

## ABSTRACT

Title of Dissertation:           ESSAYS ON LAW, FINANCE, AND VENTURE  
  CAPITALISTS' ASSET ALLOCATION DECISIONS

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This dissertation consists of three essays. The first essay finds that small firms in poor quality legal environments (poor quality contract enforcement and property rights environments) are more financially constrained relative to small firms in better quality legal environments. Consequently, financial development, that is, the emergence of venture capitalists, has a greater effect on small firms' access to external financing in poor quality legal environments.

The second essay finds that the quality of contract enforcement is a risk factor, while the quality of property rights protection is not. The results indicate that poor quality property rights protection hinders the development of informal capital markets; hence, there exists a greater need for financial intermediation in such environments.

These results indicate that venture capital financing should be encouraged in poor

quality legal environments and provide one rationale for why capital markets in poor quality legal environment countries tend to be bank-based.

The third essay finds that the demand for growth financing is lower in poor quality legal environments relative to better quality legal environments. The existing literature has focused on the effect that limited supply of external financing has on firm growth rates in poor quality legal environments. This paper indicates that lower firm growth rates in poor quality legal environments may also result from lower demand for growth financing.

The empirical results in all three essays indicate that poor quality legal environments primarily affect the development of informal capital markets. Hence, financial intermediation is of greater importance in poor quality legal environments during the early stages of a firm's growth cycle. This indicates that encouraging the growth of venture capital financing, which is better suited to ameliorating moral hazard problems (investments in small firms and technology intensive ventures) relative to debt or bank financing, will facilitate faster economic growth in poor quality legal environments. Evidence that venture capitalists' asset allocations are significantly and positively associated with long-run country growth rates is provided in the second essay.

ESSAYS ON LAW, FINANCE, AND VENTURE CAPITALISTS' ASSET  
ALLOCATION DECISIONS

By

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## DEDICATION

This dissertation is dedicated to my mother, Mary Ariomi Obrimah, nee Omishakin, who, despite her good genes and high intelligence quotient did not have the opportunities that I have had to pursue the highest levels of education.

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# Chapter I

## Law, Finance, and Venture Capitalists' Asset Allocation Decisions

Beck, Demirgüç-Kunt, Laeven, and Levine (2005) predict that small firms in poor quality legal environments are more financially constrained relative to small firms in better quality legal environments. Hence, they predict that financial development has more of an effect on small firms' access to external financing relative to large firms' access to external financing in poor quality legal environments.

In this paper, I examine whether small firms in poor quality legal environments (countries characterized by poor quality contract enforcement and property rights protection) are more financially constrained relative to small firms in better quality legal environments. The empirical framework adopted in this paper also enables me to examine whether financial development has more of an effect on small firms' access to external financing relative to large firms' access to external financing in poor quality legal environments.

I utilize venture capitalists' propensity to concentrate investments in a par-

ticular class of firms as a measure of the gap between the demand and supply of venture capital financing in poor and better quality legal environments. The propensity to concentrate investments in a particular class of firms is a measure of the probability of entry by a venture capitalist. Hence, the propensity to concentrate investments in a particular class of firms is a measure of the size of economic profits in a particular sector. These economic profits may exist either because of a gap between the demand and supply of venture capital financing or due to venture capitalists' ability to earn risk premiums in poor quality legal environments. This characterization of the propensity to concentrate is supported by the finding in Hsu (2004) that entrepreneurs are more likely to obtain financing from specialized (or more reputable) venture capitalists, even when financing terms offered by diversified venture capitalists are more favorable.

I hypothesize that venture capitalists' propensity to concentrate investments in small firms will decrease with the quality of the legal environment if the gap between demand and supply is greater in poor quality legal environments. The sample consists of fourteen emerging and developed countries where the venture capital market is an emerging market. Hence, the interaction between the demand and supply of venture capital financing provides information about which classes of firms were more disadvantaged with respect to access to external financing prior to the emergence of venture capitalists. Moreover, given that venture capital (or private equity financing) is considered the most expensive source of private financing (Fenn, Liang, and Prowse (1997)), the results obtained are not necessarily particular to venture capital financing. Hence, the results can be interpreted to pertain to the gap between the supply and demand of external financing.

Four broad classes of firms are considered in the paper: early stage technology and non-technology intensive ventures (small firms), and later stage technology and non-technology intensive ventures (relatively large firms, hence-

forth referred to as large firms). Early stage ventures are in the early stages of a firm's growth cycle, while later stage ventures are in the expansion stages of a firm's growth cycle.

I find that venture capitalists' propensity to concentrate investments in small firms decreases with the quality of the legal environment. This indicates that the gap between the supply and demand of venture capital financing for small firms decreases with the quality of the legal environment. A robustness test based on asset allocations of venture capitalists investing in but located outside the sample countries also indicates that the gap between the supply and demand of venture capital financing for small firms decreases with the quality of the legal environment.

These results are consistent with the prediction in Beck, Demirgüç-Kunt, Laeven, and Levine (2005) that small firms in poor quality legal environments are more financially constrained relative to small firms in better quality legal environments. These results also indicate that financial development, in this case the emergence of venture capitalists, has more of an effect on small firms' access to external financing relative to large firms' access to external financing in poor quality legal environments.

Amongst small firms, I find that economic profits associated with the financing of small non-technology intensive ventures are greater than those associated with the financing of small technology intensive ventures in poor quality legal environments. This finding provides empirical support for the provision of incentives to venture capitalists in emerging countries to facilitate increased investments in small technology intensive ventures.

Berger and Udell (1998) estimate that the informal equity or angel investor market in the U.S. is twice the size of the formal venture capital market. Furthermore, Berger and Udell state that "discussions with industry participants indicate that most firms that obtain venture capital financing had prior angel finance".<sup>1</sup> This indicates that angel investors or informal capital markets

constitute a significant source of external financing for small firms in better quality legal environments.

The prediction in Beck, Demirgüç-Kunt, Laeven, and Levine (2005) and the findings in Berger and Udell (1998) suggest that poor quality legal environments primarily affect the development of informal capital markets, hence, the relatively greater need for financial intermediation during the early stages of a firm's life cycle. I utilize a switching regression model with endogenous switching to examine whether there exist significant differences between poor and better quality legal environments with respect to the life cycle stages of firms that obtain venture capital financing. If significant differences exist, the switching regression model will be able to distinguish between transactions in poor and better quality legal environments without any prior specification of countries characterized by poor quality legal environments.

I find that the switching regression model with endogenous switching is able to distinguish between venture capital transactions in poor and better quality legal environments. Venture capital investments in poor quality legal environments are more likely to be concentrated in early stage (small) ventures, while those in better quality legal environments are more likely to be concentrated in later stage (large) ventures. Furthermore, venture capitalists' propensity to concentrate investments in small firms decreases with the quality of the legal environment amongst emerging countries, while venture capitalists' propensity to concentrate investments in large firms increases with the quality of the legal environment amongst developed countries.<sup>2</sup>

These results indicate that the gap between the demand and supply of external financing for small firms is greater in poor quality legal environments, while the gap between the supply and demand of external financing for large firms is greater in better quality legal environments. Furthermore, the gap between the demand and supply of venture capital financing for small firms decreases with the quality of the legal environment amongst both emerging

and developed countries. These results support the hypothesis that poor quality legal environments primarily affect the development of informal capital markets. These results are also consistent with the theoretical framework in Diamond (1984) for the emergence of a financial intermediary.

Beck, Demirgüç-Kunt and Maksimovic (2005) find, using data from a survey, that poor quality legal environments have a greater (adverse) effect on small firms' access to growth financing relative to large firms' access to growth financing. The results in this paper are consistent with this finding in Beck et al. (2005). However, this paper differs from Beck et al. (2005) in at least four respects.

First, the results in this paper also show that small firms in poor quality legal environments are more financially constrained relative to small firms in better quality legal environments. Second, the empirical framework adopted in this paper enables me to conclude that financial development, that is, the emergence of venture capitalists, has more of an effect on small firms' access to external financing relative to large firms' access to external financing in poor quality legal environments.

Third, the results obtained from a switching regression model with endogenous switching indicate that poor quality legal environments primarily affect the development of informal capital markets, which may explain why banks play a much larger role in poor quality legal environments' financial markets. This interpretation of the results suggests that venture capital financing should be encouraged in poor quality legal environments. Lastly, the results in this paper are based on data on the demand and supply of external financing in poor and better quality legal environments, while the results in Beck et al. (2005) are based on the subjective responses of entrepreneurs to questions regarding obstacles that firms encounter with respect to access to external financing.

The rest of the paper proceeds as follows. Section I reviews related litera-

ture. Section II outlines the analytical framework. Section III discusses the venture capital data from which the variables utilized in empirical tests are constructed. Test results are reported and interpreted in Section IV. Section V concludes.

## I Related Literature

The law and finance literature finds that the availability of external financing is linked to the quality of a country's legal environment. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) find that financial markets are better developed in countries with strong legal frameworks. Similarly, both Demirgüç-Kunt and Maksimovic (1998) and Rajan and Zingales (1998) conclude that firms in better quality legal (law and order or contract enforcement) environments have better access to external financing. Demirgüç-Kunt and Maksimovic (1999) find that capital markets in emerging countries are more constrained with respect to the availability of long-term funds relative to capital markets in developed countries.

The empirical tests in all of the papers cited in the preceding paragraph are based on data for public companies, hence, even the smallest firms in their samples are quite large. Consequently, the results in these papers may not necessarily apply to small firms. Moreover, these papers are not able to examine the division of the gains from financial development between small and large firms. This paper, on the other hand, examines how poor quality legal environments affect small firms' access to external financing, as well as the division of the gains from financial development between small and large firms.

Ueda (2004) predicts that venture capitalists will be more likely to invest in high risk, high growth, and low collateral value ventures. Similarly, Fluck (1998) predicts that debt is sub-optimal relative to equity for firms character-



ized by relatively more severe moral hazard problems (high growth, high risk and low collateral value ventures). The results in Gompers (1995) indicate that U.S. venture capitalists' asset allocation decisions are consistent with the predictions in Ueda (2004) and Fluck (1998).

The quality of contract enforcement is expected to affect venture capitalists' asset allocation decisions given that venture capital transactions involve a lot of contractual clauses, which cannot be credible if they can't be enforced. For instance, Kaplan and Stromberg (2003) find that control rights are separately allocated in venture capital contracts with the allocation largely dependent on investment outcomes. This contingent allocation of control rights may not be credible or enforceable in countries characterized by poor quality contract enforcement or property rights protection. Hence, poor quality legal environments may skew venture capitalists' asset allocations towards relatively less risky ventures, or asset allocations that are sub-optimal relative to the prediction in Ueda (2004).

## II Analytical Framework

Venture capitalists' propensity to concentrate investments in a particular class of firms is utilized as a proxy for economic profits associated with investing in that class of firms. Economic profits may exist either because supply lags demand or due to venture capitalists' ability to earn risk premiums for providing financing in poor quality legal environments. The probability that venture capitalists will specialize in providing financing to a particular class of firms,  $j$ , increases with the size of economic profits associated with the provision of financing to  $j$ -type firms. Hence, if economic profits associated with the provision of financing to  $j$ -type firms are greater than those associated with  $k$ -type firms, venture capitalists will have a greater propensity to concentrate investments in  $j$ -type firms relative to  $k$ -type firms.

This argument also extends across countries whenever capital markets are not segmented. If economic profits associated with the provision of venture capital financing to *j-type* firms are greater in country *m* relative to country *n*, venture capitalists in country *m* will have a greater propensity to concentrate investments in *j-type* firms relative to venture capitalists in country *n*. Hence, the prediction in Beck, Demirgüç-Kunt, Laeven, and Levine (2005) that small firms are more financially constrained in poor quality legal environments implies that venture capitalists in poor quality legal environments have a greater propensity to concentrate investments in small firms relative to venture capitalists in better quality legal environments.

This leads to the following hypothesis:

## A Propensity to concentrate investments in small firms

**Hypothesis 1** *Small firms in poor quality legal environments are more financially constrained relative to small firms in better quality legal environments. Hence, venture capitalists in poor quality legal environments have a greater propensity to concentrate investments in small firms relative to venture capitalists in better quality legal environments.*

Hypothesis one is tested using probit models, which are specified as follows:

$$\begin{aligned}
probability(j\text{-}type_i) = & \beta_0 + \beta_1 growth_{j,c} + \beta_2 lawenforcement_{j,c} \\
& + \beta_3 bankregulation_{j,c} + \beta_4 marketstructure_{j,c} + \beta_5 propertyrights_{j,c} \\
& + \beta_6 firmyear_i + \beta_7 firmtype_i + \beta_8 entrepreneurship_{j,c} \\
& + \beta_9 fundcountry_i + \beta_{10} firstyear_j + \epsilon_i. \quad (I.1)
\end{aligned}$$

The subscript *j, c* refers to company *j* located in country *c*,<sup>3</sup> while the subscript *i* refers to a venture capitalist providing financing. The dependent

variable is an indicator variable equal to one if a venture capitalist's investments are concentrated in *j-type* firms. Four classes of *j-type* firms are considered. These are early stage non-technology intensive ventures; early stage technology intensive ventures; later stage non-technology intensive ventures; and later stage technology intensive ventures. Early stage ventures are in the early stages of a firm's growth cycle (small firms), while later stages are in the expansion stages of a firm's growth cycle (relatively large firms). Agency problems associated with investing in early stage and technology intensive ventures are relatively more severe than those associated with investing in later stage and non-technology intensive ventures. Appendix A (Table AII) details the specific classes that make up these broad groupings.

