 reports the descriptive statistics and correlations for the dependent and independent variables. The average venture is four years old. A quarter of the ventures in our sample belongs to the life science sector. Concerning the main variables of interest, we find that 66% of the ventures have patents, 48% of the investors do not have rights to inspect, and 40% of the ventures do not have a finished product (i.e. adverse selection risk). Further, the highest education of the founders, on average, is between master and PhD. Finally, we find that the average syndicate controls 44% of the board seats and in 57% of the cases have the right to veto.

Considering that we have binary and non-binary variables, we run three different types of correlation analyses. While we are using the standard pairwise method to calculate the correlations between non-binary variables, we apply the tetrachoric method for binary variables and the point bi-serial method for correlations across these two general variable categories.[6] A closer examination of the correlation coefficients reveals that adverse

[6] The Stata command *Tetrachoric* computes pairwise estimates of the tetrachoric correlations with the (iterative) maximum likelihood estimator obtained from bivariate probit using the Edwards and Edwards (1984) non-

selection and moral hazard mechanisms tend to be used in conjunction, i.e., they appear to be strategic complements. If VCs can claim more board seats, then they are also successful in negotiating veto rights into the contracts. They are also more likely to invest in ventures where the founders are well educated and the ventures possess patents. We also find that VCs were less demanding during the dot-com bubble with respect to all these categories.

---------- Insert Table 3 about here ----------

Table 4 reports our main results based on the structural equation model outlined in Figure 2. First, we run a model with only the control variables included. This model is reported in columns 1, 3, 5 and 7. It yields the counter-intuitive finding that larger syndicates invest in ventures with more educated founders. In principle, larger syndicates possess better screening and due diligence capabilities, and therefore require a lower number of signals. Syndicate size may however also lead to a better deal flow implying the opportunity to invest in better (e.g. more educated) teams. Larger syndicates negotiate more board seats. Unsurprisingly, our results further show that life science ventures are run by more educated founders and possess more patents. As expected, the dot com bubble variable impacts all our dependent variables negatively, i.e., VCs. are less demanding in terms of signals and contractual mechanisms during this period. In a similar fashion, "VC investments" has a negative impact on the post-investment agency risk mitigating mechanisms.

As a second step, we run the model with all the main variables, i.e., we also include the mitigating mechanisms as controls. We find that it is significantly more likely that the adverse selection mitigating mechanisms (i.e. patents and educated founders) are used in conjunction. In contrast, we do not find a significant relationship between VC board seats and

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iterative estimator as the initial value. The Stata command *pbis* performs a point bi-serial correlation and tests whether the correlation coefficient is significantly different from zero.

veto rights. In columns 2 and 4, we report the results associated with our adverse selection hypotheses (H1-2). We posit that when these risks are high, VCs tend to invest in ventures with positive quality signals related to founders' education and company's patents. The results show that VCs investing in a venture with a higher level of adverse selection (both with "no right to inspect" and "no finished product") select more educated founders. We, however, do not find a significant relationship between the level of adverse selection risk and the probability of investment in ventures with patents. Hence, hypothesis 1 is partially supported.

Our second hypothesis theorizes that the use of these mitigating mechanisms is weaker in countries with higher corporate transparency standards (i.e. *country adverse selection standards*). Transparency negatively influences investments in educated founders, but does not affect the prevalence of investing in ventures with patenting activity. Hence, only one part of hypothesis 2 is actually supported.

In columns 6 and 8 we report the results associated with our post-investment moral hazard risk hypotheses (H3-4). Our third hypothesis posits that when this risk is high, VCs are more likely to use risk mitigating mechanisms such as board seats and veto rights. The results partially support this hypothesis. In column 6, we find that moral hazard risk significantly increases the share of board seats controlled by investors. A similar pattern, albeit not significant, is found in relation to VC veto rights. Hence, the results lend partial support to hypothesis 3 as well.

Hypothesis 4 theorizes that better legal protection of shareholder rights (i.e. country moral hazard standards) encourages VC investors to use mechanisms such as board seats and veto rights more actively. The results lend strong support to this logic. Better shareholder protection leads to a higher share of board seats and more veto rights controlled by the VCs.

