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# **Institutional frameworks, venture capital and the financing of European new technolog-based firms**

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**INSTITUTIONAL FRAMEWORKS, VENTURE CAPITAL AND THE FINANCING OF  
EUROPEAN NEW TECHNOLOGY-BASED FIRMS\***

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## ABSTRACT

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**Manuscript Type:** Empirical

**Research Question/Issue:** We first study how cross-country differences in legal quality and personal bankruptcy laws affect the financing of New Technology-Based Firms (NTBFs). Second, we study how venture capital (VC) investors, as expert monitors and initiators of good governance practices in their portfolio firms, moderate abovementioned relationships.

**Research Findings/Insights:** Using a unique longitudinal dataset comprising 6,813 NTBFs from six European countries, we find that higher quality legal systems increase the use of outside financing. Less forgiving personal bankruptcy laws decrease the use of outside financing. More importantly, VC ownership strengthens the abovementioned relationships.

**Theoretical/Academic Implications:** This paper provides new evidence on the link between national legal systems and the financing of NTBFs. More significantly, we address recent calls for more research that integrates institutional and agency frameworks. Specifically, this paper shows that the financing of NTBFs is the outcome of both national institutional frameworks and firm-level corporate governance.

**Practitioner/Policy Implications:** NTBFs play a key role in employment and wealth generation in our modern knowledge-based economies. Yet, access to sufficient and adequate financing is a critical barrier in the development of these firms. This study informs policy makers on the role of national institutions, firm-level corporate governance and their interaction on the financing strategies of NTBFs.

**Keywords:** Corporate Governance, Financing, Legal Quality, Personal Bankruptcy Laws, Venture Capital

## INTRODUCTION

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A rich literature shows how the institutional framework of the country in which firms are incorporated impacts their financing. Seminal work on law and finance, for instance, has shown that countries with higher quality legal systems have larger and more developed equity and debt markets (Armour & Cumming, 2006; Djankov, McLiesh, & Shleifer, 2007; Groh, von Liechtenstein, & Lieser, 2010; La Porta, Lopez-de-Silanes, Shleifer, & Vishny 1997). Higher quality legal systems increase the supply of financing towards firms because they decrease the costs of investors to monitor entrepreneurs and curb the scope for entrepreneurs to maximize private benefits (Cumming, Schmidt, & Walz, 2010). A largely separate stream of research has focused on how firm-level corporate governance systems relate to firms' financing strategies. Agency theorists in particular have, for example, focused on the role of large (and often public) shareholders as governance factors that may reduce agency problems (Brush, Bromiley, & Hendrickx, 2000; Demsetz & Lehn, 1985; Shleifer & Vishny, 1986), which influence firms' financing strategies (Jensen & Meckling, 1976).

More recently, multiple scholars have called for an integration of the above research streams because country-level institutional frameworks and firm-level corporate governance mechanisms may operate as interdependent systems in controlling agency problems (Aguilera, Filatotchev, Gospel, & Jackson, 2008; Strange, Filatotchev, Wright, & Buck, 2009). Several recent studies on Initial Public Offerings (IPOs) have indeed demonstrated that the effectiveness of corporate governance systems at the firm level is likely to differ significantly from country to country (Bruton, Filatotchev, Chahine, & Wright, 2010; Chahine & Saade, 2011).

Most studies investigating the role of country-level institutional frameworks or corporate governance systems on firms' financing strategies focus on public firms. Nevertheless, it is generally acknowledged that New Technology-Based Firms (NTBFs) contribute significantly to the development of our modern knowledge-based economies in terms of exports, employment, innovations and the like (e.g., Colombo & Grilli, 2005; Knockaert, Ucbasaran, Wright, & Clarysse, 2011; Storey & Tether, 1998). Due to high information asymmetries and agency problems, these firms face considerable difficulties in raising sufficient outside financing (Berger & Udell, 1998). It is hence surprising that to date, scholars have primarily focused on the independent effects of either country-level institutional frameworks or firm-level corporate governance systems as mechanisms which may ease information asymmetry and agency problems and as such facilitate access to outside financing for NTBFs. The goal of the present paper is to integrate a country-level institutional perspective and a firm-level agency perspective to explain financing strategies in NTBFs. More specifically, we ask the following research questions: (a) how do cross-country differences in legal quality and personal bankruptcy

laws influence financing strategies of NTBFs and (b) how does venture capital (VC) ownership as a mitigating factor of agency risk influence these relationships?

We focus on VC ownership as an important firm-level governance mechanism in NTBFs because VC investors are frequently described as initiators of good governance mechanisms in their portfolio firms (Bottazzi, Da Rin, & Hellmann, 2008; Knockaert, Lockett, Clarysse, & Wright, 2006; Lerner, 1995; Sapienza, Manigart, & Vermeir, 1996; Van den Berghe & Levrau, 2004). They are typically more actively involved than non-management shareholders in public firms, including institutional shareholders (Wright & Robbie, 1998), thereby actively monitoring entrepreneurs and decreasing agency risks (Gompers, 1995). Furthermore, VC investors are often one of the most important shareholders in NTBFs, ranked second behind entrepreneurs themselves (George, Wiklund, & Zahra, 2005).

To address the research questions, we take advantage of a unique longitudinal database comprising a sample of 6,813 NTBFs from six European countries (Belgium, Finland, France, Italy, Spain and U.K.), of which 606 firms have VC investors as shareholders. While the countries in our sample are geographically close to each other, they are characterized by significant differences in institutional frameworks (Bruton et al., 2010). Furthermore, focusing on a more homogenous sample of developed European countries helps to minimize unobserved heterogeneity among countries (Armour & Cumming, 2006).

The contributions of our study are two-fold. First, this paper expands on previous research that studied how cross-country differences in legal systems influence the financing strategies of firms. Prior work has largely focused on the relationship between creditor or shareholder rights and financing decisions in public firms (e.g., Acharya, Amihud, & Litov, 2011; Roberts & Sufi, 2009; Seifert & Gonenc, 2012). This is unfortunate because the vast majority of firms never reach the stage where they become public (Berger & Udell, 1998) and extant research has shown how financing decisions are very different in public versus private firms (Brav, 2009). Moreover, given our focus on private NTBFs, we focus on an important but often overlooked aspect of law, namely personal bankruptcy laws, and study their impact on the financing of entrepreneurial firms. Although these laws have been argued to be particularly relevant for influencing entrepreneurial activity (Armour & Cumming, 2008), we know little about their role in NTBFs' financing decisions. While Armour and Cumming (2006) show that more forgiving bankruptcy laws stimulate the development of VC markets at the country level, they also call for more research that captures the firm-level effects of these laws. We contribute to this call with the current study and show how personal bankruptcy laws influence the financing strategies of NTBFs. Finally, previous research has studied how differences in the quality of legal systems affect the financing behavior of VC investors (Cumming et al., 2010; Bottazzi, Da Rin, & Hellmann, 2009, Lerner & Schoar, 2005). For this purpose, prior research has exclusively focused on

VC-backed firms and the financing provided by VC investors, which raises important selection problems (Cosh, Cumming, & Hughes, 2009; Cumming et al., 2010). We address this shortcoming in the literature by studying the role of the quality of legal systems on the financing strategies of both VC-backed and non-VC-backed firms.

A second major contribution of the present research is its contribution to a further integration of institutional theory and agency theory (Filatotchev & Boyd, 2009). On the one hand, studies drawing on institutional theory focus on those institutions which shape “the rules of the game in a society” (North, 1990, p. 3) but largely ignore the impact of firm-level corporate governance systems. In these studies, entrepreneurs are more or less passive, and may be advantaged or disadvantaged based on the country from which they operate. On the other hand, studies drawing on agency theory focus on how corporate governance mechanisms at the firm level affect firm development but typically ignore the impact of different institutional frameworks. In these studies, entrepreneurs are often assumed to operate within an institutional vacuum. Multiple scholars have called for an integration of both perspectives, because our understanding of the effectiveness of governance systems would benefit from viewing these systems as operating as a bundle of interdependent systems (Aguilera et al., 2008; Filatotchev & Boyd, 2009). Nevertheless, our understanding of the nature of these interdependencies is limited. This study is one of the first that provides large sample evidence of the combined effect of national legal systems and firm-level governance factors, such as VC ownership, on the financing of NTBFs. We argue and show that the financing strategy of NTBFs is the complex outcome of both national legal systems and firm-level corporate governance factors.

The rest of this article is organized as follows. In the following section, we provide the theoretical background of this paper. Then, we develop specific hypotheses. Thereafter, we discuss the method, including the sample, variables and econometric approach used. Next, we present the main research findings. Finally, we conclude by discussing our results from both a theoretical and practical perspective.