Concentration in early stage non-technology intensive ventures is determined as follows. For each venture capital fund in the sample with investments in non-technology intensive ventures, I determine total dollar disbursements to all non-technology intensive ventures in its portfolio as well as proportions of the total disbursed to early stage non-technology intensive ventures. I then divide the venture capital funds into three terciles based on the proportion of their total investments disbursed to early stage non-technology intensive ventures and venture capital funds located in the third tercile are deemed to be 'concentrated' in early stage non-technology intensive ventures. Concentration is similarly determined for all other classes of *j-type* firms.

The variable *lawenforcement* is a country's ranking on the contract enforcement index developed by the Business Environmental Risk Guide (BERG), while *propertyrights* is a country's ranking on the property rights protection index obtained from LLSV (1998). These variables are motivated in Section I. Following, I motivate the other independent variables included in the empirical tests. Detailed descriptions of all variables are provided in Table AI in the Appendix, while correlations between the independent variables are reported in Table AIV.

**Country growth rates** The financial development literature finds that financial development is strongly linked with economic growth. This literature includes King and Levine (1993), Beck, Levine and Loayza (2000) and Luintel and Khan (1999). This link between financial development and faster economic implies that faster economic growth may lead to the development of a venture capital market. Furthermore, venture capitalists will be more likely to concentrate investments in industries that are responsible for faster economic growth. In this paper, I include GDP growth rates as an independent variable that proxies for country-specific growth opportunities. This variable is termed *growth*.

**Banking regulation** Obrimah (2004) finds that commercial banks in the U.S. that set up venture capital operations in-house hold less risky portfolios relative to those that enter the venture capital market by setting up a venture capital fund. This suggests that the probability of concentration in low agency cost ventures may be higher in countries where banks are allowed to hold the equity of non-financial firms. The banking regulation variable ranks countries on a scale of one through four. A ranking of one indicates that commercial banks are free to hold the equity of non-financial firms, while a ranking of two indicates that they can only do this within an independent subsidiary. A ranking higher than two indicates more restrictions on commercial banks' abilities to hold non-financial equity. I obtain country classifications based on this banking regulation from Demirgüç-Kunt and Levine (2001). This variable is termed *bankregulation*.

**Market structure** Black and Gilson (1998) find that capital market structure (market-based versus bank-based) is a determinant of the level of venture capital activity across countries. In market-based economies, the incentive of an IPO exit, which creates a liquid asset for the entrepreneur increases the de-

mand for venture capital funds, which in turn leads to a greater supply of venture capital funds and a higher level of venture capital activity. Since higher demand results in more competition, venture capitalists in more market-based economies are expected to concentrate investments in ventures characterized by more severe agency problems. Hence, the propensity to concentrate investments in high agency cost ventures is expected to increase with the extent to which capital markets are market-based. The market structure variable is constructed as the ratio of stock market capitalization to GDP. This variable is termed *marketstructure*.

**Entrepreneurship** Given that I only observe completed deals, there is a need to account for possible differences in deal flow across countries. Consequently, I include measures of the propensity to take risks, or the propensity for entrepreneurship in the tests implemented. These variables are taken from the Global Competitiveness Report published by the World Economic Forum. The two variables considered, one for the propensity to take risks and the other for the propensity to innovate have a correlation of 0.83. Both variables have similar effects when included in the tests implemented, but only results with the propensity for entrepreneurship/innovation are reported. These are continuous variables and the entrepreneurship/innovation variable is termed *entrepreneurship*.

**Location of venture capital fund** The variable *fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country (equivalently, poor quality legal environment). A positive regression coefficient ( $\beta_9$ ) on this variable indicates that venture capitalists in poor quality legal environments have a greater propensity to concentrate investments in *j-type* firms relative to venture capitalists in better quality legal environments. Hence, this variable indicates whether economic profits that accrue

to venture capitalists are greater in poor quality legal environments relative to better quality legal environments. If the coefficient of *fundcountry* is significant with the expected sign (positive), while the quality of legal environment variables are not, this suggests that economic profits in poor quality legal environments are also driven by venture capitalists' ability to earn risk premiums.

**Venture capital fund related variables** Venture capital firm specific variables are included as independent variables in the tests implemented. *firmtype* is the organizational form of a venture capital firm, which has been shown to contain information about venture capitalists' risk preferences (Obrimah (2004), Hellmann, Lindsey, and Puri (2003)). Appendix A (Table AIII) reports the classification of venture capitalists according to organizational form. *firmyear* is the year in which a venture capital firm commenced operations. This variable is included in the empirical tests because it is expected that venture capitalists' asset allocations are affected by how long they have been in business. *firstyear* is a dummy variable for the year in which a financing relationship commenced. This variable accounts for possible changes in venture capitalists' investment opportunity sets over time.

**Venture capital firm reputation** The number of deals a venture capitalist has participated in is utilized as a weight in the tests performed. This is based on the following argument. Suppose at time  $t = 0$ , there exist four VCs (*vca*, *vcb*, *vcc* and *vcd*), one of which (*vca*) is concentrated in technology intensive ventures, while the others are not. Assume that at time  $t = 1$ , the demand for venture capital financing from technology intensive ventures increases significantly. Given that reputation and specialization are important in the venture capital market,<sup>4</sup> *vca* attracts a significant chunk of the increased demand, but due to risk considerations is only able to soak up half of the increased demand.

*vcb*, on the other hand, is able to soak up more of the residual demand (35 percent) relative to *vcc* and *vcd* and ends up being classified as a concentrated VC at time  $t = 1$ .

If *vca* and *vcb* are given equal weight in the empirical tests at  $t = 1$ , *vcb*'s importance is overstated, while *vca*'s importance is understated. Hence, in order to capture the demand dynamics, which is central to the research question, it is important to capture the relative importance of *vca* and *vcb*. The same argument applies to the country variables. If the demand for venture capital financing is greater in better quality property rights environments, then there may be more financing transactions in these countries and this ought to be reflected in the empirical tests. This argument is supported by the finding in Rajan and Zingales (1998) that financial development has a significant impact on the growth of the number of firms. All empirical tests, except the switching regressions are based on first financing rounds only.

## **B The demand-supply equilibrium of venture capital financing**

Berger and Udell (1998) estimate that the informal equity or angel investor market in the U.S. is twice the size of the formal venture capital market. Furthermore, Berger and Udell state that “discussions with industry participants indicate that most firms that obtain venture capital financing had prior angel finance”.<sup>5</sup> This indicates that angel investors or informal equity markets constitute a significant source of external financing for early stage ventures in better quality legal environments. This finding, coupled with the prediction in Beck, Demirgüç-Kunt, Laeven, and Levine (2005) that small firms in poor quality legal environments are more financially constrained relative to small firms in better quality legal environments suggests that poor quality legal environments primarily affect the development of informal capital markets.

If poor quality legal environments primarily affect the development of informal capital markets, venture capitalists' propensity to concentrate investments in small firms will decrease with the quality of the legal environment amongst both emerging and developed countries. It is also expected that venture capitalists in poor quality legal environments have a greater propensity to concentrate investments in small firms, while those in better quality legal environments have a greater propensity to concentrate investments in large firms. This leads to the following hypothesis, which is consistent with but expands on hypothesis one:

**Hypothesis 2** *Venture capitalists in poor quality legal environments have a greater propensity to concentrate investments in small firms and this propensity decreases with the quality of the legal environment. Venture capitalists in better quality legal environments have a greater propensity to concentrate investments in large firms, and this propensity increases with the quality of the legal environment.*

Hypothesis two is tested using a switching regression model with endogenous switching. The switching regression model examines whether there are significant structural differences in the demand-supply equilibrium of venture capital financing between emerging and developed countries with respect to the life cycle characteristics of portfolio companies. Let  $X$  be a vector of independent variables,  $Y$  a vector of dependent variables,  $\beta$  a vector of regression coefficients and  $Z$  a vector of independent variables. Let particular elements of these vector variables be represented by corresponding lower case representations. Then, a switching regression model with endogenous switching is defined as follows:<sup>6</sup>



$$y_{1i} = X_i\beta_1 + v_{1i} \quad (\text{I.2a})$$

$$y_{2i} = X_i\beta_2 + v_{2i} \quad (\text{I.2b})$$

$$I_i^* = Z_i\gamma - \epsilon_i \quad (\text{I.2c})$$

$$I_i = 1 \text{ iff } I_i^* > 0 \quad (\text{I.3a})$$

$$I_i = 0 \text{ iff } I_i^* \leq 0 \quad (\text{I.3b})$$

The observed  $y_i$  is defined as

$$y_i = y_{1i} \text{ iff } I_i = 1 \quad (\text{I.4a})$$

$$y_i = y_{2i} \text{ iff } I_i = 0 \quad (\text{I.4b})$$

$$(v_1, v_2, \epsilon)' \sim N(0, \Sigma). \quad (\text{I.4c})$$

Equations (I.2a) and (I.2b) are the two hypothesized regimes that cannot be distinguished from the subject data. That is, only  $y_i$  is observed. The function  $I_i^*$  represents some initial guess of the partition of the two endogenous regression regimes while equations (I.3a) and (I.3b) represent the switching equation that allocates the dependent variable to two different but unobserved regimes as specified in equations (I.4a) and (I.4b). Equation (I.2a) is referred to as the first component regression generated by the switching regression, while equation (I.2b) is the second component regression generated by the switching regression. In this set up,  $v_{1i}$ ,  $v_{2i}$  and  $\epsilon_i$  have well defined distributions on the whole population.

In this paper,  $I_i^* > 0$  for developed countries, while  $I_i^* \leq 0$  for emerging countries per World Bank classifications. Also,  $I_i^* > 0$  if *bankregulation* = 1

(no restriction on banks' ability to hold non-financial equity), while  $I_i^* \leq 0$  if  $bankregulation \geq 2$  (increasing level of restrictions on banks' ability to hold non-financial equity). The vector  $Z$  is made up of two variables, the quality of the law and order environment,  $law_{j,c}$  and GDP growth ( $growth_{j,c}$ ). The dependent variable in the model being examined for regime shifts (the *main equation*) are the three terciles of concentration in non-technology intensive ventures ( $nonhitechqt_i$ ). The regression model (*main equation*) from which the two component regressions are generated is specified as follows:

$$\begin{aligned}
nonhitechqt_i = & \alpha_0 + \alpha_1 age_j + \alpha_2 early_j + \alpha_3 marktobook_j \\
& + \alpha_4 tangibleassets_j + \alpha_5 public_j + \alpha_6 onetime_{j,i} \\
& + \alpha_7 firstyear_j + \alpha_8 gdpper capita_{j,c} + \alpha_9 firmyear_i \\
& + \alpha_{10} capital_i + \alpha_{11} firmtype_i + v_i. \quad (I.5)
\end{aligned}$$

The switch equation, which serves as the initial guess of the two component regressions is specified as follows:

$$gdpper capita_{j,c} = \omega_0 + \omega_1 law_{j,c} + \omega_2 growth_{j,c} + \epsilon_i. \quad (I.6)$$

The main equation and the switch equation are similarly specified for tests where  $bankregulation$  is utilized as the switch variable. Independent variables are as follows:  $age$  is the age of a portfolio company when it received financing;  $early$  is an indicator variable equal to one if a portfolio company was in the early stages of a firm's life cycle when it received financing;  $marktobook$  are industry market-to-book ratios, while  $tangibleassets$  are industry ratios of tangible assets to total assets. The  $marktobook$  and  $tangibleassets$  ratios are computed based on firm 2-digit SIC codes obtained from Compustat's Global Vantage database; the ratios proxy for possible differences in the level of asym-

metric information between non-technology intensive ventures in emerging and developed countries (Titman and Wessels (1988)).

The variable *public* is an indicator variable equal to one if a portfolio company eventually went public. This variable proxies for differences between emerging and developed countries with respect to exit strategies (Cumming and McIntosh (2002)), which may affect venture capitalists' asset allocation decisions. The variable *onetime* is an indicator variable equal to one if a financing relationship consists of only one financing round; this variable proxies for differences in the use of staged financing between emerging and developed countries; *capital* is a venture capital firm's capital under management in millions of dollars, which may affect venture capitalists' decisions to concentrate investments in a particular class of firms; *law* ranks the quality of the law and order environment across countries; this variable is obtained from LLSV (1998). All other variables are as described in the preceding subsection.