Finally, to rule out multicollinearity, we calculated the variance inflation factors (VIFs). VIF averages are generally significantly below the critical mark of 10 (Kutner, Neter, Nachtsheim, and Wasserman 2004). They range from 1.40 (Founders' education as dependent variable) and 1.46 (VC Board Seats as dependent variable) to 4.25 (VC Veto Rights as dependent variable) and 7.82 (Patents as dependent variable). Founders' education is strongly correlated with patents and, after excluding the latter, the VIF average drops to a more appropriate 4.55. This adjustment does not alter the general conclusions.

---------- Insert Table 4 about here ----------

ROBUSTNESS TESTS

As previously discussed, we use two alternative measures of adverse selection and information asymmetries: "lack of rights to inspect" and "lack of finished product". Both measures are likely to increase with information asymmetries between investors and the entrepreneur. In Table 4 we report the results with the inclusion of the first measure. As a robustness test, we proxy pre-investment adverse selection risks with the latter variable as well. The impact on founders' education remains positive and significant, and the impact on patents becomes positive (in line with our first hypothesis) but is still insignificant. As an alternative measure of "founders' education", we use a dummy variable taking on the value of 1 if founders have earned a PhD. The results are not tangibly affected.

Further, to rule out alternative explanations, we add other control variables to the models presented in Table 4.[7] First, we include additional VC characteristics in the analysis. We consider fixed effects for the main investor to control for the possibility that VCs prefer

[7] We refrain from including all these variables in the main part of our analysis. Sample size would have been further limited by missing observations for some of these variables. Further, including too many controls would reduce the variance captured by each variable in the model. For example, it is not possible to include fixed effects for all investors in our sample.

to use certain practices, regardless of the start-up's agency costs or institutional characteristics. Second, we add a measure that captures the average age of the VCs involved in the deal; VCs might change their strategic priorities or contracting practices as they gain experience. Third, we include a range of additional dummies to capture VC characteristics. Three dummies mark the most prolific investors (with at least 25 investments) in our dataset. Fourth, we also add two dummy variables associated with corporate venture capital firms and bank-affiliated VCs. Lastly, to control for the ventures' industry, in addition to "life science", we also included a dummy related to ventures operating in the Information and Communications Technology space. All these analyses confirm the robustness of our main results. Furthermore, in some instances, we generate additional support for our third hypothesis. The variable "post-investment moral hazard risk" continues to have a positive impact on the likelihood of negotiating "VC veto rights", but it now becomes significant at the 10% level. We also controlled for two additional start-up characteristics. The venture's *net income* is used as a proxy for venture quality and the *round* number[8] captures the resolution of investment uncertainty. The inclusion of these controls does not have a material impact on our results.

DISCUSSION

Our study builds on past work examining the use of mitigating mechanisms in the VC-investee relationship on the basis of an agency cost rationale (e.g. Cumming, 2008; Cumming and Johan, 2009; Jia, 2015; Kaplan and Strömberg, 2003; Manigart et al., 2006). First, we argue that in the pre-investment phase, the VC's own capacity to screen and conduct due diligence on prospective ventures seeking investment is complemented by the venture's own signaling efforts (e.g. Connelly et al., 2011). We extend this argument to consider how a

[8] We thank an anonymous reviewer for pointing this out.

venture's signaling effect diminishes (or strengthens) in response to lower (or greater) adverse selection problems where institutional settings support more (or less) corporate transparency or disclosures (e.g. Cumming et al., 2010). Second, VCs consider post-investment moral hazard risk and may opt for contractual covenants – veto powers and board seats – to curb potential opportunism through monitoring (e.g. Hellman and Puri, 2002; Boeker and Wiltbank, 2005). We argue that this may only be truly effective in settings supportive of shareholder rights protection, which provide the requisite enforcement (e.g. Cumming et al., 2010; La Porta et al., 1997; 1998; 2000). Our study examines a wider and, to some extent, different set of mitigating and signaling mechanisms than those considered in the extant literature. We test these arguments using an international sample of VC investments and we find broad support for our conjectures.

Regarding adverse selection, our baseline finding is that investors use quality signals of the venture (founder characteristics and patents) to mitigate these risks. These results buttress prior work in arguing that VCs overcome the inability to inspect or the absence of a finished product by other quality signals such as the entrepreneurs' education (e.g. Kaplan, Sensoy and Stromberg, 2009) or the existence of patented technologies (e.g. Lerner, 1994). The deployment of mechanisms to mitigate agency costs must follow a cost-benefit logic. Investing in ventures with strong signals comes at the cost of higher valuations at the time of contracting (e.g. Hsu, 2004). VCs can alternatively consider any factors that make signaling by ventures contingently valuable (e.g. Gao et al., 2010).