## THEORETICAL BACKGROUND

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Much of corporate governance research is concerned with the mechanisms that mitigate agency problems (Jensen & Meckling, 1976). When NTBFs raise outside equity financing, two related types of agency problems may emerge (Gompers, 1995). First, entrepreneurs may invest in projects that have high personal returns but low expected monetary payoffs to outside shareholders. When entrepreneurs have raised outside equity financing, they still receive all of the benefits related to the consumption of perquisites but no longer bear all of the costs. Second, entrepreneurs who possess private information may choose to continue investing in value destroying projects. Entrepreneurs, for instance, may want to undertake inefficient continuation of their firms because they provide them significant private benefits including independence. Additional agency problems may emerge when firms raise outside debt financing (Myers, 1977). For instance, entrepreneurs may sell assets to pay themselves dividends thereby leaving less value to debtors in case of bankruptcy; they may take excessive risks of which the costs are primarily borne by debtors; or they may reject value creating projects in which the proceeds would accrue primarily to debtors. Not surprisingly, such agency problems make the financing of NTBFs a process fraught with difficulties (Cassar, 2004; Heyman, Deloof, & Ooghe, 2008; Gompers, 1995).

To date, two largely separate streams of work have focused on the factors which may mitigate agency problems when NTBFs raise outside financing. First, since the seminal work by La Porta and colleagues (1997), a significant body of research has argued and shown that national laws affect the costs and benefits of investors related to monitoring entrepreneurs and as such influence the supply of outside sources of financing. Specifically, the costs associated with monitoring entrepreneurs is lower in higher quality legal systems, which reduces the scope for entrepreneurs to maximize private benefits (Cumming et al., 2010). This explains why both equity (including VC) markets and debt markets are larger and more developed in countries with higher quality legal systems (Armour & Cumming, 2006; Djankov et al., 2007; Groh et al., 2010; La Porta et al., 1997) thereby increasing the supply of debt and equity financing.

Second, agency theorists have long considered the monitoring role of large outside shareholders as a governance mechanism that may reduce specific agency problems (Brush et al., 2000; Demsetz & Lehn, 1985; Shleifer & Vishny, 1986). In NTBFs, VC investors are often one of the most important owners next to entrepreneurs themselves (George et al., 2005). Unlike other institutional investors, such as pension funds, insurance firms and banks, VC investors are more active and act more like reference shareholders (Van den Berghe & Levrau, 2004). VC investors engage in extensive monitoring of their portfolio firms through shareholders agreements,

differentiated shareholders rights, board membership and intense relationships with management. Besides monitoring, VC investors also provide value adding services, including the professionalization of their portfolio firms (Hellmann & Puri, 2002; Sapienza et al., 1996). Finally, VC investors may signal firm quality to other prospective investors, thereby making these investors more likely to contribute financing (Janney & Folta, 2003).

Despite the value of these two separate streams of research, scholars increasingly argue that the effectiveness of corporate governance mechanisms, including block ownership by VC investors, differs significantly from country to country (Bruton et al., 2010; Chahine & Saade, 2012; Dharwadkar, George, & Brandes, 2000; Douma, George, & Kabir, 2006; Hoskisson, Cannella, Tihanyi, & Faraci, 2004). However, to date, we have only limited knowledge on how country-level and firm-level corporate governance systems operate together and influence the financing strategies of NTBFs. Indeed, ambiguous results in the corporate governance literature (e.g., Dalton, Daily, Certo, & Roengpitya, 2003) have often been attributed to the lack of attention towards multiple governance mechanisms which may interact with each other (Aguilera et al., 2008). Hence, Filatotchev and Boyd (2009) state that “although the vast majority of previous corporate governance studies are predominantly focused on organizational aspects in a single-country setting, future research should also focus on national systems or corporate governance and their interactions with firm-level governance factors” (p. 263).

A major question is whether national and firm-level systems act as substitutes or complements. In a substitution framework, national governance mechanisms and firm-level corporate governance mechanisms may substitute for one another (Dalton et al., 2003). Klapper and Love (2004), for instance, show that firms can (partially) compensate for ineffective laws and enforcement at the country level by establishing good corporate governance at the firm level. In contrast, others suggest that country-level and firm-level governance mechanisms operate in a complementary manner (Aguilera et al., 2008). Specifically, higher quality national laws and firm-level corporate governance mechanisms may mutually enhance each other such that their combined presence increases their effectiveness. Chahine and Saade (2012), for instance, confirm the existence of a complementary relationship between the level of shareholder protection at the country level and board independence at the firm level in reducing IPO underpricing.

In what follows, we first develop hypotheses on the relationship between country-level institutional systems, focusing on the quality of a country’s legal system and on personal bankruptcy laws, and the financing of NTBFs. Next, we discuss how VC investors may moderate abovementioned relationships.



## HYPOTHESES

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### National Legal Systems and the Financing of NTBFs

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As higher quality legal systems allow for more transparency and possibilities to enforce contracts and thereby reduce the agency costs for outside investors associated with investing in firms, higher quality legal systems lead to larger and more developed equity and debt markets (La Porta et al., 1997). Much research in the law and finance tradition, however, has focused on the development of public equity and debt markets which are only accessible for large and mature firms (e.g., La Porta et al., 1997), and thereby ignoring those financial markets which are accessible for NTBFs, such as the VC market.

Recently, Groh and colleagues (2010) showed that VC and private equity investment activity is positively related to a country's investor protection in Europe. Higher quality legal systems may also be relevant for private debt investors. Djankov and colleagues (2007) investigate cross-country determinants of private credit, using data on private and public credit registries. Their results suggest that both creditor protection through the legal system and information-sharing institutions are associated with higher ratios of private credit to gross domestic product. Higher quality legal frameworks and corporate governance at the country level are hence expected to increase the supply of outside financing, including outside equity and debt, to NTBFs.

Higher quality legal systems are not only likely to increase the supply of outside financing, but may also stimulate the demand for outside financing. First, private equity transactions in countries with higher quality legal systems have higher valuations (Lerner & Schoar, 2005). This implies that for a given investment, entrepreneurs can retain a larger equity stake, which is important because this determines their future financial return and their control over the firm. Hence, VC will be more attractive for entrepreneurs operating in countries with higher quality legal systems and higher ensuing valuations. Second, the search costs for entrepreneurs are lower in countries with higher quality legal systems, as investors are likely to provide financing more quickly (Cumming et al., 2010). Many NTBFs require significant amounts of outside financing to fund their founding and subsequent development (Cosh et al., 2009; Robb & Robinson, 2012; Vanacker & Manigart, 2010). The lower cost of outside financing combined with an increased supply of outside financing in countries with higher quality legal systems may stimulate entrepreneurs to demand more outside financing. Therefore,

*Hypothesis 1: Higher quality legal systems will be associated with the use of more outside financing (including outside equity and debt) in NTBFs.*

Prior academic research has related entrepreneurship to personal bankruptcy laws (Armour & Cumming, 2008). Personal bankruptcy laws are widely regarded as having a direct influence on entrepreneurs even when entrepreneurs are seeking to incorporate their firms as limited liability firms. First, prior to incorporation entrepreneurs typically use their own sources of financing first before raising outside financing (Berger & Udell, 1998). Second, creditors frequently demand personal guarantees from entrepreneurs, which is tantamount to “contracting out” the liability shield incorporation provides to entrepreneurs (Armour & Cumming, 2008). Hence, national personal bankruptcy laws significantly influence the strategies of entrepreneurs. Countries with more forgiving personal bankruptcy laws, reflected in the ability of bankrupt entrepreneurs to obtain a fresh start (i.e., a discharge from pre-bankruptcy indebtedness) have larger VC markets (Armour & Cumming, 2008). Aggregate data on the development of VC markets as a whole, however, do not capture the details of how individual entrepreneurs adjust their financing strategies in response to different bankruptcy laws. Two opposing forces might be at work. On the one hand, outside investors may be more willing to provide financing to entrepreneurial firms when bankruptcy laws are less forgiving, as these enable investors to recuperate a larger fraction of their investment. On the other hand, entrepreneurs may limit their demand for outside financing as a result of less forgiving bankruptcy laws because these laws increase entrepreneurs’ personal risk when their firms go bankrupt.

We argue that demand-side arguments dominate, as there is significant evidence that entrepreneurs have a strong influence on the financing policies of their firms. Eckhardt, Shane, and Delmar (2006), for instance, show how outside investors can only invest in those firms where entrepreneurs are willing to raise outside financing. Many entrepreneurs are reluctant to raise outside financing because outside investors may limit the independence of entrepreneurs or may even push their firms into bankruptcy under certain conditions (Manigart & Struyf, 1997; Sapienza, Korsgaard, & Forbes, 2003). For instance, although banks do not intervene in the day-to-day operations and strategic planning of firms, when firms are unable to fulfill fixed debt-related payments (i.e., interest and principle amount) banks can push firms into bankruptcy (Balcaen, Manigart, Ooghe, & Buyze, 2013). Equity investors such as VC investors limit the independence of entrepreneurs through their active involvement, although they may also help entrepreneurs to realize more than what would be possible when they go it alone. Further, outside shareholders have a portfolio perspective and may decide to de-commit themselves from a portfolio firm when other investments in their portfolio are expected to create more value. This may lead to bankruptcy

(Cumming & Dai, 2012; Dimov & De Clercq, 2006), even if the focal firm would still be viable for the entrepreneur. The above is especially problematic for entrepreneurs operating in countries with less forgiving bankruptcy laws. For example, while in some countries entrepreneurs are discharged from their firm's liabilities after bankruptcy, in other countries they may be held personally liable for all remaining liabilities for a number of years or even indefinitely (Armour & Cumming, 2008). The fact that personal discharge is not available strongly increases the personal risk of entrepreneurs and limits them to obtain a fresh start and become independent entrepreneurs in the future after having experienced a bankruptcy. Hence, entrepreneurs will be less likely to seek outside equity or debt financing for their NTBFs in countries with less forgiving bankruptcy laws.