### III Venture capital data

Venture capital markets in the sample countries are emerging markets that for the most part, developed concurrently and experienced significant growth starting in the late 1990s. Hence, differences in venture capitalists' asset allocation decisions cannot be attributed to differences in the relative maturities of the venture capital markets in these countries. Furthermore, venture capital markets in the sample emerging and developed countries are not segmented. In fact, venture capitalists in some developed countries (Singapore and Hong Kong in particular) raise venture capital funds for investments in the sample emerging countries.<sup>7</sup>

Data on venture capital transactions are obtained from VentureXpert, which is owned by Ventureconomics. The cross-country data set consists of 6,552 distinct venture capital investments during 4,264 distinct rounds of

venture financing. Venture capital firms located in the sample countries are responsible for 67 percent of all sample transactions (4,200 observations), while venture capitalists located primarily in the U.S. and the U.K. are responsible for 33 percent of all sample transactions (2,352 observations).

These investments involve 2,857 portfolio companies located in Asia and Israel that received their first round of funding from venture capitalists (VCs) between 1982 and December 2000. The developed countries based on World Bank classifications are: Australia, Hong Kong (China), New Zealand, Japan and Singapore; while the emerging countries are: China, India, Indonesia, Israel, Malaysia, Philippines, Korea, Republic, Taiwan (China) and Thailand.

This sample is obtained from a total database of 10,192 venture capital and private equity transactions. From this total sample, I eliminate:

1. All buyout transactions, since these are not standard venture capital transactions (1,042 observations);
2. All venture capital relationships that did not commence prior to December 31, 2000 (1,815 observations); this ensures that I have at least two-and-a-half years of data on each financing relationship;
3. All investments in the financial services industry (180 observations); as well as any observation that does not specify the dollar value of each round investment; the investment stage; the industry; and the name of the portfolio company (603 observations).

This process resulted in the elimination of 3,640 data records. These investments involve 818 venture capital firms with 465 or 57 percent of these venture capital firms located in the sample countries.<sup>8</sup> Table I reports industry and investment stage statistics by sample country for this data set. The statistics reported in Table I indicate that technology intensive deals outnumber non-technology intensive deals in practically all of the sample countries

regardless of the location of the venture capitalists providing financing. Also, later stage deals outnumber early stage financing deals across all sample countries regardless of the location of the venture capitalists providing financing.

Panels A and B of Table II show that venture capitalists in poor quality legal environments invest smaller amounts in a larger number of firms relative to venture capitalists in better quality legal environments. On average, the number of firms in emerging country-based venture capitalists' portfolios is 2x the number of firms in developed country-based venture capitalists' portfolios. The amount disbursed by emerging country-based venture capitalists to a single firm are about 0.2x to 0.33x the amounts disbursed by developed country-based venture capitalists. This is consistent with test-of-means statistics reported in Panel C of Table II, which indicate that average capital under management for emerging country-based venture capital firms is about 0.38x average capital under management for developed country-based venture capital firms. These means are significantly different at the 5 percent confidence level.

About thirty percent of portfolio companies are non-technology intensive companies in the cross-country sample. This proportion is very similar to that reported in Obrimah (2004) for VCs in the U.S. Total funding committed to all sample companies amounts to \$1.56 billion, with 31 percent (61 percent) being disbursed to non-technology intensive (respectively, technology intensive) ventures.

Independent private partnerships, corporate venture funds and commercial bank-affiliated venture capitalists (VCs), in that order, are responsible for most of the sample transactions. All venture capital types invest in non-technology intensive companies. The venture capital types with the largest proportions of non-technology intensive companies in their portfolios are commercial bank-affiliated VCs (33 percent), independent private partnerships (26 percent) and corporate VCs (15 percent). Investments in early stage companies constitute

between 29 percent (for investment bank-affiliated VCs) and 60 percent (for government-affiliated VCs) of all investment transactions.

Forty-three percent of sample portfolio companies are early stage ventures at the first round of venture financing. Early stage ventures constitute a significant minority amongst non-technology intensive ventures (32 percent), a slight minority amongst technology intensive ventures (47 percent) and a significant majority amongst medical/health-related ventures (60 percent). A total of \$780 million was disbursed to portfolio companies receiving their first round of venture capital financing and 31 percent of this total went to early stage ventures.

Syndication is not very prevalent within this sample. Deals involving syndications between the different classes of VCs are also very few. The percentage of deals involving independent private partnerships and at least one other venture capital class range from 8 percent for commercial bank affiliated VCs, to 16 percent for investment bank affiliated VCs. Syndication with other classes of VCs, other than independent private partnerships is even less prevalent. The proportion of deals involving a single class of VCs ranges from 79 percent for investment bank affiliated VCs, to 91 percent for independent private partnerships. This lack of extensive syndication may be rational in markets that are far from perfect, since information rents are likely to exist in such markets.<sup>9</sup>

## **IV Results and Interpretations**

Test results reported in Table III indicate that the propensity to concentrate investments in early stage non-technology intensive ventures decreases with the extent to which property rights are protected. That is, the gap between the supply and demand of external financing for this class of firms is relatively greater in poor quality property rights environments. The quality of contract

enforcement, on the other hand, has no effect on the gap between the supply and demand of external financing for this class of firms.

However, venture capitalists in poor quality contract enforcement environments are significantly more likely to concentrate investments in early stage non-technology intensive ventures relative to venture capitalists in better quality contract enforcement environments. This indicates that economic profits associated with investing in this class of firms are relatively greater in poor quality contract enforcement environments, suggesting that venture capitalists in poor quality contract enforcement environments are able to earn risk premiums for providing financing to this class of firms.

The coefficient of the *fundcountry* variable indicates that venture capital funds in emerging countries are significantly more likely to concentrate investments in early stage non-technology intensive ventures relative to those in developed countries. This difference, which is between 28 percent and 41 percent, is economically significant. These results are consistent with hypothesis one, which predicts that small firms in poor quality legal environments are more financially constrained relative to small firms in better quality legal environments.

## **A Early stage technology intensive ventures**

Table IV reports test results where the dependent variable is concentration in early stage technology intensive ventures. The results indicate that the propensity to concentrate investments in early stage technology intensive ventures decreases with the extent to which property rights are protected and the quality of contract enforcement. Concentration in early stage technology intensive ventures also decreases with the propensity for entrepreneurship.

These results indicate that the gap between the demand and supply of external financing for this class of firms is relatively greater in poor quality

legal environments and low propensity for entrepreneurship countries. The coefficient of the propensity for entrepreneurship variable suggests that the lack of financing to fund innovation can adversely affect attitudes towards innovation or entrepreneurship.

The coefficient of *fundcountry* indicates that venture capital funds in emerging countries are significantly more likely to concentrate investments in early stage technology intensive ventures relative to those in better quality legal environments. This difference, which is between 9 percent and 13 percent, is economically significant, though less so relative to that obtained for early stage non-technology intensive ventures. This indicates that economic profits associated with investing in early stage non-technology intensive ventures are greater than those associated with investing in early stage technology intensive ventures in poor quality legal environments. These results are consistent with hypothesis one, which predicts that small firms in poor quality legal environments are more financially constrained relative to small firms in better quality legal environments.

## **B Later stage non-technology intensive ventures**

Test results reported in Table V indicate that the propensity to concentrate investments in later stage non-technology intensive ventures increases with the quality of contract enforcement and property rights protection, while it decreases with the extent to which banks are precluded from holding the equity of non-financial firms and long-run country growth rates. Concentration in later stage non-technology intensive ventures also decreases with the propensity for entrepreneurship across countries.

These results indicate that the gap between the supply and demand of external financing for this class of firms is relatively greater in better quality legal environments and low propensity for entrepreneurship countries. The



results also indicate that the gap between the supply and demand of external financing for later stage non-technology intensive ventures is relatively greater in countries where banks are allowed to hold the equity of non-financial firms. This is in line with the finding in Obrimah (2004) that U.S. commercial banks that set up venture capital operations inhouse hold less risky portfolios relative to those that set up venture capital funds.

The coefficient of *fundcountry* indicates, with the exception of specification (2), that venture capital funds in poor quality legal environments are significantly less likely to concentrate investments in later stage non-technology intensive ventures relative to those in better quality legal environments. This difference, which is between 20 percent and 25 percent, is economically significant. These results are consistent with hypothesis one, which implies that large firms in poor quality legal environments are less financially constrained relative to large firms in better quality legal environments.

## **C Later stage technology intensive ventures**

Table VI reports test results where the dependent variable is concentration in later stage technology intensive ventures. The results indicate that the propensity to concentrate investments in later stage technology intensive ventures increases with the extent to which property rights are protected and the extent to which capital markets are market based.

This indicates that the gap between the supply and demand of external financing for this class of firms is greater in better quality legal environments. This also indicates that the gap between the demand and supply of external financing for this class of firms is larger in market-based capital markets (relative to bank-based capital markets) in line with the prediction in Black and Gilson (1998).

The coefficient of *fundcountry* indicates, except in specification (2), that

venture capital funds in emerging countries are significantly less likely to concentrate investments in later stage technology intensive ventures relative to those in developed countries. This difference, which is between 8 percent and 15 percent, is economically significant, though less so relative to that obtained for later stage non-technology intensive ventures. These results are consistent with hypothesis one, which implies that large firms in poor quality legal environments are less financially constrained relative to large firms in better quality legal environments.

## **D The demand-supply equilibrium of venture capital financing**

Tables VIIA and VIIC report the results from the switching regression model with endogenous switching. The results indicate that asset allocations of venture capitalists differ significantly depending on whether they are investing in emerging or developed countries. The switching regression is able to generate two different component regressions from the data. The switching regression also generates probabilities that a particular observation is utilized in the first component regression. Probabilities higher than the mean indicate that an observation is included in the first component regression. Probabilities lower than the mean indicate that an observation is included in the second component regression.

The mean probability that an observation is utilized in the first component regression, when the switch variable is *gdppercapita* is 0.39, while the corresponding probability is 0.58 for the switching regression that utilizes *bankregulation* as the switch variable. Table VIIB, which summarizes the probabilities by sample country shows that sample emerging countries (poor quality legal environments) and developed countries (better quality legal environments) are assigned to different component regressions, with the only

exception being observations from Taiwan, which are assigned to the component regressions to which developed country-observations are assigned.<sup>10</sup>

Although the switch variables are different, the coefficients and robust t-statistics generated in specifications (1) and (4) are practically identical (the component regressions to which emerging countries are assigned), while those generated in specifications (2) and (3) are practically identical (the component regressions to which developed countries are assigned).

The results indicate that there are significant differences in the asset allocation decisions of venture capitalists investing in emerging and developed countries. First, venture capitalists in emerging countries are more likely to invest in early stage non-technology intensive ventures, while those in developed countries are more likely to invest in later stage non-technology intensive ventures. Second, while concentration in early stage non-technology intensive ventures decreases with *gdppercapita* and increases with *bankregulation* amongst emerging countries, concentration in later stage non-technology intensive ventures increases with *gdppercapita* and decreases with *bankregulation* amongst developed countries.

These results indicate that the gap between the supply and demand of external financing for small firms is greater in poor quality legal environments, while the gap between the supply and demand of external financing for large firms is greater in better quality legal environments. The results also indicate that the gap between the supply and demand of venture capital financing for small firms decreases with the quality of the legal environment amongst both emerging and developed countries.

These results are consistent with hypothesis two, which predicts that venture capitalists in poor quality legal environments are more likely to concentrate investments in small firms, while those in better quality legal environments are more likely to concentrate investments in large firms. The likelihood ratio test of the restrictions implied by the switching regression model indicates

that the restrictions implied by the switching equation cannot be rejected at the one percent confidence level. The ratio of the likelihoods is approximately 0.97.

## **E Out-of-sample robustness test**

I examine the asset allocation decisions of venture capitalists investing in the sample countries, but located in developed countries outside the region. If the results obtained in the preceding subsections are driven by gaps between the supply and demand of external financing, it is expected that this will be reflected in the asset allocations of venture capitalists investing in but located outside the sample countries. There are 350 such venture capitalists in all and 250 (respectively, 72) are based in the United States (United Kingdom).

The test results show that the propensity to concentrate investments in early stage non-technology intensive ventures decreases with the quality of contract enforcement and property rights protection for venture capitalists investing in but located outside the sample countries. Hence, consistent with the results in the preceding subsections, the gap between the supply and demand of external financing for small firms is greater in poor quality legal environments. These test results are reported in Table VIII.

## **F Specification test for probit models**

Specification tests indicate that the probit models utilized in the tests are well specified. The test of goodness-of-fit for the probit model where the dependent variable is concentration in early stage non-technology ventures yields a Pearson  $\chi^2$  statistic of 514.16 that is significant at the one percent confidence level. A stricter goodness-of-fit test, the Hosmer-Lemeshow<sup>11</sup>  $\chi^2$  goodness of fit statistic yields a test statistic of 55.40, which is significant at the one percent confidence level.