The study generates a similar conclusion for moral hazard. VC investors negotiate board seats and veto rights in accordance with the perceived degree of moral hazard risk. If VCs negotiate too forcefully at the onset and are too demanding with respect to contractual monitoring rights (board seats and veto powers), they may ultimately harm the entrepreneur-investor relationship (e.g. Hellman and Puri, 2002). Doing so can also draw away attention

from other portfolio companies, naturally limiting the VCs' willingness and capacity to engage in monitoring (e.g. Hellman and Puri, 2002). Any effort of countering the entrepreneurs' propensity to behave opportunistically must reflect these opportunity costs implying that VCs must consider factors that reduce or increase the contingent value of screening or monitoring.

This study further demonstrates that agency costs vary in response to variations in institutional factors, which is a research gap previously identified by the literature (e.g. Bellavitis, Filatotchev, Kamuriwo and Vanacker, 2017; Cumming and Johan, 2009). The results highlight the contingency effect of the institutional environment on the prevalence of VC investments. Transparency-enhancing regulations, for instance, lower the net benefits of VCs investing in (and paying for) ventures with stronger signals.

We also find that the enhancement of shareholder protection incentivizes the adoption of monitoring mechanisms such as board seats and veto rights. Shareholder empowerment encourages the usage of governance mechanisms that can be used to counter opportunistic behavior of founder-agents. In contrast, monitoring may be too costly in legally weak institutional settings relative to the benefits (e.g. Jensen and Meckling, 1976; Cumming and Johan, 2009), which can encourage the adoption of alternative, less direct monitoring mechanisms (e.g. syndication) or a reassignment of cash flow rights via staging (e.g. Gompers, 1995) or security design (e.g. Cumming and Johan, 2009). These findings contribute toward a growing body of literature that jointly considers institutional factors and VC investments (e.g. Jia, 2015; Nahata, Hazarika and Tandon, 2014; Schwienbacher, 2008).

Our study explains why institutional differences (e.g. related to legal standards) may result in substitution or complementarity effects, which is analogous to discussions of the use of contractual covenants in the literature (e.g. Burchardt et al., 2016). We find that signaling

mechanisms such as patents and founders' education complement each other. The same applies to mechanisms and regulations dealing with moral hazard risks. We however also find that adverse selection mechanisms and legal standards have a substitutive relationship.

This research complements previous works that emphasized the advantages of implementing alternative mechanisms (e.g. Manigart et al., 2006; Cumming, 2005a; 2005b; Cumming, 2006; Cumming and Johan, 2007). In a first step, we align the benefits of mitigatory and signaling mechanisms to the existence of agency risk. We then move this research agenda forward by arguing theoretically and supporting empirically how the institutional environment (corporate transparency and shareholder protection standards) influences the use of mitigating mechanisms for adverse selection and moral hazard.

Our paper is novel in that it empirically disentangles moral hazard from adverse selection. The VC industry represents an appropriate setting for tackling this issue. Adverse selection is relatively more prevalent in the pre-investment phase and tends to resolve itself over time (Podolny, 2001), while problems of post-investment information asymmetry such as moral hazard and hidden information become more prevalent as the venture's use of outside capital grows. This peculiarity allows us to provide evidence of the distinctive nature of adverse selection and moral hazard risk and, consequently, helps us to deliver insights into how corrective mechanisms can tackle each problem separately. The results help to open an avenue for further research on how investors can align their capital deployment strategies to reduce agency conflicts, while at the same time nurturing their relationship with the entrepreneurs.

The paper suggests important policy implications as well. Our findings indicate that setting high corporate transparency standards, including the capacity to enforce shareholders' rights, is not only beneficial to the corporate governance of large and publicly listed

companies, but also for the development of appropriate governance structures of smaller and VC-backed ventures. Strong corporate transparency laws have an indirect effect on voluntary disclosures of private ventures, which in turn affect agency costs imposed on VCs. By expanding disclosure requirements, professionalizing reporting practices and protecting the rights of (minority) shareholders, financial investors can monitor privately held companies more effectively. Therefore, strong institutional standards would be beneficial to the entrepreneurial ecosystem.