Overall, although outside investors may be more willing to provide financing to entrepreneurial firms when bankruptcy laws are less forgiving, we expect that entrepreneurial motives will dominate. Specifically, entrepreneurs operating in countries with less forgiving bankruptcy laws will be less likely to seek outside sources of financing. Thus,

*Hypothesis 2: Less forgiving bankruptcy laws will be associated with the use of less outside financing (including outside equity and debt) in NTBFs.*

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## VENTURE CAPITAL AND THE RELATIONSHIP BETWEEN NATIONAL LEGAL SYSTEMS AND THE FINANCING OF NTBFs

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We argued that higher quality and more forgiving legal systems will be associated with the use of more outside financing. So far, however, we have ignored how firm-level governance systems may influence the relationship between national legal systems and the use of outside financing. One particular firm-level corporate governance system on which we focus in this study is VC ownership. VC investors play a particularly important role in NTBFs not only because they are expert monitors, but also because they influence the governance systems in their portfolio firms (Gompers, 1995; Sapienza et al., 1996; Van den Berghe & Levräu, 2004). VCs are, for example, instrumental in expanding the management teams of their portfolio firms with key employees (Jain & Kini, 1999), replace them with more professional managers (Hellmann, 1998; Gorman & Sahlman, 1989; Sahlman, 1990; Barry, Muscarella, & Peavy, 1990) and install more independent directors (Williams, Duncan, & Ginter, 2006; Suchard, 2009) that reduce the agency risks related to entrepreneurs' opportunism (Hellmann, 1998). We hence argue that VC ownership will influence the relationship between the quality of national legal systems and the use of outside financing in a number of ways.

Several arguments may be advanced to suggest that VC ownership substitutes for the quality of legal systems at the country level. First, VC investors are known to write extensive contracts which govern the relationship between entrepreneurs and outside shareholders (Kaplan & Strömberg, 2004). These contracts can cover gaps in national legal frameworks (Abdi & Aulakh, 2012) as VC investors often have the flexibility to adopt or decline specific provisions which affect the level of legal protection (Chahine & Saade, 2011; Klapper & Love, 2004). Specifically, the capacity of contracting to establish the obligations (typically of entrepreneurs) and privileges (typically of VC investors) in different aspects of the investment relationship can remedy for the absence of high quality national laws. Consequently, VC-backed firms in countries with weak investor protection may still be able to raise significant amounts of outside financing despite weak governance frameworks at the country level.

Second, termination rights and contractual hostages are two mechanisms which may further reduce the dependence on national legal frameworks (Abdi & Aulakh, 2012). Termination rights entail that VC investors can unilaterally decide to stop providing further (financial) support to their portfolio firms. VC investors typically do not provide all financing at once, but rather engage in staged financing, which allows them to limit their losses when specific portfolio firms do not perform according to expectations (Gompers, 1995). When inside VC investors decide not to provide additional financing this often has far reaching consequences, as outside investors will interpret this as a negative signal of firm quality, thereby limiting a firm's ability to raise additional financing from new financing sources. Contractual hostages entail that VC investors are often endowed with rights to block particular decisions. Such hostages further relieve the dependence on legal frameworks, since opportunistic behavior can be blocked directly with limited reliance on national legal systems (Abdi & Aulakh, 2012). Thus,

*Hypothesis 3A: VC ownership will decrease the positive relationship between higher quality legal systems and the use of more outside financing in NTBFs (substitutive relationship).*

A different stream of reasoning challenges the above claims and argues for a complementary relationship between the quality of national legal systems and VC ownership. Inadequacies in the legal enforcement of contracts entail that contractual provisions have a restricted capacity to cover for gaps in national legal systems (Abdi & Aulakh, 2012). Contractual governance used by investors to reduce agency problems is hence only valuable when investors have access to an effective national legal system. Another reason why contractual provisions may be insufficient to cover for gaps in legal systems is the incomplete nature of contracts themselves. Specifically, under high uncertainty, the

parties involved in a contract are not able to include all contingencies (Hart, 1995). This explains why the quality of national legal systems is expected to remain important even when investors are able to write extensive contracts. The above entails that VC investors may be more effective in reducing agency problems through contractual monitoring when they operate in countries with high quality legal systems, which should benefit the likelihood that they will provide additional financial support towards their portfolio firms in these countries. The additional financial resources provided by VC investors may furthermore provide a positive signal to other prospective investors thereby increasing their likelihood of contributing new financial resources as well (Janney & Folta, 2003). This leads to the following alternative hypothesis:

*Hypothesis 3B: VC ownership will increase the positive relationship between higher quality legal systems and the use of more outside financing in NTBFs (complementary relationship).*

We previously argued that less forgiving bankruptcy laws will be associated with the use of less outside financing in entrepreneurial firms. VC investors, however, are expected to influence the relationship between personal bankruptcy laws and the use of outside financing. Specifically, when VC investors are present, we expect that entrepreneurial firms will use even less outside financing in countries with less forgiving bankruptcy laws. Entrepreneurs typically invest a significant part of their personal wealth in their own firms (Berger & Udell, 1998). Consequently, the wealth of entrepreneurs is often linked to the outcome of one particular firm. Entrepreneurs will hence avoid their firms going bankrupt with all means possible and may even prefer their firms to continue although this is inefficient from an economic point of view. For VC investors, however, a specific entrepreneurial firm is only one of their investment projects. VC investors are hence less affected when one of their portfolio firms goes bankrupt. Indeed, VC investors typically get most of their returns from only one or a few successful exits from their larger portfolio in which most investments eventually turn out to be outright failures (Sahlman, 1990). When firms raise additional financing from increasingly broader pool of equity investors, this may decrease the commitment by any investor, thereby increasing the risk of bankruptcy (Dimov & De Clercq, 2006).

As VC investors are less concerned with the failure of one specific portfolio firm, entrepreneurs who raised VC financing in the past might become extremely wary to raise additional outside financing. For these firms, raising additional equity financing typically implies increasing the size of the VC syndicate and hence reducing VC investors' commitment, thereby increasing the risk of bankruptcy (Dimov & De Clercq, 2006). This is especially detrimental for entrepreneurs in a context where entrepreneurs are confronted with less forgiving personal bankruptcy laws. Moreover, all else equal, the more outside financing is raised from outside investors the higher will be their power to

push firms towards bankruptcy when (financial) problems emerge. While VC investors, for instance, are known to support their portfolio firms, it is also well-established that they eventually focus most of their attention towards those firms with the highest prospects and de-commit from portfolio firms with poor prospects (Puri & Zarutskie, 2012). This may make entrepreneurs who previously raised VC financing particularly wary to raise additional outside financing in countries with less forgiving bankruptcy laws. Thus,

*Hypothesis 4: VC ownership will increase the negative relationship between less forgiving bankruptcy laws and the use of less outside financing in NTBFs.*

## METHOD

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### Sample and Data Sources

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In order to test the hypotheses, a unique, hand-collected longitudinal dataset of 6,813 NTBFs from six European countries (Belgium, Finland, France, Italy, Spain and the U.K.) is used<sup>1</sup>. NTBFs that received VC financing were identified from several public data sources including press clippings, VC websites, commercial databases (VentureXpert, Zephyr, country-specific databases). VC-backed NTBFs were included if they satisfied four criteria at the time of their initial VC investment. First, the initial VC investment occurred between 1994 and 2004. Initial VC investments were divided between the pre-bubble, the bubble and the post-bubble investment period as VC investment strategies have proven to be significantly different in each period (Gompers & Lerner, 2001) and to mitigate as such potential biases due to the selection of VC-backed firms in only one single investment period. Second, at the time of the initial VC investment all firms were maximum ten years old. This ensures we study young firms that raised VC financing, rather than mature firms that raised buy-out financing or other types of private equity financing. Third, firms were active in high-tech industries which were identified from the NACE Rev2 classification system. The NACE Rev2 sectors were reclassified into more aggregate sectors following the transformation guidelines provided by the European Venture Capital and Private Equity Association (EVCA): Life Sciences (Biotech and Pharmaceutical), Communication (Telecom), ICT (ICT Manufacturing), Internet Related (Internet and Web Publishing), Software and Other (including Aerospace, Energy, Nanotech, Other R&D and Robotics). Fourth, firms

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<sup>1</sup> Data were gathered through the European VICO project, which is described in detail by Bertoni and Pellón (2011). Germany is excluded from our study because almost no relevant accounting data, needed for the purpose of this study, is available on German firms.

were independent at first investment, which implies they were not controlled (< 50 percent) by a third party.

After the identification of the VC-backed NTBFs, a control group was randomly selected from the population of NTBFs that did not receive VC funding, using similar criteria with respect to country of origin, founding period (age), high-tech industries and independence as described above. The population of NTBFs was derived from the country-specific economy-wide databases or Amadeus (Bureau van Dijk). For each VC-backed firm, ten non-VC backed firms were selected. The ten-to-one ratio reflects the importance of VC financing for NTBFs (Bottazzi & da Rin, 2002; Puri & Zarutskie, 2012). It was additionally checked whether firms in the control group had never received VC in any form.