Furthermore, using the sample mean third-tercile-concentration of 0.345 as a cutoff point, I find that 72 percent of venture capital firms that are classified as ‘concentrated’ in early stage non-technology intensive ventures are correctly predicted by the model, while 73 percent of those classified as ‘not concentrated’ in non-technology intensive ventures are correctly classified. In all, the model correctly classifies 72.65 percent of the data. All of these statistics indicate that the probit models are well specified.

## V Conclusions

In this paper, I find that venture capitalists in poor quality legal environments (countries characterized by poor quality contract enforcement and property rights protection) are more likely to concentrate investments in early stage (small) ventures, while those in better quality legal environments are more likely to concentrate investments in later stage (large) ventures. Furthermore, the propensity to concentrate investments in early stage ventures decreases with the quality of the legal environment amongst both emerging and developed countries.

These results indicate that the gap between the demand and supply of venture capital financing is greater for small firms in poor quality legal environments. Furthermore, the gap between the supply and demand of venture capital financing for small firms decreases with the quality of the legal environment. These results are in line with the prediction in Beck, Demirgüç-Kunt, Laeven, and Levine (2005) that small firms are the most constrained with respect to access to external financing in poor quality legal environments. The results are also consistent with the prediction that financial development, in this case, the emergence of venture capitalists, has a greater effect on small firms’ access to external financing in poor quality legal environments.

The results in this paper, coupled with the predictions in Beck, Demirgüç-

Kunt, Laeven, and Levine (2005) suggest that poor quality legal environments primarily affect the growth of informal capital markets, hence the relatively greater need for financial intermediation during the early stages of a firm's growth cycle in poor quality legal environments. This interpretation of the results is consistent with the fact that the informal equity or angel investor market constitutes a much larger source of financing for small firms in the U.S. relative to the formal equity or venture capital market (Berger and Udell (1998)).

Consistent with the findings in Obrimah (2004), I find that the organizational form adopted by commercial bank affiliated venture capitalists contains information about their risk preferences. In countries where commercial banks are not precluded from holding the equity of non-financial firms, commercial bank affiliated venture capitalists are more likely to concentrate investments in later stage ventures. In countries where commercial banks are precluded from holding the equity of non-financial firms, on the other hand, commercial bank affiliated venture capitalists are more likely to concentrate investments in early stage ventures or relatively riskier ventures.

The empirical results in this paper are based on the initial or first rounds of venture capital financing provided to entrepreneurs by venture capitalists. Firm growth rates, however, may depend on the demand and supply of venture capital financing after a financing relationship has been established. An examination of how poor quality legal environments affect the demand for additional rounds of venture capital financing is a subject for future research.

## Notes

<sup>1</sup>Berger and Udell (1998, pg. 630).

<sup>2</sup>In this paper, there exists a one-to-one correspondence between a country's classification as a poor quality contract enforcement environment and its classification as an emerging country.

<sup>3</sup>Venture capital funds providing financing to company  $j$  may be located in different countries.

<sup>4</sup>Gompers (1996), Hsu (2004)

<sup>5</sup>Berger and Udell (1998, pg. 630).

<sup>6</sup>See Maddala (1983) for a detailed discussion of switching regressions with endogenous switching.

<sup>7</sup>The Guide to Venture Capital in Asia (2000).

<sup>8</sup>We note here that discussions with Ventureconomics indicate that the coverage of Asia venture capital transactions in the VentureXpert database simply reflects the data that they have been able to obtain so far and does not represent any bias on their part whatsoever. The fact that macro characteristics of this unique data set correspond to macro data on Asian countries and Israel obtained from the GVCA further lends credence to this assertion

<sup>9</sup>These statistics are not reported, but are available upon request from the author.

<sup>10</sup>This result provides some support for those who have argued that Taiwan should be regarded as a developed economy instead of its current classification as an emerging economy.

<sup>11</sup>The Hosmer-Lemeshow goodness of fit statistic is utilized instead of the standard Pearson goodness of fit statistic when the number of observations per covariate pattern is small. In this study, the number of observations per covariate pattern is about 2, hence the Hosmer-Lemeshow goodness of fit statistic provides a stricter goodness of fit test relative to the Pearson statistic. In Using the Hosmer-Lemeshow goodness of fit test, the number of groups is usually limited to ten.

## A Data descriptions, classifications and sources

Table AI: Data Descriptions and sources

The first 17 variables are associated with venture capital transactions and are obtained from VentureXpert. Sources are cited for all other variables. Concentration in early stage non-technology intensive ventures is constructed as follows. For each venture capital fund in the sample with investments in non-technology intensive ventures, I determine total dollar disbursements to all non-technology intensive ventures in its portfolio as well as proportions of the total disbursed to early stage non-technology intensive ventures. I then divide the venture capital funds into three terciles based on the proportion of their total investments disbursed to early stage non-technology intensive ventures and venture capital funds located in the third tercile are deemed to be concentrated in early stage non-technology intensive ventures. Concentration in later stage non-technology intensive ventures; early stage technology intensive ventures; later stage technology intensive ventures is similarly determined. The three terciles of concentration in non-technology intensive ventures are also similarly determined.

Symbol	Description/Construction
<i>Earlynontechfm</i>	Dummy variable = 1 if a venture capital fund is concentrated in early stage non-technology intensive ventures.
<i>Laternontechfm</i>	Dummy variable = 1 if a venture capital fund is concentrated in later stage non-technology intensive ventures.
<i>Earlyhitechfm</i>	Dummy variable = 1 if a venture capital fund is concentrated in early stage technology intensive ventures.
<i>Laterhitechfm</i>	Dummy variable = 1 if a venture capital fund is concentrated in later stage technology intensive ventures.
<i>Onetime</i>	Dummy variable = 1 if a financing relationship involves only one round of financing.
<i>Public</i>	Dummy variable = 1 if a portfolio company eventually goes public, and 0 otherwise.
<i>Nonhitechqt</i>	The three terciles of concentration in non-technology intensive ventures.
<i>Fundcountry</i>	Dummy variable = 1 if a venture capital fund is located in a sample emerging country.
<i>Age</i>	Portfolio company's age at first round of venture capital financing.
<i>Firmyear</i>	The year a venture capital firm commenced operations.
<i>Early</i>	Dummy variable = 1 if a portfolio company is in the early stages of a firm's growth cycle.
<i>IVC</i>	Dummy variable = 1 if a venture capital fund is an independent private partnership .
<i>Inbankafvc</i>	Dummy variable = 1 if a venture capital fund is affiliated with an investment bank

*continued*



Table AI-Continued

Symbol	Description/Construction
<i>Corporatevc</i>	Dummy variable = 1 if a venture capital fund is affiliated with a non-financial corp
<i>Commbankafvc</i>	Dummy variable = 1 if a venture capital fund is affiliated with a commercial bank
<i>Govtafvc</i>	Dummy variable = 1 if a venture capital fund is government-owned or affiliated
<i>Capital</i>	Venture capital firm-reported capital under management (‘\$Millions).
<i>Entrepreneurship</i>	Country ranking of entrepreneurship and innovation by the World Economic Forum. Taken from the Global Competitiveness Report (1996). Higher rankings imply higher innovation capabilities.
<i>Markettobook</i>	Industry-wide ratios of market to book value based on 2-digit sic codes. Ratios are calculated separately for portfolio companies located in the emerging and developed country sub-samples. Data are obtained from Compustat’s Global Vantage Database.
<i>Tangibleassets</i>	Industry-wide ratios of property, plant, and equipment to total assets based on 2-digit sic codes. Ratios are calculated separately for portfolio companies located in the emerging and developed country sub-samples. Data are obtained from Compustat’s Global Vantage Database.
<i>Lawenforcement*</i>	Measures the relative degree to which contractual agreements are enforced and complications presented by language and mentality differences. Scored 1-4, with higher scores for superior quality, averaged over 1980-1989, and 1990- 995; Source: Knack and Keefer (1995) using data from Business Environmental Risk Guide (BERG).
<i>Growth</i>	Annual GDP growth; Source: World Development Indicators (2002).
<i>Propertyrights*</i>	Rating of property rights on a scale of 1 to 5. The more protection private property receives, the higher the score. Source: LLSV (1998b), using data from 1997 Index of Economic Freedom.
<i>Gdppercapita</i>	Annual GDP Per Capita obtained from the World Development Indicators (2002).
<i>Marketstructure</i>	Constructed as the ratio of stock market capitalization to GDP; stock market capitalizations are obtained from the Emerging Stock Markets Factbook, while GDP data are obtained from the World Development Indicators (2002) CD ROM.
<i>Bankregulation*</i>	Ability of banks to own and control non-financial firms. Source: Barth, Caprio, and Levine (1998). 1 indicates “unrestricted” (banks can engage in the full range of the activity directly in the bank), 2 indicates “permitted” (the full range of those activities can be conducted, but all or some of the activity must be conducted in subsidiaries), 3 indicates “restricted” (banks can engage in less than the full range of those activities, either in the bank or subsidiaries) and 4 indicates “prohibited” (the activity may not be conducted by the bank or subsidiaries).

\* descriptions obtained from Demirgüç-Kunt and Levine (2001).

Table AII: Industry and investment stage classifications

This table reports the industry, and investment stage classification schemes employed in this paper. *Hitech* are technologically intensive inventories; *Nonhitech* are non-technologically intensive ventures; while *Medical* are medical/health-related ventures. Actual classifications are obtained from VentureXpert. Portfolio companies in the Start-up/Seed or Early stages of a firm's life cycle are firms that are still in the early stages of a firm's growth cycle. Firms classified as early stage firms tend to be older and further on along the firm's life cycle relative to those classified as Start-up/Seed firms. Portfolio companies in the expansion or later stages of a firm's growth cycle are relatively established firms who need financing primarily to fund growth opportunities. These are larger and older firms relative to Early Stage and Start-up firms. Firms classified as later stage firms tend to be further along on a firm's life cycle relative to those classified as expansion stage firms.

Actual Classifications	Broad Classifications in this paper		
Panel A: Industry Classifications			
	Hitech	Nonhitech	Medical
Agr/Forestry/Fish		×	
Biotechnology			×
Business Services		×	
Communications	×		
Computer Hardware	×		
Computer Other	×		
Computer Software	×		
Construction		×	
Consumer Related		×	
Industrial/Energy		×	
Internet Specific	×		
Manufacturing		×	
Medical/Health			×
Other		×	
Semiconductor/Electr.	×		
Transportation		×	
Utilities		×	
Panel B: Classifications by Investment Stage			
	Later Stage	Early Stage	
Early Stage		×	
Expansion	×		
Later Stage	×		
Startup/Seed		×	

Table AIII: Classification of venture capitalists by organizational structure

This table reports the ‘venture capital type’ classification scheme employed in this paper. The row items are the actual classifications of venture capital firms by organizational structure. These classifications are obtained from VentureXpert. *SBIC NEC* are Small Business Investment Companies (SBICs) not classified within any of the other VentureXpert classes. *Fund of funds* are venture capital funds that invest in other venture capital funds rather than investing directly in firms in need of venture capital financing. All other ‘actual’ classifications are self-explanatory. The Broad classifications in this paper are five. These are *IVC* (Independent Venture Capitalist; *Invbankaffvc* (Investment Bank affiliated venture capitalist); *Corporatevc* (Corporate venture capitalist; *Commbankaffvc* (Commercial Bank affiliated venture capitalist); and *Govtaffvc* (Government affiliated venture capitalist).

Actual Classifications	Broad Classifications in this paper				
	IVC	Invbankaffvc	Corporatevc	Commbankaffvc	Govtaffvc
Affiliate of Other Financial Institution				×	
Bank Group				×	
Business Development Fund					×
Commercial Bank Affiliate				×	
Corporate (non-financial) Affiliate			×		
Corporate (non-financial) Venture Program			×		
Investment Management Firm		×			
Investment Bank & Affiliates		×			
Other Government Program					×
Fund of Funds	×				
Independent Private Partnership	×				
SBIC NEC					×
State Govt. Affiliated Program					×

Table AIV: Correlations Table for the cross-country sample

This table reports correlations between independent variables utilized in this paper. The data comes from fourteen emerging and developed countries. The developed countries based on World Bank classifications are: Australia, Hong Kong (China), New Zealand, Japan and Singapore; while the emerging countries are: China, India, Indonesia, Israel, Malaysia, Philippines, Korea, Republic, Taiwan (China) and Thailand. The data consists of 4,200 distinct venture capital transactions between entrepreneurs and venture capitalists located within the sample countries. *Firmyear* is the year a venture capital firm commenced operations; *Growth* is annual GDP growth; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Entrepreneurship* is a ranking of the propensity for entrepreneurship/innovation across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Invbankaffvc* are Investment Bank affiliated venture capitalists; *Corporatevc* are venture capitalists affiliated with non-financial corporations; *Commbankaffvc* are Commercial Bank affiliated venture capitalists; *Govtaffvc* are government affiliated venture capitalists; *Early* is an indicator variable equal to one if a firm was in the early stages of a firm's growth cycle when it received its first round of financing; *Gdppercapita* is annual GDP Per Capita.