Limitations and future research

Our paper has several limitations that at the same time present opportunities for future research. The dataset used here provides access to a unique set of information that allows for an in-depth analysis of the agency costs involved in each sample transaction. While a dataset from secondary sources would not offer similar richness, a more broadly diversified cross-country sample of primary contract data will. For one, it would allow the inclusion of other quality signals such as the endorsement of third parties (e.g. industry awards). Second, it may be possible to control for a wider range of macroeconomic influences such as GDP, unemployment or cost of capital. Third, we see the inclusion of syndicate heterogeneity (presence of corporate VCs, government and independents) as an interesting extension to our analysis. Lastly, depending on data availability, future work can study the effectiveness of mitigating mechanism over time, or on different variables such as venture performance.

CONCLUSION

It is well established that agency conflicts play a defining role in shaping the relationship between VC investors and entrepreneurs. We investigate potential mechanisms that VCs can utilize to reduce these conflicts. The main insight from this study is that mitigating mechanisms such as signals or contractual covenants are a double-edged sword.

They can help to minimize agency conflicts but are also costly to implement and negotiate. We show that the quality of the institutional context has a significant impact on the trade-offs between benefits and costs associated with the potential deployment of these mechanisms.

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Table 1. Summary information of portfolio firms and financing rounds

Panel A. Segmentation by Geography

	Germany	**U.S.**	**U.K.**	**Israel**	**Sweden**	**France**	**Netherlands**	**Norway**	**Finland**	**Switzerland**	**Austria**	**Belgium**
# Portfolio companies	44	25	15	11	12	9	1	4	3	1	1	1
Relative frequency (%)	35%	20%	12%	9%	9%	7%	1%	3%	2%	1%	1%	1%
# Financing rounds	81	65	37	24	20	19	5	5	5	2	1	1
Relative frequency (%)	31%	25%	14%	9%	8%	7%	2%	2%	2%	1%	0.4%	0.4%

Panel B. Segmentation by year

	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
# Financing rounds	2	4	18	42	40	27	33	34	30	26	8	1
Relative frequency (%)	1%	2%	7%	16%	15%	10%	12%	13%	11%	10%	3%	0%

Panel C. Segmentation by stage

	Seed	**Start-up**	**Early Stage**	**Expansion**	**Recap.**
# Financing rounds	13	87	109	47	9
Relative frequency (%)	5%	33%	41%	18%	3%

Panel D. Segmentation by round number

	1st	**2nd**	**3rd**	**4th**	**5th +**
# Financing rounds	159	62	25	9	10
Relative frequency (%)	60%	23%	9%	3%	4%

N=265

Table 2. List of controls: Operationalization and expected results.

Control	**Operationalization**	**Expected impact on pre-investment adverse selection mechanisms**	**Expected impact on post-investment moral hazard mechanisms**
Number of VCs	Count of the number of VCs investing in the venture.	Negative due to the additional due diligence capacities of multiple investors.	Positive due to the additional board seats negotiated by larger syndicates.
Venture Age	Age of the venture in months.	Negative on founders' education due to lower information asymmetries in older ventures. Positive on patents due to the resources necessary to develop patents.	Positive due to higher incentives to behave opportunistically.
VC investments	Number of VC investments in the same year-country of the focal deal.	Negative due to softer investors' selection criteria.	Negative due to time investors' time constraints and stronger bargaining power of entrepreneurs.
Distance	Distance in Km between the lead VC and the venture.	Positive due to the difficulty in evaluating distant ventures.	Positive due to the difficulty in monitoring distant ventures.
Life Science	Dummy variable accounting for whether the venture is in the life science industry.	Positive due to the difficulty in evaluating life science ventures.	Positive due to the difficulty in monitoring life science ventures.
Incentives	Dummy variable accounting for whether management incentive programs are available.	Positive/Negative. The use of incentives signals investors' uncertainty. Other mechanisms could be	Positive/Negative. The use of incentives signals necessity to reduce moral hazard. Other mechanisms could be

		considered substitutive or complementary.	considered substitutive or complementary.
Staged Financing	Dummy variable accounting for whether the financing is disbursed in stages.	Positive/Negative. The use of staged financing signals necessity to deal with adverse selection. Other mechanisms could be considered substitutive or complementary.	Positive/Negative. The use of staged financing signals necessity to reduce moral hazard. Other mechanisms could be considered substitutive or complementary.
Dot Com	Dummy variable accounting for whether the investment is finalized during the period 1999-2000 (dot com bubble).	Negative due to softer investors' selection criteria.	Negative due to time investors' time constraints and stronger bargaining power of entrepreneurs.