For each firm, yearly financial statement and employment data was collected through the Amadeus database or an equivalent country specific database from the year the firms entered the database until 2007 or until the firms disappeared (either through bankruptcy or through acquisition). This procedure entails that we limit survival bias because our database also includes firms which eventually fail. Further, yearly non-financial data such as the number of patent applications (Patstat database) or important events that occurred during the period of analysis such as Initial Public Offerings and Mergers and Acquisitions were registered. As our study focuses on the financing strategies of private firms, 297 firm-year observations were excluded for reason that the NTBFs transformed from private into public firms which is likely to have a significant impact on financing strategies (Brav, 2009). Pre-IPO years, however, were kept in the database. Finally, 398 firm-year observations were excluded because of missing data. This results in a final sample of 6,813 NTBFs of which 606 raised VC, and 50,135 firm-year observations of which 3,734 from VC-backed firms.

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Insert Table 1 about here

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Table 1 provides a description of the sample by breaking down the number of firm by country, foundation period and sector. Nearly 25 percent of the firms in the sample are French, closely followed by the U.K. (23 percent). Italian firms represent 15 percent of the sample, Belgian and Spanish firms each 13 percent and Finnish firms 11 percent. Nearly 37 percent of all firms were founded between 2000 and 2004, 31 percent between 1995 and 1999, 18 percent between 1990 and 1994 and 14 percent between 1984 and 1989. Most firms operate in the software industry (45 percent), followed by ICT (17 percent), internet (12 percent), life sciences (9 percent) and

communication (5 percent). The other industries represent the remaining 12 percent. Obviously, VC-backed NTBFs and the random sample of non-VC-backed NTBF will not perfectly match with each other since entrepreneurs select their firms as candidates for receiving VC financing and VC investors select firms in which they want to invest based on observable and unobservable firm characteristics (Eckhardt, Shane, & Delmar, 2006). We control for such selection issues in our econometric models (see more details below).

## Dependent Variables

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The dependent variables of interest in this study include measures of incremental financing events and capital structure. Book values retrieved from balance sheets are used to calculate different measures as market variables are unavailable for private firms (Brav, 2009). Previous research has shown that the use of book values is not a serious limitation when studying outside financing and capital structure decisions (Fama & French, 2002; Leary & Roberts, 2005).

Following previous research, multiple constructs are selected as dependent variables, reflecting incremental finance decisions and capital structure (Brav, 2009; Cosh, Cumming, & Hughes, 2009). These include raising outside financing (External Financing), the amount of outside financing raised (Ln External Financing), the choice between outside equity versus outside debt (Equity/Debt), the amount of outside equity raised (Ln Equity) and the amount of outside debt raised (Ln Debt). We further model capital structure decisions with the financial debt ratio (Leverage) as dependent variable. While the measures reflecting financing events capture more the dynamics of financing strategies at particular points in time, the capital structure of firms provides a snapshot of all previous financing events (de Haan & Hinloopen, 2003).

External Financing is a dummy variable that takes the value of one if a firm raised external finance in a given year  $T$ . Raising external finance is defined as a minimum five percent increase in the total amount of outside debt and equity from year  $T-1$  to year  $T$ , relative to pre-issue total assets. The minimum threshold of five percent benefits the comparability of our study with prior research and allows us to study significant financing events (Brav, 2009; de Haan & Hinloopen, 2003; Leary & Roberts, 2010; Vanacker & Manigart, 2010). Firms may issue only outside debt, only outside equity or both in year  $T$ . A second variable, Equity/Debt, is a dummy variable equal to one if firms raise outside equity and zero if firms raise outside debt, treating equity and debt issues as mutually exclusive financing events (see Helwege and Liang (1996) for a similar approach). The amount of outside financing raised in any given firm-year—including both external equity and debt—(Ln External



Financing), of external equity (Ln Equity) and of debt (Ln Debt) were log-transformed before they were studied. Our construct for capital structure, Leverage, is defined as the ratio of total financial debt on total assets.

## Independent Variables

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The main explanatory variables in the regression models are constructs that measure country-level differences and firm-level differences in corporate governance systems. At the country-level, we include differences in the quality of the legal framework (Legality Index) and differences in the severity of personal bankruptcy law reflected by the ability of entrepreneurs to obtain a fresh start after bankruptcy (Discharge Not Available). At the firm-level, we include the effectiveness of corporate governance reflected by VC ownership (VC).

**Legality Index.** Legality Index is a measure for the quality of the legal framework in each country. We use the legality index developed by Berkowitz, Pistor, and Richard (2003), which is the weighted sum of legal measures derived from La Porta et al. (1997, 1998, 2000), for several reasons. First, Cumming, Fleming and Schwienbacher (2006) have shown that this legality index captures differences in national corporate governance systems which are particularly relevant for NTBFs, more specifically differences in IPO activity. Second, the legality index is positively related with firm-level governance mechanisms like the screening and monitoring activities of VC investors (Cumming, Schmidt, & Walz, 2010). Third, the legality index is derived from laws pertaining to investing, the quality of enforcement and the need that they will need to be enforced (Cumming, Fleming, & Schwienbacher, 2006) which are laws that are relevant for outside investors in NTBFs.

**Discharge Not Available.** The variable used to measure cross-country differences in personal bankruptcy law, i.e. whether entrepreneurs are able or unable to obtain a fresh start after bankruptcy, is based upon Armour and Cumming (2008) but extended to cover the period of study. The variable Discharge Not Available is a dummy variable that indicates whether there is a discharge from personal indebtedness for entrepreneurs after a bankruptcy or not. The dummy variable takes the value one if there is no discharge available for entrepreneurs and thus no opportunity to obtain a fresh start and takes the value zero if bankruptcy law foresees a discharge. Bankruptcy law was relaxed and a fresh start was introduced during the period of analysis in Belgium (1998), Finland (1993) and Italy (2006), so the Discharge Not Available dummy variable shifts from one to zero in the year in which the reform took place.

**VC.** Prior research indicates that the mere presence of VC investors as shareholders influences the operations and governance of firms (e.g., Hellmann & Puri, 2002; Puri & Zarutskie,

2012). The variable VC is a dummy variable that captures VC ownership and is hence a construct that measures firm-level differences in corporate governance systems. VC is equal to one from the year in which the firm receives VC financing (if any), and zero otherwise. In addition, we calculate interactions between the VC dummy variable and the country-level variables described above.

## Control Variables

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Control variables are used in the multivariate analyses, which are largely motivated by prior research. They can be aggregated in different categories.

**Firm Accounting Variables.** Extant corporate finance literature (Leary & Roberts, 2005, 2010; Brav, 2009, Fama & French, 2002) has shown that firm-level accounting variables are important determinants of external finance decisions. The amount of internal resources available is defined as the beginning year's cash level plus the net operating cashflow minus the change in working capital (Leary & Roberts, 2010). Internal resources are further split into Deficit Funds and Surplus Funds where respectively negative values of internal resources are reported and positive values are set equal to zero (deficit variable) or vice versa (surplus variable) (Leary & Roberts, 2010; Helwege & Liang, 1996). We further control for Size (the logarithm of total assets), Net working capital (accounts receivable + inventory – accounts payable), Tangible (asset tangibility), Short Term to Tot Debt (the proportion of short term debt to total debt) and T-A Leverage (target minus actual leverage scaled to total assets). Target leverage is defined as the predicted leverage obtained from a standard OLS leverage regression (Brav, 2009). In our capital structure regression model, we substitute the amount of internal funds by ROA (return on assets, defined as EBIT scaled to the average of current and preceding total assets) and control for CAPEX (the amount of capital expenditures scaled to total assets).

**Firm Non-Accounting Variables.** The second category of control variables are non-accounting firm-level variables. We control for a firm's growth in employees (Employee Growth) as high-growth firms need more external financing (Gompers, 1995, Mande, Park, & Son, 2012). We further control for firm age (Log Firm Age) and the cumulative number of patent applications (# of Patent Applications), as both firm age and innovativeness (captured by the number of patent applications) are indicators of a firm's degree of asymmetric information which may affect outside finance options (Myers, 1984).

**Other Control Variables.** Finally, country-level variables control for between-country differences apart from personal bankruptcy law or legal quality. Differences in economic

development (GDP Growth) and the development of capital markets (MSCI (Morgan Stanley Capital International) index) that might affect entrepreneurial activity (Armour & Cumming, 2008) are included. We further control directly and indirectly for differences in entrepreneurial activity by including Self Employment as a percentage of total employment and Personal minus Corporate tax rate (Groh, von Liechtenstein, & Lieser, 2010). Remaining time-variant effects and industry effects are captured by year dummies and industry dummies.