	Firm-year	Growth	Lawenforcement	Bankregulation	Marketstructure	Propertyrights	Entrepreneurship
Firmyear	1.0000						
Growth	0.1338	1.0000					
Lawenforcement	0.0425	-0.5028	1.0000				
Bankregulation	-0.0994	0.6686	-0.6043	1.0000			
Marketstructure	0.0336	-0.4845	0.7267	0.4052	1.0000		
Propertyrights	0.2298	0.3707	0.4990	-0.1151	0.2933	1.0000	
Entrepreneurship	0.1021	0.1262	-0.4193	-0.3299	-0.4199	-0.2764	1.0000
Fundcountry	0.0456	0.5692	-0.7865	0.3856	-0.7633	-0.3428	0.6220
Invbankaffvc	-0.0246	-0.2964	0.1518	-0.2206	0.1402	-0.0799	-0.0116
Corporatevc	0.0806	0.1899	-0.0375	0.1034	0.0102	0.0986	0.0168
Commbankaffvc	-0.1864	-0.0469	-0.2134	0.1313	-0.1306	-0.3308	0.0842
Govtaffvc	-0.2620	-0.0029	-0.0484	0.1112	-0.0499	-0.0990	-0.0634
Early	-0.0091	0.0564	-0.1197	0.0735	-0.0871	-0.0954	0.0878
Gdppercapita	0.1036	-0.2073	0.8987	-0.4031	0.5648	0.7253	-0.5220

  

	Fundcountry	Invbankaffvc	Corporatevc	Commbankaffvc	Govtaffvc	Early	Gdppercapita
Fundcountry	1.0000						
Invbankaffvc	-0.1904	1.0000					
Corporatevc	0.0688	-0.1250	1.0000				
Commbankaffvc	0.1919	-0.1677	-0.1408	1.0000			
Govtaffvc	-0.1462	-0.1051	-0.0883	-0.1184	1.0000		
Early	0.1479	-0.0999	0.0531	0.0454	0.1281	1.0000	
Gdppercapita	-0.6736	0.0418	0.0133	-0.2834	-0.0422	-0.1217	1.0000

Table I: Summary statistics for venture capital data by country

This table reports the industry, and investment stage distribution of the venture capital data utilized in this paper. These data are obtained from VentureXpert and consist of 6,552 venture capital transactions between entrepreneurs located in the fourteen sample countries and (1) venture capitalists located in these sample countries (sample VCs); and (2) venture capitalists located primarily in the U.S. and the U.K. ('Other VCs'). *Hitech* are technology intensive ventures; *Nonhitech* are non-technology intensive ventures; and *Medical* are medical or health related ventures. *Early Stage* firms are firms in the early stages of a firm's growth cycle, while *Later Stage* firms are firms in the expansion stages of a firm's growth cycle. Details of industries classified as *Hitech*, *Nonhitech* or *Medical* as well as firms classified as early stage or later stage firms are provided in Table AII of the Appendix.

	Transactions with sample VCs			Transactions with other VCs			
Panel A: Data descriptions by country and industry classification							
Country	Hit-ech	Med-ical	Nonhi-tech	Hit-ech	Med-ical	Nonhi-tech	Total
Australia	444	122	287	160	34	90	1,137
China	72	15	34	100	11	39	271
Hong Kong	84		45	143		40	312
India	389	69	319	180	8	33	998
Indonesia	12	1	18	7		18	56
Israel	187	64	8	460	135	22	876
Japan	65	10	49	91	15	140	370
Korea	1,076	138	249	213	24	36	1,736
Malaysia	24	1	12	6	2	13	58
New Zealand	30	4	21	16		9	80
Philippines	9		7	8		25	49
Singapore	106	6	26	122	16	32	308
Taiwan	139	1	36	65	1	22	264
Thailand	4		13	6	5	9	37
Total	2,644	431	1,125	1,577	251	528	6,552

Panel B: Data descriptions by country and investment stage classification						
Country	Later Stage	Early Stage	Later Stage	Early Stage	Total	
Australia	577	276	181	103	1,137	
China	72	49	94	56	271	
Hong Kong	100	29	141	42	312	
India	368	409	134	87	998	
Indonesia	28	3	19	6	56	
Israel	156	103	352	265	876	
Japan	90	34	172	74	370	
Korea	817	646	146	127	1,736	
Malaysia	21	16	16	5	58	
New Zealand	45	10	25		80	
Philippines	15	1	26	7	49	
Singapore	86	52	117	53	308	
Taiwan	157	19	62	26	264	
Thailand	12	5	10	10	37	
Total	2,547	1,653	1,495	861	6,552	

Table II: Industry- and investment stage-based test-of-means results

This table reports the results of industry and investment stage based test-of-means. The data consists of 4,200 funding transactions between entrepreneurs and venture capitalists located within the sample countries from 1982 to 2003. *Nonhitech* are non-technology intensive ventures, *Hitech* are technology intensive ventures, while *Health Related* are medical/health related ventures. *Early Stage* firms are firms in the early stages of a firm's growth cycle. *Later Stage* firms are firms in the expansion stages of a firm's growth cycle. *Capital* is total capital under management by a venture capital firm (includes funds committed to venture capitalists but not yet disbursed and investments from which venture capitalists are yet to exit). *t - stats* are the t-statistics associated with the test-of-means. The test-of-means does not assume that the variances of the two groups utilized in the tests are equal. All numbers are actual except noted otherwise.

Item	# of obs.	Mean Values		t-stats
		Developed Country	Emerging Country	
Panel A: Mean number of portfolio companies by industry and investment stage classification				
Later Stage & Nonhitech	361	21.73	36.49	-6.517***
Early Stage & Nonhitech	102	15.84	32.25	-4.443***
Later Stage & Hitech	770	16.98	35.7	-12.064***
Early Stage & Hitech	497	15.28	34.34	-10.213***
Later Stage & Health Related	91	20.83	31.65	-2.152***
Early Stage & Health Related	78	9.35	42.39	-6.440***
Panel B: Mean per company investment by industry and investment stage classification (\$'000s)				
Later Stage & Nonhitech	361	5,507	1,340	1.447
Early Stage & Nonhitech	102	3,650	625	-2.541**
Later Stage & Hitech	770	7,751	2,279	5.733***
Early Stage & Hitech	497	6,132	2,126	4.246***
Later Stage & Health Related	91	6,806	4,721	1.246
Early Stage & Health Related	78	5,082	2,532	1.178
Panel C: Mean venture capital firm capitalization (\$ Millions) and number of venture funds				
Capital	177	192	73	3.208***
# of funds per venture capital firm	1899	2.698	4.273	-12.722***

\*\*\* indicates significance at the 1%, confidence level

Table III: Concentration in early stage non-technology intensive ventures

The probit model estimated is

$$\begin{aligned} \text{Earlynontechfm} = & \beta_0 + \beta_1 \text{growth} + \beta_2 \text{Lawenforcement} + \beta_3 \text{Bankregulation} \\ & + \beta_4 \text{Marketstructure} + \beta_5 \text{Propertyrights} + \beta_6 \text{Firmyear} \\ & + \beta_7 \text{Firmtype} + \beta_8 \text{Entrepreneurship} + \beta_9 \text{Fundcountry} \\ & + \beta_{10} \text{Firstyear} + \epsilon. \end{aligned}$$

*Earlynontechfm* is an indicator variable equal to one if a venture capital fund's investments are concentrated in early stage non-technology intensive ventures. *Growth* is the growth rate of GDP; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Firmyear* is the year a venture firm was founded; *Firmtype* is a venture capital firm's organizational form (*IVC*, *Invbankaffvc*, *Corporatevc*, *Commbankaffvc*, and *Govtffvc*); *Entrepreneurship* is a ranking of the propensity for entrepreneurship across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Firstyear* is the year a portfolio company received its first round of venture capital financing. Data on venture capital transactions are obtained from VentureXpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), while z-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)
Firmyear	-.00736 (-2.13)**	-.00657 (-1.89)*	-.0104 (-3.22)***	-.00768 (-2.22)**	-.00922 (-2.89)***
Growth	.000387 (0.05)				
Lawenforcement		.0171 (0.21)			
Bankregulation			.0603 (1.09)		
Marketstructure				.0372 (0.49)	
Propertyrights					-.1819 (-5.77)***
Entrepreneurship	-.0907 (-1.49)	-.1073 (-1.31)	-.1204 (-1.49)	-.1329 (-1.68)*	-.0801 (-1.04)
Fundcountry	.3915 (8.22)***	.3993 (5.70)***	.4066 (7.00)***	.4105 (6.55)***	.2841 (5.08)***
Invbankaffvc	.00541 (0.07)	.0352 (0.43)	.00899 (0.11)	.0205 (0.27)	-.1645 (-2.00)**
Corporatevc	.0367 (0.46)	.0587 (0.70)	.0375 (0.45)	.0407 (0.51)	.0728 (0.85)
Commbankaffvc	.0520 (0.57)	.0893 (0.95)	.0471 (0.51)	.0764 (0.85)	-.0474 (-0.50)
Govtffvc	.3112 (4.29)***	.3352 (4.67)***	.4054 (5.10)***	.3132 (4.41)***	.3154 (3.87)***
Pseudo $R^2$	0.1787	0.1595	0.2150	0.1767	0.2565
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	732	696	690	746	690

\*\*\*,\*\*, \* indicate significance at the 1% , 5%, and 10% confidence levels respectively

Table IV: Concentration in early stage technology intensive ventures

The probit model estimated is

$$\begin{aligned} \text{Earlytechfm} = & \beta_0 + \beta_1 \text{growth} + \beta_2 \text{Lawenforcement} + \beta_3 \text{Bankregulation} \\ & + \beta_4 \text{Marketstructure} + \beta_5 \text{Propertyrights} + \beta_6 \text{Firmyear} \\ & + \beta_7 \text{Firmtype} + \beta_8 \text{Entrepreneurship} + \beta_9 \text{Fundcountry} \\ & + \beta_{10} \text{Firstyear} + \epsilon. \end{aligned}$$

*Earlytechfm* is an indicator variable equal to one if a venture capital fund's investments are concentrated in early stage technology intensive ventures. *Growth* is the growth rate of GDP; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Firmyear* is the year a venture firm was founded; *Firmtype* is a venture capital firm's organizational form (*IVC*, *Invbankaffvc*, *Corporatevc*, *Commbankaffvc*, and *Govtaffvc*); *Entrepreneurship* is a ranking of the propensity for entrepreneurship across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Firstyear* is the year a portfolio company received its first round of venture capital financing. Data on venture capital transactions are obtained from Venture-Xpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), while z-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)
Firmyear	-.00175 (-1.34)	-.00230 (-1.79)*	-.00191 (-1.37)	-.00153 (-1.16)	-.00188 (-1.37)
Growth	.00214 (0.44)				
Lawenforcement		-.0939 (-1.72)*			
Bankregulation			.0172 (0.62)		
Marketstructure				-.0102 (-0.24)	
Propertyrights					-.0751 (-3.96)***
Entrepreneurship	-.1099 (-2.82)***	-.1254 (-2.60)***	.0250 (0.42)	-.1043 (-2.42)**	-.00986 (-0.19)
Fundcountry	.1255 (3.86)***	.0929 (1.69)*	.1207 (3.40)***	.1213 (2.81)***	.1011 (3.01)***
Invbankaffvc	.0894 (2.09)**	.0864 (2.00)**	.0609 (1.45)	.0843 (2.04)**	-.0102 (-0.24)
Corporatevc	-.0206 (-0.52)	-.0342 (-0.83)	-.0570 (-1.37)	-.0170 (-0.43)	-.0496 (-1.20)
Commbankaffvc	.0144 (0.21)	.0202 (0.28)	-.00912 (-0.13)	.0147 (0.21)	-.0175 (-0.24)
Govtaffvc	.1890 (4.13)***	.1541 (3.33)***	.2197 (4.60)***	.1874 (4.12)***	.1917 (3.92)***
Pseudo $R^2$	0.0685	0.0746	0.0801	0.0717	0.0889
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	1725	1663	1563	1735	1563

\*\*\*,\*\*,\*, indicate significance at the 1% , 5%, and 10% significance levels respectively



Table V: Concentration in later stage non-technology intensive ventures

The probit model estimated is

$$\begin{aligned} Laternontechfm = & \beta_0 + \beta_1 growth + \beta_2 Lawenforcement + \beta_3 Bankregulation \\ & + \beta_4 Marketstructure + \beta_5 Propertyrights + \beta_6 Firmyear \\ & + \beta_7 Firmtype + \beta_8 Entrepreneurship + \beta_9 Fundcountry \\ & + \beta_{10} Firstyear + \epsilon. \end{aligned}$$