Table 3. Descriptive statistics and correlations

		Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Founders' Education	2.64 (.53)															
2	Patents	.66 (.47)	.36*														
3	VC Board Seats	.44 (.20)	-0.02	.10													
4	VC Veto Rights	.57 (.49)	-.07	.05	.14*												
5	Number of VCs	3.79 (3.13)	.16*	.19*	.16*	-.18*											
6	Venture Age	48.2 (37.6)	0.06	.22*	0.06	.02	-0.01										
7	VC Investments	49.4 (138.1)	.01	.07	-0.21*	-.12	.08	.04									
8	Distance	5.48 (2.67)	-0.03	.12	-.05	-.14*	.17*	.10	.23*								
9	Life Science	.25 (.43)	.35*	.25	.08	.01	.09	-.09	-.18*	-.13*							
10	Incentives	.86 (.34)	-.08	.14	.17*	-.09	.15*	.13*	.13*	.09	-.21						
11	Staged Financing	.48 (.50)	.10	.03	.09	.10	.04	.18*	.02	-.02	.03	-.08					
12	Dot Com	.22 (.41)	-.21*	-.48*	-.17*	-.16	-.11	-.21*	.12	-.09	-.12	-.24	-.14				
13	Post-Investment Moral Hazard Risk	1.02 (.90)	0.11	-.03	0.12	.05	0.00	-0.08	-.11	.01	.18*	-.07	-.00	-.00			
14	Country Moral Hazard Standards	6.76 (1.74)	-.02	-.26*	.16*	.36*	-.35*	-0.07	-.50*	-.39*	.20*	-.25*	.01	.07	0.02		
15	Pre-Investment Adverse Selection Risk	.48 (.50)	.12	-.11	-.07	.19	-.11	-.02	-.12	-.08	-.19	-.12	.15	.22	-.00	.14*	
16	Country Adverse Selection Standards	6.87 (1.04)	-.13*	-.04	.19*	.29*	-.21*	-0.07	-.47*	-.15*	.19*	-.11	.02	.05	0.13*	.64*	.17*

Table 4. Generalized Structural Equation Model with Quasi Maximum Likelihood Estimations.

Column	1	2	3	4	5	6	7	8
Dependent variables	**Founders' Education**	**Founders' Education**	**Patents**	**Patents**	**VC Board Seats**	**VC Board Seats**	**VC Veto Rights**	**VC Veto Rights**
Controls								
Number of VCs	.33** (.13)	.36** (.16)	.11 (.07)	-.05 (.08)	0.1*** (.00)	.01*** (.00)	-.05 (.05)	.02 (.07)
Venture Age	-.00 (.00)	-.00 (.00)	.01*** (.00)	.01* (.00)	-.00 (.00)	-.00 (.00)	.00 (.00)	.00 (.00)
VC investments	.00 (.00)	-.00 (.00)	.00 (.00)	.00* (.00)	-.00*** (.00)	-.00 (.00)	-.01*** (.00)	-.00 (.00)
Distance	-.08 (.07)	-.04 (.08)	.07 (.06)	-.01 (.08)	-.00 (.00)	.00 (.00)	-.06 (.05)	.04 (.07)
Life Science	2.71*** (.64)	3.20*** (.75)	1.11*** (.42)	.45 (.53)	-.05* (.03)	-.06* (.03)	-.33 (.33)	-.71* (.41)
Incentives	-1.14* (.54)	-1.08 (.73)	.03 (.50)	.16 (.56)	.11*** (.04)	.14*** (.04)	-.07 (.42)	.22 (.49)
Staged Financing	.03 (.39)	.39 (.47)	-.34 (.33)	-.17 (.43)	.04 (.02)	.04 (.02)	.17 (.28)	.08 (.35)
Dot Com	-1.18** (.46)	-1.17** (.55)	-1.34 (.36)	-1.18** (.48)	-.04 (.03)	-.04 (.03)	-.34 (.35)	-.52 (.40)
Patents		1.49*** (.51)						
Founders' Education				1.35*** (.46)				
VC Veto Rights						.01 (.03)		
VC Board Seats								.51 (.91)
IVs								
Pre-investment Adverse Selection Risk		1.66*** (.50)		-.71 (.45)				
Country Adverse Selection Standards		-.84** (.37)		-.02 (.33)				
Post-investment Moral Hazard Risk						.03** (.01)		.20 (.19)
Country Moral Hazard standards						.03** (.01)		.70*** (.19)
Intercept	-	-	-.60 (.64)	-2.39 (2.84)	.34*** (.05)	-.00 (.12)	1.25** (.58)	-5.26*** (1.75)
Observations	243	230	243	217	243	230	243	217
Log likelihood	-306.56	-249.52	-306.56	-212.06	-306.56	-249.52	-306.56	-212.06