## Econometric Approach

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Five regression specifications study outside financing decisions. Probit models are used for the estimation of External Financing and Equity/Debt because the dependent variables are dummy variables. Tobit models are used for the estimation of Ln External Financing, Ln Equity and Ln Debt. Tobit models account for the fact that the log transformed variables of the amount of financing are truncated below by zero (Cosh, Cumming, & Hughes, 2009). Capital structure is studied using Leverage as dependent variable in a pooled OLS regression model. If the probability of attracting VC is correlated with the residuals of outside finance decisions or capital structure, the reported results might suffer from a selection bias. In all models we therefore include an Inverse Mills Ratio (obtained from a probit model estimating the probability that firms raise VC financing). The Inverse Mills Ratio corrects for possible selection biases that arise if firms self-select into VC financing or VCs select particular firms based on observable and unobservable characteristics (Heckman, 1979).

The control variables Surplus Funds, Deficit Funds, Tangible, and CAPEX are scaled by total assets to control for size effects and to mitigate heteroskedasticity (Brav, 2009). Size, Employee Growth, Net Working Capital, Tangible, Short Term to Tot Debt, T-A Leverage, ROA and CAPEX are lagged one year to limit potential endogeneity issues. The regressions also include a constant, year and industry fixed effects.

All currency variables are in thousands of euros and corrected for inflation (2008=100). In order to mitigate the impact of potential sample outliers, variables were winsorized at the five percent level (one-tail winsorizing) if needed.

Firm-years are the unit of analysis. The coefficients of the regression models are corrected for heteroskedasticity and correlation across observations of a given firm by the clustering technique (Petersen, 2009). We report marginal effects to show the economic significance alongside the statistical significance (Cosh, Cumming, & Hughes, 2009).

## RESULTS

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### Descriptive statistics and correlations

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Table 2 reports descriptive statistics and the correlation matrix. Panel A reports correlations per country-year observation (e.g., country X-1996; 97 observations in total), Panel B reports correlations per firm-year observation (e.g., firm X-1996; 50,132 observations in total).

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Insert Table 2 about here

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The average value of Legality Index is 19.47. The index value for Finland (21.49), Belgium (20.82), U.K. (20.41) and France (19.67) are above the average value, the index value for Italy (17.23) and Spain (17.13) fall below the average value. The mean value of Discharge Not Available is 0.38, which indicates that in 62 percent of the observations entrepreneurs could obtain a fresh start after bankruptcy. VC ownership was reported in on average 7 percent of the firm-year observations. Firms are on average 5 years old, have 13 percent of tangible assets and a 4 percent profit margin. External Financing was raised in on average 38 percent of the firm-year observations. Conditional on raising external financing, the average amount of external financing raised is 3.6 million. Equity (on average 4.1 million) accounts for 43 percent of all financing events, debt (on average 2.2 million) accounts for 57 percent. Leverage is on average 15 percent.

The Pearson correlation coefficients between on the one hand the Legality Index and on the other hand debt financing (Equity/Debt), the amount of equity (Ln Equity Amount) and financial debt ratios (Leverage) are significantly positive ( $p < 5\%$ ). This is consistent with the first hypothesis. Discharge not Available is a dummy variable and hence its correlations should be interpreted with care. Keeping this caveat in mind, correlation coefficients are significantly negative ( $p < 5\%$ ) between Discharge not Available and the amount of external financing (Ln External Amount), the amount of equity (Ln Equity Amount) and financial debt ratios (Leverage), which is consistent with the second hypothesis.

Unreported Variance Inflation Factors (VIF) indicate that high correlations between the Legality Index variable, the Discharge Not Available variable, the VC dummy and their respective interactions may lead to multicollinearity problems ( $VIF > 10$ ). We therefore orthogonalize these

variables in Stata (using the orthog procedure) and create new orthogonal variables that are used to replace the original variables in the regression models. Pollock and Rindova (2003) provide more details on this procedure.

## Multivariate analyses

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Controlling for selection issues at the firm-level. We first model the propensity of firms to raise VC financing, as a first step in the two-step Heckman procedure; the outcome is shown in Appendix. Following Eckhart, Shane, and Delmar (2006), the VC selection process is a two-stage process in which entrepreneurs first self-select their firms as candidates for VC financing and in the second stage VC investors select firms from the pool of firms willing to attract VC funding. Irrespective of who selects whom (Hellmann, 2008), the first step of the Heckman correction method reports estimates for the only observable outcome of this selection process, namely the event of attracting VC financing.

The dependent variable in the selection equation, VC, is a dummy variable equal to one from the moment the firm raises VC financing, zero otherwise. The independent variables that are expected to influence the probability of VC financing are the amount of internal funds available, disaggregated into Surplus Funds and Deficit Funds. Entrepreneurs are often reluctant to give up control thus VC financing is typically viewed as a last resort type of outside financing (Vanacker & Manigart, 2010). We therefore expect that the likelihood of the VC financing event increases when internal resources are exhausted. Other control variables are Log Firm Age, Employee Growth, Size and # of Patent Applications as VC financing is typically associated with NTBFs with significant growth ambitions which are especially vulnerable to liabilities of newness and smallness (Zahra & Filatotchev, 2004). As a last determinant, the lagged inflation-adjusted yearly inflow of capital in the VC industry (VC inflowt-1) is included, which is likely to positively affect deal origination (Gompers & Lerner, 1996) and thus also the initial VC financing event. Fixed effects are included to control for all other country-, industry- and time specific factors that might affect the event of attracting initial VC financing.

Consistent with expectations, the probability of attracting VC financing increases significantly when deficit funds are larger and when firms are younger, report higher growth rates and have more patent applications. Firm size is positively associated with the probability of raising VC financing. A larger inflow of capital in the VC industry (VC Inflowt-1) also increases, as expected, the probability of the VC financing event.

In the subsequent section, we test our hypotheses after controlling for the propensity of firms to raise VC financing. To do so, we estimate an Inverse Mills Ratio, based on the probit model described above, which we include in all subsequent regression models.

Hypothesis Tests. To test Hypotheses 1 and 2, we run the multivariate regression models as reported in Table 3. All models are significant (unreported). The number of observations in each model is different, bounded by the number of observations of the dependent variable. For example, the use of external financing is defined for all firm-year observations (almost 13,000), but the amount of funding is conditional on raising outside finance, which was observed for 4,099 firm-year observations.

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Insert Table 3 about here

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Hypothesis 1 predicts that higher quality legal systems will be associated with the use of more outside financing in NTBFs, which is strongly supported ( $p < 0.1\%$ ). An increase of the Legality Index with one unit, which is approximately the difference between the U.K. (20.41) and Finland (21.49), increases the probability of outside finance with 17 percent, the amount of outside finance with approximately 50 percent (44 percent for outside debt) and 10 percent higher leverage. The quality of legal systems does not impact the choice between equity and debt, however, as the coefficient of Legality Index is insignificant in the Equity/Debt model. This suggests that equity and debt finance become equally more important in higher quality legal systems.

Hypothesis 2 predicts that less forgiving bankruptcy laws will be associated with the use of less outside financing in NTBFs. A change of the Discharge Not Available dummy variable from zero (fresh start) to one (no fresh start) decreases the probability of outside finance with 3 percent ( $p < 5\%$ ), decreases the amount of external financing with approximately 9 percent (8 percent for debt financing –  $p < 1\%$ ) and leads to a 1 percent lower leverage ( $p < 1\%$ ). These results thus empirically support the second hypothesis. Interestingly, the economic impact of a better overall legal system is higher than the impact of more forgiving personal bankruptcy laws.

VC ownership (VC) is also an important determinant of outside finance decisions. Compared with non-VC-backed NTBFs, VC-backed NTBFs raise on average more often and higher amounts of outside finance (both 3 percent), more often equity (5 percent) and higher amounts of equity (plus 4 percent) but less debt and lower amounts of debt (both 5 percent). Interestingly, leverage is not significantly different between VC and non-VC-backed firms. The inverse Mills ratio is negative and significant suggesting that there exists a negative association between the residuals of the selection model and the residuals of the outside finance models. The unobserved factors that are likely to

influence the probability of raising VC are thus negatively correlated with the unobserved factors that are likely to influence outside finance decisions.

The effects of the other significant firm-specific variables are largely in line with previous findings. More Surplus Funds lead to less outside finance but more Deficit Funds lead to more outside finance. Larger firms (Size) raise less often outside finance but the amounts are larger; they raise more equity (or less debt) (marginally significant). Firms with higher employee growth raise more often outside finance and more often debt (or less equity). A higher net working capital increases the amount of debt raised; more patent applications have a negative impact on outside finance decisions (and especially debt raised). Asset tangibility, the proportion of short term debt, firm age and capital expenditures are positively associated with debt financing, while return on assets (ROA) is negatively associated with debt finance.

Some country-level variables also affect NTBFs' financing strategies. A higher economic development (GDP Growth) results in less outside finance but higher debt ratios. More developed capital markets (MSCI) and higher levels of self-employment (Self Employment) are positively associated with outside finance, a higher wedge between personal income tax and corporate tax (Personal-Corporate Tax) is positively associated with equity finance.

To test Hypotheses 3 and 4, we add interaction terms to our models. VC\*Legality Index is the interaction between Legality Index and VC and provides a test of Hypotheses 3A & 3B. VC\*Discharge Not Available is the interaction between Discharge Not Available and VC and provides a test of Hypothesis 4. The results of the models including the interaction terms are reported in Table 4.