*Laternontechfm* is an indicator variable equal to one if a venture capital fund's investments are concentrated in later stage non-technology intensive ventures. *Growth* is the growth rate of GDP; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Firmyear* is the year a venture firm was founded; *Firmtype* is a venture capital firm's organizational form (*IVC*, *Invcbankaffvc*, *Corporatevc*, *Commbankaffvc*, and *Govtaffvc*); *Entrepreneurship* is a ranking of the propensity for entrepreneurship across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Firstyear* is the year a portfolio company received its first round of venture capital financing. Data on venture capital transactions are obtained from VentureXpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), while z-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)
Firmyear	.00597 (2.24)**	.00420 (1.62)	.00395 (1.36)	.00565 (2.17)**	.00358 (1.24)
Growth	-.00907 (-1.67)*				
Lawenforcement		.1107 (1.87)*			
Bankregulation			-.0924 (-2.40)**		
Marketstructure				.0689 (1.28)	
Propertyrights					.0650 (2.40)**
Entrepreneurship	-.0594 (-1.29)	-.1589 (-2.47)**	-.0681 (-1.25)	-.1069 (-1.81)*	-.0451 (-0.84)
Fundcountry	-.2470 (-6.07)***	-.1054 (-1.56)	-.2236 (-5.36)***	-.1999 (-3.46)***	-.2257 (-4.79)***
Invcbankaffvc	-.0176 (-0.36)	.0460 (0.88)	-.0326 (-0.69)	-.0021 (-0.04)	.0181 (0.35)
Corporatevc	-.1790 (-3.03)***	-.1598 (-2.79)***	-.1777 (-3.07)***	-.1863 (-3.46)***	-.1844 (-3.26)***
Commbankaffvc	-.0795 (-1.00)	-.0473 (-0.61)	-.0536 (-0.68)	-.0699 (-0.89)	-.0178 (-0.22)
Govtaffvc	-.2191 (-4.32)***	-.2061 (-4.41)***	-.2835 (-5.70)***	-.2170 (-4.47)***	-.2698 (-5.08)***
Pseudo $R^2$	0.1321	0.1303	0.1674	0.1263	0.1674
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	732	696	690	746	690

\*\*\*,\*\*, \* indicate significance at the 1%, 5%, and 10% confidence levels respectively

Table VI: Concentration in later stage technology intensive ventures

The probit model estimated is

$$\begin{aligned} Latertechfm = & \beta_0 + \beta_1 growth + \beta_2 Lawenforcement + \beta_3 Bankregulation \\ & + \beta_4 Marketstructure + \beta_5 Propertyrights + \beta_6 Firmyear \\ & + \beta_7 Firmtype + \beta_8 Entrepreneurship + \beta_9 Fundcountry \\ & + \beta_{10} Firstyear + \epsilon. \end{aligned}$$

*Latertechfm* is an indicator variable equal to one if a venture capital fund's investments are concentrated in later stage technology intensive ventures. *Growth* is the growth rate of GDP; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Firmyear* is the year a venture firm was founded; *Firmtype* is a venture capital firm's organizational form (*IVC*, *Invbankaffvc*, *Corporatevc*, *Commbankaffvc*, and *Govtaffvc*); *Entrepreneurship* is a ranking of the propensity for entrepreneurship across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Firstyear* is the year a portfolio company received its first round of venture capital financing. Data on venture capital transactions are obtained from VentureXpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), while z-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)
Firmyear	.00336 (1.65)*	.00370 (1.67)*	.00450 (2.21)**	.00359 (1.69)*	.00402 (2.06)**
Growth	.00148 (0.44)				
Lawenforcement		.0436 (0.89)			
Bankregulation			.0183 (0.69)		
Marketstructure				.0656 (1.80)*	
Propertyrights					.0392 (2.15)**
Entrepreneurship	.0454 (1.12)	-.0121 (-0.25)	.0451 (0.81)	.0135 (0.30)	.0346 (0.68)
Fundcountry	-.1472 (-4.31)***	-.0676 (-1.26)	-.1742 (-4.78)***	-.0815 (-1.84)*	-.1459 (-4.35)***
Invbankaffvc	.0596 (1.31)	.0473 (1.03)	.0859 (1.97)**	.0626 (1.40)	.1176 (2.49)**
Corporatevc	-.0217 (-0.57)	-.0354 (-0.93)	-.00589 (-0.16)	-.0303 (-0.80)	-.00457 (-0.12)
Commbankaffvc	.2411 (3.53)***	.2273 (3.22)***	.2406 (3.43)***	.2439 (3.55)***	.2560 (3.62)***
Govtaffvc	-.2021 (-4.86)***	-.1944 (-4.75)***	-.2452 (-5.62)***	-.2042 (-4.92)***	-.2420 (-5.47)***
Pseudo $R^2$	0.0506	0.0462	0.0743	0.0544	0.0770
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	1725	1663	1563	1735	1563

\*\*\*,\*\*,\* indicate significance at the 1%, 5%, and 10% significance levels respectively

Table VIIA: Switching regression model with endogenous switching: the switch equation

Tests are implemented using a switching regression model with endogenous switching that generates White robust t-statistics. A switching regression model consists of a main equation and a switch equation. This table reports the results for the switch equation of a switching regression model. The main equation of the switching regression model is specified as follows (variables are described in Table VIIC).

$$\begin{aligned} nonhitechqt = & \alpha_0 + \alpha_1 age + \alpha_2 early + \alpha_3 markettobook + \alpha_4 tangibleassets \\ & + \alpha_5 public + \alpha_6 onetime + \alpha_7 firstyear + \alpha_8 gdppercapita \\ & + \alpha_9 firmyear + \alpha_{10} capital + \alpha_{11} firmtype + v. \end{aligned}$$

The switch equations for which test results are reported in this table are specified as follows

$$\begin{aligned} Gdppercapita &= \omega_0 + \omega_1 Law + \omega_2 Growth + \epsilon_1. \\ Bankregulation &= \mu_0 + \mu_1 Law + \mu_2 Growth + \epsilon_2. \end{aligned}$$

*Gdppercapita* is GDP Per Capita; *Bankregulation* is the extent to which banks are precluded from holding the equity of non-financial firms; *Law* is a ranking of the quality of the law and order environment across countries; while *Growth* is annual GDP growth. The switch equation represents some initial guess of the partition in a mixture data. The switching regression model generates two component regressions as well as the probability that a particular observation is included in the first component regression. The two component regressions obtained from the switching regression model are reported in Table VIIC. Switching regression models with endogenous switching are discussed in Maddala (1983). Data on venture capital transactions are obtained from VentureXpert and consist of 4,200 funding transactions between entrepreneurs and venture capitalists located in Asia and the Middle East from 1982 to 2003. Detailed descriptions of the variables are provided in Tables AI through AIII of the Appendix.

Panel A: The switch equation regression output		
	Switch Variable	
	Gdppercapita	Bankregulation
Law	-1.2003 (-266.70)***	1.1555 (246.37)***
Growth	.0796 (54.95)***	-.0818 (-53.95)***
R-squared	0.9788	0.9766
p-value	0.0000	0.0000
Panel B: Probability distribution for being included in the first component regression		
Percentiles	Probabilities	Probabilities
5%	.005426	.040843
10%	.006440	.058031
25%	.009751	.443513
50%	.5398	.443513
75%	.5398	.9877
90%	.9464	.9913
95%	.9621	.9926
Mean	.3977	.5869
Variance	.1009	.1038
Skewness	.1222	-.0161
Kurtosis	1.9216	1.8342

\*\*\* indicates significance at the 1% significance level

Table VIIB: Switching regression-generated assignment of country observations

This table lists the probability that an observation drawn from a sample country is incorporated into the first component regression generated by a switching regression model with endogenous switching. A switching regression model consists of a main equation and a switch equation. The main equation of the switching regression model is specified as follows (results for the main equation are reported in Table VIIC).

$$\begin{aligned} nonhitechqt = & \alpha_0 + \alpha_1 age + \alpha_2 early + \alpha_3 marktobook \\ & + \alpha_4 tangibleassets + \alpha_5 public + \alpha_6 onetime \\ & + \alpha_7 firstyear + \alpha_8 gdppercapita + \alpha_9 firmyear \\ & + \alpha_{10} capital + \alpha_{11} firmtype + v. \end{aligned}$$

The switch equations for which test results are reported in Table VIIA are specified as follows

$$\begin{aligned} Gdppercapita &= \omega_0 + \omega_1 Law + \omega_2 Growth + \epsilon_1. \\ Bankregulation &= \mu_0 + \mu_1 Law + \mu_2 Growth + \epsilon_2. \end{aligned}$$

The switching regression model generates two component regressions from a mixture data as well as the probability that an observation is included in the first component regression. A probability higher than the mean probability indicates that an observation is more likely to have been included in the first component regression. Consequently, if the mean probability for a sample country is greater than the overall mean probability, this indicates that observations from that country are more likely to have been utilized in the first component regression generated by the switching regression model. Switching regression models are discussed in Maddala (1983). Data on venture capital transactions are obtained from VentureXpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Detailed descriptions of the variables are provided in Tables AI through A3 of the Appendix.

Company Nation	Switch variable	
	gdppercapita	bankregulation
Mean Probabililty	0.4110	0.5727
Australia	.0074	.9900
Hong Kong	.3278	.6531
Japan	.0216	.9734
New Zealand	.0069	.9906
Singapore	.1281	.8534
Taiwan	.1482	.8351
China	.5626	.4228
India	.9656	.0469
Indonesia	.8245	.1772
Israel	.5219	.4723
Korea	.5334	.4502
Malaysia	.7084	.2865
Philippines	.9592	.0451
Thailand	.4491	.5359

Table VIIC: Switching regression: The main equation

Tests are implemented using a switching regression model. The switching regression generates two component regressions from a mixture data based on some initial guess of a partition in the data (the switch equation). The output from the switch equations are reported in Table VIIA Table VIIB reports the country averages for the probability that an observation is included in the first component regression. Specifications (1) and (3) are first component regressions, while specifications (2) and (4) are second component regressions. The country averages indicate that observations from sample emerging countries are utilized in specifications (1) and (4), while observations from sample developed countries are utilized in specifications (2) and (3). The two component regressions are generated from the following equation referred to as the main equation:

$$\begin{aligned} Nonhitechqt = & \alpha_0 + \alpha_1 Age + \alpha_2 Early + \alpha_3 Markettobook + \alpha_4 Tangibleassets + \alpha_5 Public \\ & + \alpha_6 Onetime + \alpha_7 Firstyear + \alpha_8 Gdppercapita + \alpha_9 Firmyear \\ & + \alpha_{10} Capital + \alpha_{11} Firmtype + v. \end{aligned}$$

*Nonhitechqt* are the three terciles of concentration in non-technology intensive ventures. *Age* is the age of a portfolio company when it received financing; *Early* is an indicator variable equal to one if financing was received during the early stages of a firm's growth cycle; *Markettobook* are industry market-to-book ratios; *Tangibleassets* are industry ratios of tangible assets to total assets; *Public* is an indicator variable equal to one if a portfolio company went public; *Onetime* is an indicator variable equal to one if a financing relationship consists of only one round of financing; *Firstyear* is the year a firm first received venture financing; *Gdppercapita* is GDP per capita; *Firmyear* is the year a venture capital firm commenced operations; *Capital* is a venture firm's capital under management in millions of dollars; *Firmtype* is a venture capital firm's organizational structure. Data on venture capital transactions are obtained from VentureXpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients for four variables of minor interest included as control variables as well as the constant are not reported but are available upon request from the author.