*** p <.01, ** p < .05, * p <.1

Fig. 1 – Theoretical Framework

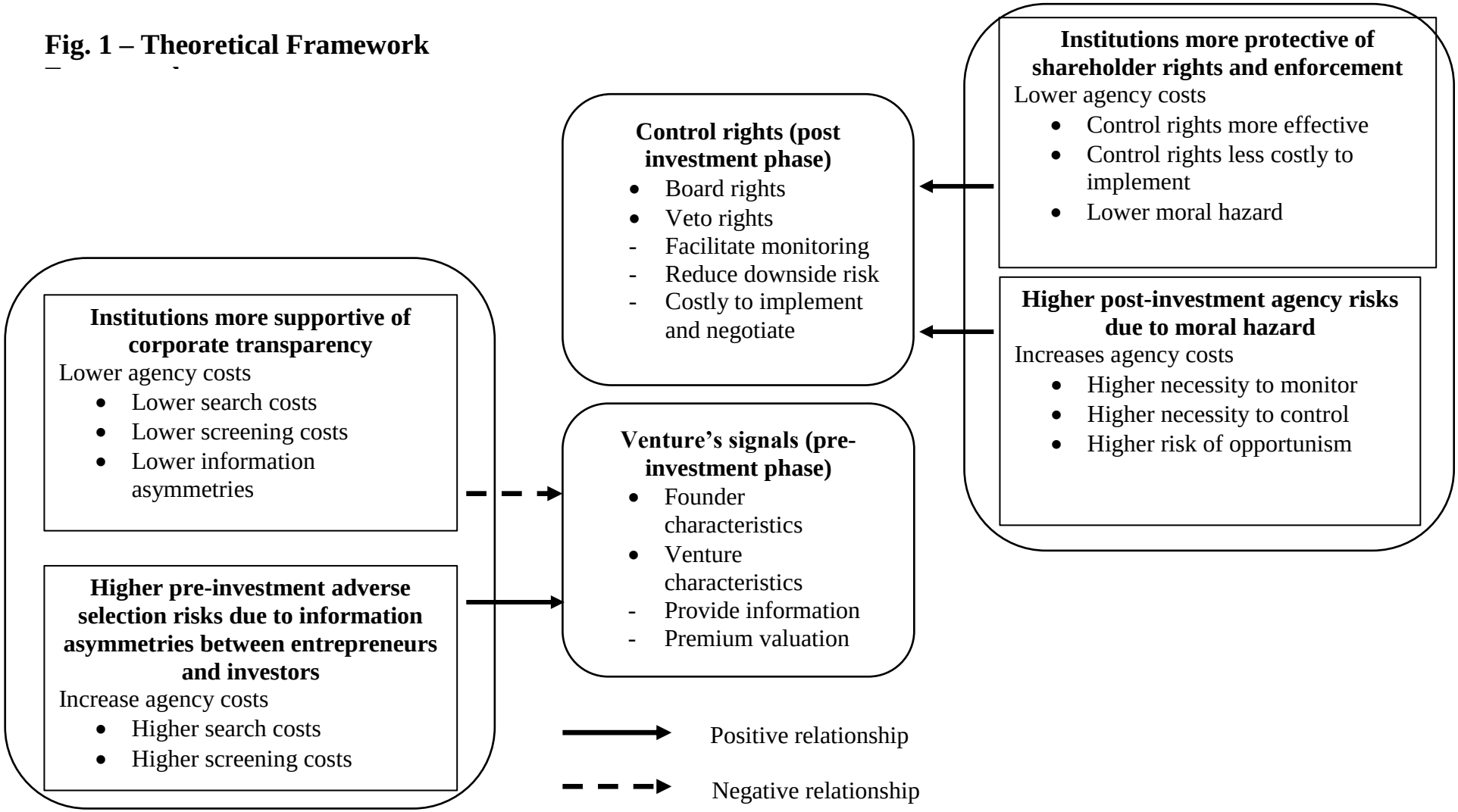