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Insert Table 4 about here

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Hypothesis 3A (3B) predicts that VC ownership decreases (increases) the positive relationship between higher quality legal systems and the use of more outside finance. The interaction term VC\*Legality Index is significant and positive in three models explaining the probability of the use of outside finance (External Financing), the amount of outside finance (Ln external financing) and the amount of equity (Ln Equity). The coefficient of the interaction term is insignificant in the models explaining the choice between equity and debt, Equity/Debt, the amount of debt, Ln Debt and leverage, Leverage. These results thus support hypothesis 3B: VC ownership complements with higher quality legal systems. The positive association between higher quality legal systems and outside funding is stronger for VC-backed firms as compared with non-VC-backed firms. Per unit increase in legality index, VC-backed firms report a 1 percent additional increase in the use of outside

finance, a 3 percent additional increase in the amount of outside finance raised and a 4 percent additional increase in the amount of equity finance raised, as compared with non-VC-backed firms.

Hypothesis 4 predicts that VC ownership will increase the negative relationship between less forgiving bankruptcy laws and the use of less outside financing. The coefficient of the interaction between Discharge Not Available and VC is therefore expected to be significantly negative. We find a significantly negative coefficient in the models explaining the amount of outside finance (Ln external financing), and the amount of equity (Ln Equity). The coefficient of the interaction term is insignificant in the other models. These findings support Hypothesis 4. VC ownership complements with less forgiving bankruptcy laws: the negative relationship between less forgiving personal bankruptcy laws and the use of outside finance is stronger for VC-backed firms as compared with non-VC-backed firms. VC-backed firms report a 3 percent additional decrease in the amount of outside finance raised and a 3 percent additional decrease in the amount of equity raised when discharge is excluded from bankruptcy law, as compared with non-VC-backed firms.

The other variables remain robust. Higher quality legal systems (Legality Index) increase outside finance, less forgiving bankruptcy laws (Discharge Not Available) decrease outside finance and the VC dummy variable (VC) leads to more outside finance, more equity but lower amounts of debt. The control variables remain largely the same as in Table 3.

Robustness Checks. Additional robustness checks were performed; the detailed results of these tests are available upon request. Overall, the robustness tests confirm that outside finance decisions are affected by country-level differences in corporate governance systems, firm-level differences in corporate governance and the interaction between both, irrespective of the construct used. In a first robustness test, the strength of investor protection index (Djankov et al., 2005) replaced the legality index as a measure of the quality of a country's legal system. This index measures the strength of minority investor protection laws and is positively associated with VC activity in European countries (Groh, von Liechtenstein, and Lieser, 2010). The same conclusions hold. Second, the personal bankruptcy dummy variable (Discharge Not Available) is replaced by other personal bankruptcy measures: time to discharge, minimum capital, exemptions, disabilities and composition (Armour & Cumming, 2008). The results remain robust, but are somewhat less strong. Our findings suggest that providing a fresh start versus no fresh start is the most important dimension of personal bankruptcy law in relation with NTBFs' finance strategies. In a third robustness check, we more explicitly test how VC ownership and thus differences in corporate governance at the firm-level affect outside finance decisions. We therefore added interaction terms between the VC dummy variable and firm accounting variables to account for the fact that VC ownership may also have an impact on the quality of financial reporting (Beuselinck, Deloof & Manigart, 2009). Since it is further plausible that the distribution of accounting variables is different between VC and non-VC-



backed firms, we also identified outliers for each subsample separately. Most of the interaction terms were insignificant, however, and did not affect our conclusions. For reasons of conciseness, we decided to report models without the interaction terms between the VC dummy variable and the firm accounting variables.

## DISCUSSION AND CONCLUSIONS

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Prior entrepreneurial finance research has mainly focused on either firm-level governance effects or on the effects of country-level institutional frameworks on the aggregate supply of outside financing. This paper expands on prior research and focuses on the joint effects of both country-level legal frameworks and firm-level corporate governance. More specifically, this paper focuses on the main effects of the quality of a country's legal system and personal bankruptcy laws and their interaction with VC ownership on the financing strategies of NTBFs. For this purpose, we use a large longitudinal dataset comprising private NTBFs from six European countries.

Using the legality index (Berkowitz, Pistor, & Richard, 2003) and the availability of personal discharge post-bankruptcy (Armour & Cumming, 2006) as proxies for cross-country differences in legal institutions relevant for entrepreneurial firms, our empirical findings increase our understanding of the role played by national legal frameworks in affecting NTBFs' financing strategies. Specifically, our results show that NTBFs operating in countries with a higher quality legal system or with more forgiving personal bankruptcy laws have a higher probability of raising outside finance, raise more external finance when they do so (both equity and debt) and have a higher leverage. Second, differences in firm-level corporate governance systems also significantly affect outside finance, as VC ownership results in a higher probability of raising outside finance, in more outside equity when NTBFs engage in equity issues, but in less debt when they engage in debt issues. Moreover, the positive association between a country's legal system and the availability of outside financing is stronger for NTBFs financed by VC investors, suggesting a complementary role played by VC ownership and a country's legal system. Further robustness tests using different indicators for a country's legal quality and personal bankruptcy law confirm these results.

Our research has some potential limitations that offer fruitful avenues for future research. First, as our research design deals with European NTBFs operating in highly (e.g., U.K.) to moderately developed (e.g., Spain) VC markets, we lack insight into the role played by those VCs in less developed VC markets like Asia or South-America. Moreover, further exploring NTBFs' financing strategies in countries with lower quality of legal systems and the potential role of VC investors

herein also remains important. Second, our research does not consider differences in the quality of VC investors. Prior research indeed shows that the mere presence of VC investors may be enough to influence the operations and governance of firms (e.g., Hellmann & Puri, 2002; Van den Berghe & Levrau, 2004). Nevertheless, research also indicates that VC investors are heterogeneous, with high quality VC investors having disproportionate positive effects on the development of their portfolio firms through stronger monitoring and corporate governance practices (Sorensen, 2007). High quality VC investors should hence have an even stronger positive effect on the availability of outside financing for their portfolio firms. Further exploring the complementarity between the quality of VC investors and a country's legal system might hence be relevant. Another area of future research consists of understanding the role played by different VC investors in syndicates (Devigne, Vanacker, Manigart, & Paeleman, 2012). Syndicates comprising different VC investors might differently impact their portfolio firms' financing strategies and differently interact with the country's legal framework.

Despite its limitations, this paper sheds light on the interaction between firm-level governance systems and country-level institutional frameworks for the financing strategies of NTBFs. Our findings suggest that NTBFs operating in countries with high quality and more forgiving legal systems have access to more outside equity and debt, and this effect is even stronger in firms financed with VC. We hereby address the recent call to study the interaction between firm-level corporate governance factors and national systems of corporate governance. The key implication for practice of our research is that a country's institutional environment strongly affects the financing options available to NTBFs, and that stronger firm-level corporate governance practices in the form of VC financing enhance the positive effects of a higher quality and more entrepreneur-friendly legal environment. Policy-makers, entrepreneurs as well as investors should consider how the quality of the legal system and personal bankruptcy laws would affect the financing strategies of entrepreneurial firms.

## NOTES

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APPENDIX

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**Selection model estimating the probability of attracting VC funding**

	<b>Probability of VC funding</b>
<b>Surplus Funds</b>	-0.02 [0.09]
<b>Deficit Funds</b>	1.44*** [0.15]
<b>Size</b>	0.15*** [0.02]
<b>Employee Growth</b>	0.18*** [0.02]
<b>Log Firm Age</b>	-0.77*** [0.10]
<b># of Patent Applications</b>	0.03* [0.01]
<b>VC Inflow<sub>t-1</sub></b>	0.01* [0.00]
<b>Country fixed effects</b>	YES
<b>Year fixed effects</b>	YES
<b>Industry fixed effects</b>	YES
<b># of Observations</b>	18,035
<b>R<sup>2</sup></b>	0.20

This table presents multivariate estimates of the probability that firms attract VC funding for the period under study. Firm years are the unit of analysis and coefficients are corrected for heteroskedasticity and correlation across observations of a given firm. The dependent variable is a binary variable equal to one from the year in which firms attract VC financing, zero otherwise. The regressions also include a constant, and control for year, country and industry effects (not reported). †, \*, \*\*,\*\*\* denote statistical significance at the 10 percent, 5 percent, 1 percent and 0.1 percent level correspondingly.