Independent Variables	Switch Variable: <i>Gdppercapita</i>		Switch Variable: <i>Bankregulation</i>	
	(1)	(2)	(3)	(4)
Age	.00187 (0.40)	.0178 (6.43)***	.0192 (6.84)***	-.00084 (-0.16)
Early	.0938 (2.40)**	-.3584 (-8.75)***	-.3820 (-9.10)***	.0885 (2.21)**
Gdppercapita	-.3775 (-14.46)***	.1270 (7.74)***		
Bankregulation			-.1429 (-8.43)***	.4059 (14.73)***
Firmyear	-.0532 (-17.15)***	-.0118 (-3.41)***	-.0130 (-3.78)***	-.0532 (-16.87)***
Invbankaffvc	.1839 (3.08)***	.2319 (3.51)***	.2399 (3.60)***	.1556 (2.64)**
Corporatevc	.1555 (2.67)***	.00540 (0.07)	.0885 (1.22)	.1455 (2.44)**
Commbankaffvc	.0178 (0.36)	.2173 (3.72)***	.2100 (3.51)***	.0170 (0.34)
Govtaffvc	-.8570 (-10.17)***	-.1490 (-1.90)*	-.1429 (-1.78)*	-.8454 (-9.57)***
Capital	-.00123 (-9.01)***	.000140 (4.12)***	.000117 (3.40)***	-.00113 (-8.17)***
R-squared	0.4834	0.2319	0.2475	0.4856
<i>p-value</i>	0.0000	0.0000	0.0000	0.0000

\*\*\*,\*\*,\*, indicate significance at the 1% , 5%, and 10% significance levels respectively

Table VIII: Concentration in early stage non-technology intensive ventures: robustness test

The probit model estimated is

$$\begin{aligned} \text{Earlynontechfm} = & \beta_0 + \beta_1 \text{growth} + \beta_2 \text{Lawenforcement} + \beta_3 \text{Bankregulation} \\ & + \beta_4 \text{Marketstructure} + \beta_5 \text{Propertyrights} + \beta_6 \text{Firmyear} \\ & + \beta_7 \text{Firmtype} + \beta_8 \text{Entrepreneurship} + \beta_{10} \text{Firstyear} + \epsilon. \end{aligned}$$

*Earlynontechfm* is an indicator variable equal to one if a venture capital fund's investments are concentrated in early stage non-technology intensive ventures. *Growth* is the growth rate of GDP; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Firmyear* is the year a venture firm was founded; *Firmtype* is a venture capital firm's organizational form (*IVC*, *Invbankaffvc*, *Corporatevc*, and *Commbankaffvc*); *Entrepreneurship* is a ranking of the propensity for entrepreneurship/innovation across countries; *Firstyear* is the year a portfolio company received its first round of venture capital financing. Data on venture capital transactions are obtained from VentureXpert and consist of 2,532 funding transactions between venture capitalists located primarily in the U.S. and the U.K. and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), while z-statistics are reported in parentheses.

Variables	(1)	(2)	(3)	(4)	(5)
Firmyear	-.00323 (-2.82)***	-.00528 (-3.32)***	-.00408 (-2.22)**	-.00453 (-3.56)***	-.00451 (-2.28)**
Growth	.0382 (2.99)***				
Lawenforcement		-.1681 (-2.47)***			
Bankregulation			.0692 (0.84)		
Marketstructure				-.0472 (-0.67)	
Propertyrights					-.1505 (-2.36)**
Entrepreneurship	-.1354 (-2.19)**	-.1492 (-2.30)**	-.0274 (-0.28)	-.1072 (-1.76)*	-.1258 (-1.50)
Invbankaffvc	-.2454 (-3.35)***	-.3060 (-3.18)***	-.3339 (-3.62)***	-.2858 (-3.46)***	-.3295 (-3.47)***
Corporatevc	.8296 (6.21)***	.8054 (6.07)***	.7479 (5.31)***	.7975 (5.73)***	.7537 (4.60)***
Commbankaffvc	.6352 (2.91)***	.7495 (4.61)***	.5546 (2.21)**	.5483 (2.49)**	.5279 (2.58)***
Pseudo $R^2$	0.3439	0.3355	0.2845	0.2997	0.3051
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	392	350	334	394	334

\*\*\*,\*\*, \* indicate significance at the 1%, 5%, and 10% significance levels respectively

## Chapter II

# Is the quality of property rights protection a risk factor?

Ueda (2004) develops a model, which predicts that entrepreneurs in poor quality property rights environments will be less likely to obtain financing from venture capitalists due to the risk of expropriation by the venture capitalist. Claessens and Laeven (2003) find that intangible asset intensive industries grow faster in better quality property rights environments. Claessens and Laeven interpret this finding as evidence for unwillingness to invest or sub-optimal demand for external financing in poor quality property rights environments because of the risk of expropriation from other economic agents. In line with this postulation, Johnson, McMillan, and Woodruff (2002) find that entrepreneurs in countries where expropriation by the government is more likely are unwilling to invest even when external financing is readily available.

The predictions in Ueda (2004) and Claessens and Laeven (2003) as well as the empirical results in Johnson, McMillan, and Woodruff (2002) characterize the quality of property rights protection as a risk factor. If this is the case, it is expected that this will affect investors' portfolio decisions in poor quality property rights environments. That is, investors in poor quality property

rights environments will be more likely to hold diversified portfolios relative to investors in better quality property rights environments in an attempt to diversify away the idiosyncratic component of expropriation risk since they are not compensated for exposure to idiosyncratic risk.

In this study, I examine whether poor quality legal environments (poor quality contract enforcement and property rights protection) are considered risk factors by venture capitalists operating in these environments. I hypothesize that venture capitalists located in poor quality legal environments will be more likely to hold diversified or balanced portfolios relative to venture capitalists located in better quality legal environments if the quality of legal environment is considered a risk factor. That is, the propensity to hold diversified portfolios (portfolios diversified across industries or across firm life cycles) will decrease with the quality of the legal environment.

However, a greater propensity to hold diversified portfolios in poor quality property rights environments may also be evidence for higher levels of risk aversion in poor quality property rights environments. Hence, in order to exclude this interpretation of empirical results, it is necessary to hold the level of risk aversion constant in both poor and better quality legal environments. This purpose is also served if investors can be shown to be risk neutral. Evidence that this is the case for venture capitalists is provided in Lerner and Schoar (2004) and Obrimah (2005).

Lerner and Schoar (2004) find that venture capitalists in poor quality legal environments take larger equity positions in their portfolio companies relative to venture capitalists in better quality legal environments. Furthermore, venture capitalists in poor quality legal environments are more likely to use straight or common equity (lower priority instrument), while venture capitalists in better quality legal environments are more likely to use convertible debt instruments (higher priority instrument prior to vesting). Obrimah (2005), on the other hand, finds that venture capitalists in poor quality legal environ-



ments have a greater propensity to concentrate investments in low collateral, high growth, and high risk ventures relative to venture capitalists in better quality legal environments. These empirical results indicate that venture capitalists in poor quality legal environments are not characterized by risk aversion relative to venture capitalists in better quality legal environments.

I find that venture capitalists' propensity to hold diversified portfolios decreases with the quality of contract enforcement, indicating that the quality of contract enforcement is a risk factor. Venture capitalists' propensity to hold diversified portfolios also decreases with the extent to which capital markets are market based, and the propensity for entrepreneurship across countries. This indicates that the demand for venture capital financing is greater in market-based economies relative to bank-based economies as postulated in Black and Gilson (1998). This also indicates that the demand for venture capital financing is greater in countries with a higher propensity for entrepreneurship.

I find, however, that the propensity to hold diversified portfolios increases with the quality of property rights protection. This indicates that the quality of property rights protection is not a risk factor. Rather, the results suggest that the demand for venture capital financing is greater in poor quality property rights environments. If the demand for venture capital financing is greater in poor quality property rights environments, this implies that venture capitalists in poor quality property rights environments will have a greater propensity to hold concentrated portfolios relative to venture capitalists in better quality legal environments. This is the argument in Obrimah (2005).

I find that venture capitalists in poor quality property rights environments are more likely to hold concentrated portfolios in three of the four classes of firms considered. This indicates that the demand for venture capital financing is greater in poor quality property rights environments relative to better quality property rights environments. Overall, the results characterize the

quality of property rights protection as a demand variable rather than a risk factor. One interpretation of these results is that poor quality property rights protection hinders financing transactions in informal capital markets. Consequently, when a financial intermediary that is willing to bear risk (venture capitalists) emerges simultaneously in poor and better quality property rights environments, the demand for the financial intermediaries' services is greater in poor quality legal environments.

If this interpretation of the results is valid, it is expected that the results will be less likely to hold for relatively large firms since these firms' financing needs are less likely to be met in informal capital markets. I find that this is the case. The demand for venture capital financing from relatively large firms is greater in better quality property rights environments. This is consistent with the findings in Obrimah (2005), which finds that small firms in poor quality legal environments are more financially constrained relative to small firms in better quality legal environments; while large firms in poor quality legal environments are less financially constrained relative to large firms in better quality legal environments. The empirical results in this paper are consistent with the conclusion in Obrimah (2005) that poor quality legal environments primarily affect the development of informal capital markets.

These results do not support the Ueda (2004) and Claessens and Laeven (2003) hypothesis that the quality of property rights protection is a risk factor, which adversely affects entrepreneurs' willingness to invest. Rather, the results indicate that the need for financial intermediation is greater in poor quality property rights environments. Hence, encouraging the growth of venture capital financing, which is better suited to ameliorating moral hazard problems (investments in small firms and technology intensive ventures) relative to bank or debt financing, will facilitate faster economic growth in poor quality property rights environments. The relatively greater need for financial intermediation during the early stages of a firm's growth cycle may also ex-

plain why capital markets in poor quality legal environments are bank-based rather than market-based.

The rest of the paper proceeds as follows. The analytical framework is discussed in Section I. Section II describes the data. Empirical results, including robustness results are reported in Section III. Section IV concludes.

## I Analytical Framework

A risk factor,  $f_i$  is made up of a non-diversifiable or market risk component,  $f_{mi}$ , and an idiosyncratic or diversifiable risk component  $f_{di}$ , which is particular to different classes of firms. As the severity of a risk factor increases across countries, both the idiosyncratic and market risk components of the risk factor are increasing. An increase in the market risk component of the risk factor leads to higher prices (required rates of return), while an increase in the idiosyncratic component increases the incentive to hold portfolios that diversify away the idiosyncratic component of the risk factor.

However, an increase in the propensity to hold diversified portfolios may also indicate that investors in poor quality legal environments are more risk averse relative to investors in better quality legal environments. Consequently, in order to exclude this interpretation of empirical results, it is necessary to show that investors in poor quality legal environments are not characterized by a higher levels of risk aversion relative to investors in better quality legal environments.

Venture capitalists' asset allocation decisions across countries provide an opportunity to hold risk aversion constant, while examining whether the quality of the legal environment (contract enforcement and property rights protection) are risk factors. First, venture capitalists hold riskier equity positions as the risk of their portfolio companies increase, hence, of necessity they must be risk neutral (see Fenn, Liang, and Prowse (1997)). Evidence that venture

capitalists in poor quality legal environments are not characterized by risk aversion relative to venture capitalists in better quality legal environments is provided in Lerner and Schoar (2004) and Obrimah (2005).

Lerner and Schoar (2004) find that venture capitalists in poor quality legal environments take larger equity positions in their portfolio companies relative to venture capitalists in better quality legal environments. Furthermore, venture capitalists in poor quality legal environments are more likely to use straight or common equity (lower priority instrument), while venture capitalists in better quality legal environments are more likely to use convertible debt instruments (higher priority instrument prior to vesting). Obrimah (2005), on the other hand, finds that venture capitalists in poor quality legal environments have a greater propensity to concentrate investments in low collateral, high growth, and high risk ventures relative to venture capitalists in better quality legal environments. This is evidence that venture capitalists in poor quality legal environments are not characterized by risk aversion relative to venture capitalists in better quality legal environments.

Macroeconomic variables such as the extent to which capital markets are market-based are also expected to affect the demand for venture capital financing, and consequently, venture capitalists' propensity to hold diversified portfolios. Black and Gilson (1998) predict that market-based capital markets are better able to support venture capital financing. In market-based economies, the incentive of an IPO exit for the entrepreneur, which creates a liquid asset increases the demand for venture capital funds, which in turn leads to a greater supply of venture capital funds and a higher level of venture capital activity. Lower demand for venture capital financing in bank-based capital markets relative to market-based capital markets implies that venture capitalists in bank-based economies will be more likely to hold diversified portfolios because the lower level of demand is less able to support concentrated portfolios.

Given that we can hold venture capitalists' attitudes towards risk constant, a decrease in the propensity to hold diversified portfolios with the quality of the legal environment is evidence that the quality of legal environment variables (contract enforcement and property rights protection) are risk factors. Venture capitalists' portfolios can be diversified across broad industry groupings, and life cycle stages at financing. The industry classifications are two - technology intensive, and non-technology intensive ventures; while the life cycle stage classifications are two - early stage and later or expansion stage ventures. Expropriation risk is relatively high for technology intensive, and early stage ventures, while it is relatively low for non-technology intensive and later stage ventures. Appendix A, (Tables AII, and AIII) details the specific classes that make up these broad groupings.

Venture capitalists that hold diversified portfolios are determined as follows. For each venture capital fund represented in the sample, I determine total dollar disbursements to all companies in its portfolio as well as proportions of the total disbursed to non-technology intensive ventures. I divide the venture capital funds into three terciles based on the proportions of their investments in non-technology intensive ventures, and venture capital funds located in the third tercile are deemed to be 'concentrated' in non-technology intensive ventures. Venture capital funds located in the second or middle tercile, on the other hand, are deemed to be 'mildly concentrated' in non-technology intensive ventures. Mildly concentrated venture capital funds are also deemed to hold diversified portfolios. Venture capitalists whose portfolios are mildly concentrated in technology intensive, early stage, and later stage ventures are similarly determined.