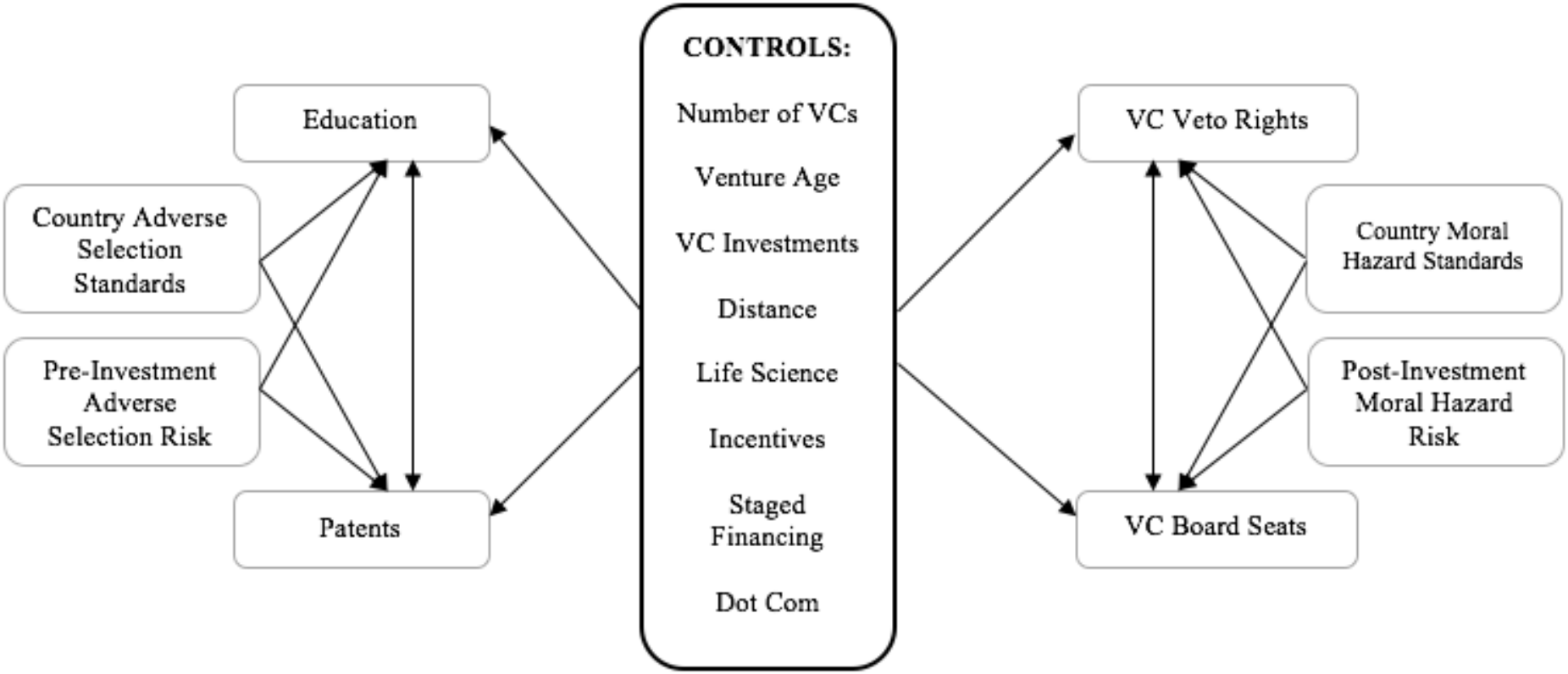
Figure 2. Structure of the Generalized Structural Equation Model