TABLE 1

<b>Description of the sample</b>						
	<b>Total Sample</b>		<b>VC-backed firms</b>		<b>Non VC-backed firms</b>	
	Number	%	Number	%	Number	%
<b>Country</b>						
<b>Finland</b>	757	11.11	69	11.39	688	11.08
<b>Spain</b>	876	12.86	81	13.37	795	12.81
<b>Belgium</b>	913	13.40	90	14.85	823	13.26
<b>Italy</b>	1,055	15.49	97	16.01	958	15.43
<b>UK</b>	1,534	22.52	169	27.89	1,365	21.99
<b>France</b>	1,678	24.63	100	16.50	1,578	25.42
<b>Foundation Period</b>						
<b>1984-1989</b>	983	14.43	21	3.47	962	15.50
<b>1990-1994</b>	1,204	17.67	89	14.69	1,115	17.96
<b>1995-1999</b>	2,136	31.35	249	41.09	1,887	30.40
<b>2000-2004</b>	2,490	36.55	247	40.76	2,243	36.14
<b>Industry</b>						
<b>Other</b>	815	11.96	40	6.60	775	12.49
<b>Communication</b>	349	5.12	38	6.27	311	5.01
<b>Life Sciences</b>	631	9.26	102	16.83	529	8.52
<b>Internet Related</b>	801	11.76	117	19.31	684	11.02
<b>ICT</b>	1,137	16.69	102	16.83	1,035	16.67
<b>Software</b>	3,080	45.21	207	34.16	2,873	46.29
<b>Total</b>	<b>6,813</b>	<b>100.00</b>	<b>606</b>	<b>100.00</b>	<b>6,207</b>	<b>100.00</b>

TABLE 2

## Correlations and Descriptive Statistics

	<i>Mean</i>	<i>S.D.</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<b>Panel A: country level correlations (# of observations = 97)</b>														
<i>Discharge Not Available*</i> (1)	0.38	0.49	1.00											
<i>Legality Index</i> (2)	19.47	1.70	<b>-0.75</b>	1.00										
<i>GDP Growth</i> (3)	2.50	1.47	-0.06	0.10										
<i>MSCI</i> (4)	0.97	0.49	<b>-0.36</b>	0.06	0.15	1.00								
<i>Self Employment</i> (5)	17.29	6.14	<b>0.79</b>	<b>-0.73</b>	-0.15	<b>-0.32</b>	1.00							
<i>Personal - Corporate Tax</i> (6)	10.60	6.59	-0.18	<b>0.23</b>	<b>-0.24</b>	-0.20	-0.15	1.00						
<b>Panel B: firm level correlations (# of observations = 50,132)</b>														
<i>External Financing*</i> (7)	0.38	0.49	<b>0.07</b>	<b>-0.10</b>	<b>0.02</b>	<b>0.03</b>	<b>0.08</b>	<b>-0.09</b>	1.00					
<i>Ln External Amount</i> (8)	5.41	2.21	<b>-0.04</b>	-0.01	<b>0.06</b>	<b>0.12</b>	<b>-0.03</b>	<b>-0.05</b>	NA	1.00				
<i>Equity/Debt*</i> (9)	0.43	0.49	-0.02	<b>-0.07</b>	<b>-0.11</b>	-0.02	-0.01	<b>0.04</b>	NA	<b>0.16</b>	1.00			
<i>Ln Equity Amount</i> (10)	5.49	2.34	<b>-0.15</b>	<b>0.12</b>	<b>0.06</b>	<b>0.16</b>	<b>-0.15</b>	<b>0.03</b>	NA	<b>0.98</b>	NA	1.00		
<i>Ln Debt Amount</i> (11)	5.17	1.97	<b>0.14</b>	<b>-0.21</b>	<b>0.08</b>	<b>0.09</b>	<b>0.23</b>	<b>-0.19</b>	NA	<b>0.95</b>	NA	<b>0.71</b>	1.00	
<i>Leverage</i> (12)	0.15	0.22	<b>-0.03</b>	<b>0.15</b>	<b>0.10</b>	<b>-0.04</b>	0.00	<b>-0.09</b>	<b>0.37</b>	<b>0.08</b>	<b>-0.48</b>	<b>-0.06</b>	<b>0.30</b>	1.00
<i>VC*</i> (13)	0.07	0.26	-0.01	0.00	0.01	0.01	<b>0.01</b>	<b>-0.03</b>	<b>0.16</b>	<b>0.25</b>	<b>0.17</b>	<b>0.26</b>	<b>0.19</b>	<b>0.04</b>
<i>Surplus Funds</i> (14)	0.27	0.26	<b>-0.13</b>	<b>0.13</b>	<b>0.06</b>	<b>0.02</b>	<b>-0.15</b>	-0.01	<b>-0.38</b>	<b>-0.31</b>	<b>-0.04</b>	<b>-0.29</b>	<b>-0.27</b>	<b>-0.25</b>
<i>Deficit Funds</i> (15)	0.05	0.12	<b>-0.03</b>	<b>0.03</b>	-0.01	0.01	<b>-0.02</b>	0.01	<b>0.45</b>	<b>0.32</b>	<b>0.21</b>	<b>0.29</b>	<b>0.22</b>	<b>0.26</b>
<i>Size</i> (16)	6.25	1.98	<b>0.04</b>	<b>-0.09</b>	<b>-0.02</b>	<b>0.04</b>	<b>0.02</b>	0.00	-0.01	<b>0.80</b>	-0.02	<b>0.80</b>	<b>0.83</b>	<b>0.06</b>
<i>Employee Growth</i> (17)	1.21	0.77	<b>0.03</b>	<b>-0.03</b>	0.01	-0.01	0.00	<b>-0.02</b>	<b>0.13</b>	<b>0.13</b>	<b>0.06</b>	<b>0.16</b>	<b>0.05</b>	0.00
<i>Net Working Capital</i> (18)	0.13	0.31	<b>0.02</b>	<b>-0.03</b>	<b>-0.01</b>	-0.01	<b>0.04</b>	-0.01	-0.01	<b>0.02</b>	-0.02	0.00	<b>0.04</b>	<b>0.03</b>
<i># of Patent Applications</i> (19)	0.40	6.12	<b>-0.03</b>	<b>0.02</b>	-0.01	<b>0.03</b>	<b>-0.03</b>	<b>0.01</b>	<b>0.03</b>	<b>0.13</b>	<b>0.06</b>	<b>0.14</b>	<b>0.17</b>	0.00
<i>Tangible</i> (20)	0.13	0.18	<b>0.15</b>	<b>-0.04</b>	<b>0.10</b>	<b>-0.21</b>	<b>0.09</b>	<b>-0.09</b>	<b>0.03</b>	0.00	<b>-0.06</b>	<b>-0.04</b>	<b>0.06</b>	<b>0.22</b>

TABLE 2

Continued

	<i>Mean</i>	<i>S.D.</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Short Term to Tot Debt (21)</i>	0.37	0.42	<b>-0.18</b>	<b>0.09</b>	<b>-0.03</b>	<b>0.13</b>	<b>-0.26</b>	<b>0.12</b>	<b>0.09</b>	<b>0.07</b>	<b>-0.10</b>	<b>0.12</b>	<b>0.05</b>	<b>0.10</b>
<i>Log Firm Age (22)</i>	0.81	0.32	<b>-0.06</b>	<b>0.03</b>	<b>0.06</b>	<b>0.08</b>	<b>-0.03</b>	<b>-0.08</b>	<b>-0.21</b>	<b>0.07</b>	<b>-0.20</b>	<b>0.06</b>	<b>0.16</b>	-0.01
<i>T-A Leverage (23)</i>	0.01	0.19	0.01	<b>-0.03</b>	0.00	<b>0.02</b>	-0.01	0.01	<b>-0.09</b>	0.02	-0.02	<b>0.05</b>	0.00	<b>-0.54</b>
<i>ROA (24)</i>	0.04	0.32	<b>0.01</b>	0.00	<b>0.08</b>	<b>0.02</b>	<b>0.05</b>	<b>-0.05</b>	<b>-0.28</b>	<b>-0.24</b>	<b>-0.34</b>	<b>-0.24</b>	<b>-0.16</b>	<b>-0.15</b>
<i>CAPEX (25)</i>	0.06	0.09	<b>0.04</b>	<b>-0.04</b>	<b>-0.04</b>	<b>-0.04</b>	<b>0.04</b>	0.00	<b>0.14</b>	<b>0.11</b>	<b>0.03</b>	<b>0.10</b>	<b>0.09</b>	<b>0.10</b>
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	
<i>VC* (13)</i>	1.00													
<i>Surplus Funds (14)</i>	<b>-0.09</b>	1.00												
<i>Deficit Funds (15)</i>	<b>0.14</b>	<b>-0.39</b>	1.00											
<i>Size (16)</i>	<b>0.15</b>	<b>-0.19</b>	0.01	1.00										
<i>Employee Growth (17)</i>	<b>0.07</b>	<b>-0.03</b>	<b>0.09</b>	<b>0.07</b>	1.00									
<i>Net Working Capital (18)</i>	<b>-0.01</b>	<b>0.03</b>	0.00	-0.01	<b>0.01</b>	1.00								
<i># of Patent Applications(19)</i>	<b>0.04</b>	<b>-0.04</b>	<b>0.06</b>	<b>0.11</b>	0.01	0.00	1.00							
<i>Tangible (20)</i>	<b>-0.04</b>	<b>-0.13</b>	<b>0.02</b>	<b>0.05</b>	-0.01	0.00	-0.01	1.00						
<i>Short Term to Tot Debt (21)</i>	<b>-0.07</b>	<b>-0.08</b>	<b>0.03</b>	<b>0.18</b>	0.01	<b>0.01</b>	<b>0.02</b>	-0.01	1.00					
<i>Log Firm Age (22)</i>	<b>-0.08</b>	<b>0.03</b>	<b>-0.15</b>	<b>0.23</b>	<b>-0.25</b>	0.00	<b>0.01</b>	<b>-0.01</b>	<b>0.06</b>	1.00				
<i>T-A Leverage (23)</i>	0.01	<b>0.08</b>	<b>-0.08</b>	<b>0.03</b>	<b>0.02</b>	<b>-0.02</b>	0.01	<b>-0.06</b>	<b>-0.04</b>	-0.01	1.00			
<i>ROA (24)</i>	<b>-0.29</b>	<b>0.28</b>	<b>-0.40</b>	<b>-0.12</b>	<b>-0.03</b>	<b>0.01</b>	<b>-0.05</b>	<b>-0.07</b>	<b>-0.03</b>	<b>0.13</b>	<b>0.06</b>	1.00		
<i>CAPEX (25)</i>	<b>0.07</b>	<b>-0.09</b>	<b>0.09</b>	<b>0.09</b>	<b>0.21</b>	0.00	0.01	<b>0.22</b>	<b>0.03</b>	0.00	-0.01	<b>-0.07</b>	1.00	

Table 2 reports the mean and standard deviation and Pearson correlation coefficients (two-tail) between all variables. Coefficients in bold denote statistical significance at the 5 percent level.

TABLE 3

## Regression models: Main effects

	External financing	Ln external financing	Equity/Debt	Ln Equity	Ln Debt	Leverage
Legality Index	0.17*** [0.01]	0.42*** [0.03]	0.01 [0.03]	0.42*** [0.05]	0.37*** [0.04]	0.10*** [0.01]
Discharge not Available	-0.03* [0.01]	-0.09** [0.03]	-0.02 [0.02]	-0.07 [0.05]	-0.08** [0.03]	-0.01** [0.00]
VC	0.03*** [0.00]	0.03* [0.01]	0.05*** [0.01]	0.04** [0.01]	-0.05*** [0.01]	0.00 [0.00]
Surplus Funds	-0.63*** [0.03]	-0.52*** [0.08]	0.05 [0.06]	-0.77*** [0.14]	-0.17+ [0.10]	
Deficit Funds	1.94*** [0.22]	2.29*** [0.13]	0.61*** [0.11]	1.29*** [0.18]	2.07*** [0.15]	
Size	-0.06*** [0.00]	0.74*** [0.01]	0.02+ [0.01]	0.75*** [0.02]	0.77*** [0.01]	-0.02*** [0.00]
Employee Growth	0.02** [0.01]	-0.05** [0.02]	-0.04** [0.02]	-0.07* [0.03]	-0.05** [0.02]	-0.02*** [0.00]
Net Working Capital	0.00 [0.00]	0.02 [0.01]		0.02 [0.01]	0.06* [0.03]	
# of Patent Applications	-0.00 [0.00]	-0.01** [0.00]	0.00 [0.00]	-0.00 [0.01]	-0.02*** [0.00]	-0.01** [0.00]
Tangible			-0.08 [0.07]			0.22*** [0.02]
Short Term to Tot Debt			-0.13*** [0.03]			0.06*** [0.01]
Log Firm Age			-0.33*** [0.07]			0.10*** [0.01]
T-A Leverage			-0.09 [0.06]			
ROA						-0.09*** [0.01]
CAPEX						0.11*** [0.03]
GDP Growth	-0.02+ [0.01]	-0.08** [0.03]	-0.01 [0.02]	-0.12** [0.05]	-0.01 [0.03]	0.02*** [0.00]
MSCI	0.39*** [0.03]	1.08*** [0.08]	0.02 [0.07]	1.14*** [0.13]	0.89*** [0.09]	0.20*** [0.02]
Self Employment	-0.00 [0.00]	0.01* [0.01]	0.00 [0.00]	0.00 [0.01]	0.04*** [0.01]	0.01*** [0.00]
Personal – Corporate Tax	-0.00 [0.00]	0.01** [0.00]	0.01** [0.00]	0.02** [0.01]	-0.00 [0.01]	-0.00*** [0.00]
Inverse Mills Ratio	-0.48*** [0.03]	-1.55*** [0.06]	0.01 [0.07]	-1.63*** [0.10]	-1.04*** [0.07]	-0.17*** [0.01]
Year fixed effects	YES	YES	YES	YES	YES	YES
Industry fixed effects	YES	YES	YES	YES	YES	YES
# of Observations	12,977	4,099	2,546	1,947	2,686	13,467
R <sup>2</sup>	0.29	0.39	0.12	0.37	0.39	0.21

Table 3 presents multivariate estimates of the outside finance decisions and leverage. Firm year observations are the unit of analysis. The coefficients represent the average partial effect of the coefficients, corrected for heteroskedasticity and correlation across observations of a given firm to show the economic significance alongside the statistical significance. The regressions also include a constant, and control for year and industry effects (coefficients not reported). †, \*, \*\*,\*\*\* denote statistical significance at the 10 percent, 5 percent, 1 percent and 0.1 percent level correspondingly.



TABLE 4

	Regression models including VC interaction					
	External financing	Ln external financing	Equity/Debt	Ln Equity	Ln Debt	Leverage
Legality Index	0.16*** [0.01]	0.39*** [0.04]	-0.01 [0.03]	0.35*** [0.06]	0.37*** [0.04]	0.10*** [0.01]
Discharge not Available	-0.02* [0.01]	-0.08** [0.03]	-0.02 [0.02]	-0.05 [0.05]	-0.08** [0.03]	-0.01** [0.00]
VC	0.03*** [0.00]	0.03* [0.01]	0.05*** [0.01]	0.03* [0.02]	-0.05*** [0.01]	0.00 [0.00]
VC* Legality Index	0.01*** [0.00]	0.03** [0.01]	0.01 [0.01]	0.04** [0.02]	-0.00 [0.01]	-0.00 [0.00]
VC* Discharge not Available	0.00 [0.00]	-0.03** [0.01]	-0.01 [0.01]	-0.03+ [0.01]	-0.01 [0.01]	0.00 [0.00]
Surplus Funds	-0.63*** [0.03]	-0.52*** [0.08]	0.05 [0.06]	-0.77*** [0.14]	-0.18+ [0.10]	
Deficit Funds	1.93*** [0.22]	2.25*** [0.13]	0.59*** [0.11]	1.25*** [0.18]	2.07*** [0.15]	
Size	-0.06*** [0.00]	0.74*** [0.01]	0.02 [0.01]	0.75*** [0.02]	0.77*** [0.01]	-0.02*** [0.00]
Employee Growth	0.02* [0.01]	-0.05** [0.02]	-0.04** [0.02]	-0.07** [0.03]	-0.05** [0.02]	-0.02*** [0.00]
Net Working Capital	0.00 [0.00]	0.01 [0.01]		0.01 [0.01]	0.06* [0.03]	
# of Patent Applications	-0.00 [0.00]	-0.01** [0.00]	0.00 [0.00]	-0.00 [0.01]	-0.02*** [0.00]	-0.00** [0.00]
Tangible			-0.07 [0.07]			0.22*** [0.02]
Short Term to Tot Debt			-0.13*** [0.03]			0.06*** [0.01]
Log Firm Age			-0.33*** [0.07]			0.10*** [0.01]
T-A Leverage			-0.09			

							[0.06]
ROA							-0.09***
							[0.01]
CAPEX							0.11***
							[0.03]
GDP Growth	-0.02	-0.08**	-0.00	-0.12**	-0.01		0.02***
	[0.01]	[0.03]	[0.02]	[0.05]	[0.03]		[0.00]
MSCI	0.39***	1.07***	0.02	1.10***	0.89***		0.20***
	[0.03]	[0.08]	[0.07]	[0.13]	[0.09]		[0.02]
Self Employment	-0.00	0.01*	-0.00	-0.00	0.04***		0.01***
	[0.00]	[0.01]	[0.00]	[0.01]	[0.01]		[0.00]
Personal – Corporate Tax	-0.00	0.01**	0.01**	0.02*	-0.00		-0.00***
	[0.00]	[0.00]	[0.00]	[0.01]	[0.01]		[0.00]
Inverse Mills Ratio	-0.49***	-1.56***	-0.01	-1.66***	-1.04***		-0.17***
	[0.03]	[0.06]	[0.07]	[0.10]	[0.07]		[0.01]
Year fixed effects	YES	YES	YES	YES	YES		YES
Industry fixed effects	YES	YES	YES	YES	YES		YES
# of Observations	12,977	4,099	2,546	1,947	2,686		13,467
R <sup>2</sup>	0.29	0.39	0.11	0.37	0.39		0.21

Table 4 presents multivariate estimates of the outside finance decisions and leverage adding the interaction terms between *Legality Index* and *VC* (*VC\* Legality Index*) and between *Discharge Not Available* and *VC* (*VC\* Discharge not Available*). Firm years are the unit of analysis. The coefficients represent the average partial effect of the coefficients, corrected for heteroskedasticity and correlation across observations of a given firm. The regressions also include a constant, and control for year and industry effects (coefficients not reported). †, \*, \*\*, \*\*\* denote statistical significance at the 10 percent, 5 percent, 1 percent and 0.1 percent level correspondingly.