## A Propensity to hold diversified portfolios

**Hypothesis 3** *The propensity to hold diversified portfolios (that is, the propensity to hold mildly concentrated portfolios) decreases with the quality of the legal environment, the propensity for entrepreneurship, and the extent to which capital markets are market based.*

The dependent variables are the three terciles of portfolio concentration in a particular portfolio item, such as non-technology intensive ventures. The tests are implemented using a multinomial logit model that utilizes venture capitalists located in the first tercile of portfolio concentration as the comparison group. Venture capital funds located in the middle tercile are deemed to hold diversified portfolios. The test specifications are as follows (stated for non-technology intensive and early stage ventures and similarly defined for other portfolio items):

$$\begin{aligned}
 Nonhitechqt_i &= \beta_0 + \beta_1 Early_{j,c} + \beta_2 Lawenforcement_{j,c} \\
 &+ \beta_3 Entrepreneurship_{j,c} + \beta_4 Marketstructure_{j,c} \\
 &+ \beta_5 Propertyrights_{j,c} + \beta_6 Firmyear_i + \beta_7 Fundcountry_i \\
 &+ \beta_8 Firmtype_i + \beta_9 Firstyear_j + \epsilon_i \quad (II.1)
 \end{aligned}$$

$$\begin{aligned}
 Earlyqt_i &= \alpha_0 + \alpha_1 Nonhitech_{j,c} + \alpha_2 Lawenforcement_{j,c} \\
 &+ \alpha_3 Entrepreneurship_{j,c} + \alpha_4 Marketstructure_{j,c} \\
 &+ \alpha_5 Propertyrights_{j,c} + \alpha_6 Firmyear_i + \alpha_7 Fundcountry_i \\
 &+ \alpha_8 Firmtype_i + \alpha_9 Firstyear_j + \epsilon_i \quad (II.2)
 \end{aligned}$$

where  $Nonhitechqt_i$  and  $Earlyqt_i$  are the three terciles of portfolio con-

centration in non-technology intensive and early stage ventures, respectively. The subscript  $c$  refers to the portfolio company's country of location, while the subscript  $j$  refers to the company receiving financing. All variables utilized in the empirical tests are described in Appendix A, Table AI, which lists all variables, describes them, and explains how they are constructed or the source as appropriate. Following, I motivate the independent variables (excluding the quality of contract enforcement (*Lawenforcement*), the quality of property rights protection (*Propertyrights*), and the extent to which capital markets are market-based (*Marketstructure*)).

**Portfolio company characteristics** Obrimah (2005b) finds that the demand for initial rounds of venture capital financing from early stage ventures in poor quality legal environments is high, while corresponding demand from later stage ventures is low. Low demand for external financing, coupled with higher risk in poor quality legal environments is expected to increase venture capitalists' propensity to hold diversified portfolios. Given these findings, I include investment stage and industry variables as independent variables in the empirical tests where applicable. The two variables included in the analyses are an indicator variable equal to one if a firm is in the early stages of a firm's growth cycle; and an indicator variable equal to one if a firm is a non-technology intensive venture.

**The demand for venture capital financing** The propensity for entrepreneurship across countries is expected to affect the demand for venture capital financing. The demand for venture capital financing is expected to be higher in countries where economic agents possess a greater propensity for entrepreneurship. This implies that venture capitalists in higher propensity for entrepreneurship countries will be less likely to hold diversified portfolios. The two variables considered, one for the propensity to take risks and the other for the

propensity to innovate have a correlation of 0.83. Both variables have the same effect when included in the analysis, but only results with the propensity for entrepreneurship/innovation are reported. These are continuous variables.

**Location of venture capital fund** The variable *fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country (equivalently, poor quality legal environment). A positive regression coefficient ( $\beta_9$ ) on this variable indicates that venture capitalists in poor quality legal environments have a greater propensity to concentrate investments in *j-type* firms relative to venture capitalists in better quality legal environments. Hence, this variable indicates whether economic profits that accrue to venture capitalists are greater in poor quality legal environments relative to better quality legal environments. If the coefficient of *fundcountry* is significant with the expected sign (positive), while the quality of legal environment variables are not, this suggests that economic profits in poor quality legal environments are also driven by venture capitalists' ability to earn risk premiums.

**Venture capital fund related variables** Venture capital firm specific variables are included as independent variables in the tests implemented. *firmtype* is the organizational form of a venture capital firm, which has been shown to contain information about venture capitalists' risk preferences (Obrimah (2004), Hellmann, Lindsey, and Puri (2003)). Appendix A (Table AIII) reports the classification of venture capitalists according to organizational form. *firmyear* is the year in which a venture capital firm commenced operations. This variable is included in the empirical tests because it is expected that venture capitalists' asset allocations are affected by how long they have been in business. *firstyear* is a dummy variable for the year in which a financing relationship commenced. This variable accounts for possible changes



in venture capitalists' investment opportunity sets over time.

**Venture capital firm reputation** The number of deals a venture capitalist has participated in is utilized as a weight in the tests implemented. This is based on the following argument. Suppose at time  $t = 0$ , there exist four VCs ( $vca$ ,  $vcb$ ,  $vcc$ , and  $vcd$ ), one of which ( $vca$ ) is concentrated in technology intensive ventures, while the others are not. Assume that at time  $t = 1$ , the demand for venture capital financing from technology intensive ventures increases significantly. Given that reputation is important in the venture capital market,<sup>12</sup>  $vca$  attracts a significant chunk of the increased demand, but due to risk considerations is only able to soak up half of the increased demand.  $vcb$ , on the other hand, is able to soak up more of the residual demand (35 percent) relative to  $vcc$ , and  $vcd$ , and ends up being classified as a concentrated VC at time  $t = 1$ .

If  $vca$ , and  $vcb$  are given equal weight in the analysis at  $t = 1$ ,  $vcb$ 's importance is overstated, while  $vca$ 's importance is understated. Hence, in order to capture the demand and risk dynamics, which are central to the analysis, it is important to base the analysis on deal level data, which captures the relative importance of  $vca$ , and  $vcb$ . The same argument applies to the country variables. If the demand for venture capital financing is higher in better quality property rights environments, then it is expected that there will be more financing transactions in these countries, and this ought to be reflected in the analysis.

## II Venture capital data

Venture capital markets in the sample countries are emerging markets that for the most part, developed concurrently and experienced significant growth starting in the late 1990s. Hence, differences in venture capitalists' asset allo-

cation decisions cannot be attributed to differences in the relative maturities of the venture capital markets in these countries. Furthermore, venture capital markets in the sample emerging and developed countries are not segmented. In fact, venture capitalists in some developed countries (Singapore and Hong Kong in particular) raise venture capital funds for investments in the sample emerging countries.<sup>13</sup>

Data on venture capital transactions are obtained from VentureXpert, which is owned by Ventureconomics. The cross-country data set consists of 6,552 distinct venture capital investments during 4,264 distinct rounds of venture financing. Venture capital firms located in the sample countries are responsible for 67 percent of all sample transactions (4,200 observations), while venture capitalists located primarily in the U.S. and the U.K. are responsible for 33 percent of all sample transactions (2,352 observations).

These investments involve 2,857 portfolio companies located in Asia and Israel that received their first round of funding from venture capitalists (VCs) between 1982 and December 2000. The developed countries based on World Bank classifications are: Australia, Hong Kong (China), New Zealand, Japan and Singapore; while the emerging countries are: China, India, Indonesia, Israel, Malaysia, Philippines, Korea, Republic, Taiwan (China) and Thailand.

This sample is obtained from a total database of 10,192 venture capital and private equity transactions. From this total sample, I eliminate:

1. All buyout transactions, since these are not standard venture capital transactions (1,042 observations);
2. All venture capital relationships that did not commence prior to December 31, 2000 (1,815 observations); this ensures that I have at least two-and-a-half years of data on each financing relationship;
3. All investments in the financial services industry (180 observations); as well as any observation that does not specify the dollar value of each

round investment; the investment stage; the industry; and the name of the portfolio company (603 observations).

This process resulted in the elimination of 3,640 data records. These investments involve 818 venture capital firms with 465 or 57 percent of these venture capital firms located in the sample countries.<sup>14</sup> Table I reports industry and investment stage statistics by sample country for this data set. The statistics reported in Table I indicate that technology intensive deals outnumber non-technology intensive deals in practically all of the sample countries regardless of the location of the venture capitalists providing financing. Also, later stage deals outnumber early stage financing deals across all sample countries regardless of the location of the venture capitalists providing financing.

Panels A and B of Table II show that venture capitalists in poor quality legal environments invest smaller amounts in a larger number of firms relative to venture capitalists in better quality legal environments. On average, the number of firms in emerging country-based venture capitalists' portfolios is 2x the number of firms in developed country-based venture capitalists' portfolios. The amount disbursed by emerging country-based venture capitalists to a single firm are about 0.2x to 0.33x the amounts disbursed by developed country-based venture capitalists. This is consistent with test-of-means statistics reported in Panel C of Table II, which indicate that average capital under management for emerging country-based venture capital firms is about 0.38x average capital under management for developed country-based venture capital firms. These means are significantly different at the 5 percent confidence level.

About thirty percent of portfolio companies are non-technology intensive companies in the cross-country sample. This proportion is very similar to that reported in Obrimah (2004) for VCs in the U.S. Total funding committed to all sample companies amounts to \$1.56 billion, with 31 percent (61

percent) being disbursed to non-technology intensive (respectively, technology intensive) ventures.

Forty-three percent of sample portfolio companies are early stage ventures at the first round of venture financing. Early stage ventures constitute a significant minority amongst non-technology intensive ventures (32 percent), a slight minority amongst technology intensive ventures (47 percent) and a significant majority amongst medical/health-related ventures (60 percent). A total of \$780 million was disbursed to portfolio companies receiving their first round of venture capital financing and 31 percent of this total went to early stage ventures.

Syndication is not very prevalent within this sample. Deals involving syndications between the different classes of VCs are also very few. The percentage of deals involving independent private partnerships and at least one other venture capital class range from 8 percent for commercial bank affiliated VCs, to 16 percent for investment bank affiliated VCs. Syndication with other classes of VCs, other than independent private partnerships is even less prevalent. The proportion of deals involving a single class of VCs ranges from 79 percent for investment bank affiliated VCs, to 91 percent for independent private partnerships. This lack of extensive syndication may be rational in markets that are far from perfect, since information rents are likely to exist in such markets.<sup>15</sup>

### **III Results and interpretations**

Empirical results reported in Table III indicate that the propensity to mildly concentrate investments in technology intensive ventures decreases with the quality of contract enforcement and the extent to which capital markets are market based in line with expectations. However, the propensity to mildly concentrate investments in technology intensive ventures increases with the

quality of property rights protection.

These results are economically significant. Venture capitalists in poor quality contract enforcement environments are 15 percent more likely to hold diversified portfolios, while those in poor quality property rights protection environments are 10 percent less likely to hold diversified portfolios. These results indicate that the quality of contract enforcement is a risk factor, while the quality of property rights protection is not. The results also support the prediction in Black and Gilson (1998), that the demand for venture capital financing is greater in market-based economies relative to bank-based economies.

## **A Non-technology intensive ventures**

Table IV reports empirical results for the propensity to mildly concentrate investments in non-technology intensive ventures. The results indicate that the propensity to mildly concentrate investments in non-technology intensive ventures decreases with the quality of contract enforcement and the extent to which capital markets are market based. However, the propensity to mildly concentrate investments in non-technology intensive ventures increases with the quality of property rights protection.

These results are economically significant. Venture capitalists in poor quality contract enforcement environments are 19 percent more likely to hold diversified portfolios, while venture capitalists in poor quality property rights protection environments are 11 percent less likely to hold diversified portfolios. These results indicate that the quality of contract enforcement is a risk factor, while the quality of property rights protection is not. The results also support the prediction in Black and Gilson (1998), that the demand for venture capital financing is greater in market-based economies relative to bank-based economies.

## **B Early stage ventures**

Test results reported in Table V indicate that the propensity to mildly concentrate investments in early stage ventures decreases with the quality of contract enforcement and the extent to which capital markets are market based. However, the propensity to mildly concentrate investments in early stage ventures increases with the quality of property rights protection. These results indicate that the quality of contract enforcement is a risk factor, while the quality of property rights protection is not. The results also indicate that the demand for venture capital financing is greater in market-based capital markets relative to bank-based capital markets.

## **C Later stage ventures**

Table VI reports test results for the propensity to mildly concentrate investments in later stage ventures. The results are qualitatively similar to those reported in Table IV for the propensity to mildly concentrate investments in early stage ventures. Hence, the results indicate that the quality of contract enforcement is a risk factor, while the quality of property rights protection is not. These results are economically significant. Venture capitalists in poor quality contract enforcement environments are about 13 percent more likely to hold diversified portfolios, while those in more market-based economies are 22 percent more likely to hold diversified portfolios.

I also find that the propensity to hold diversified portfolios consisting of later stage ventures decreases with the propensity for entrepreneurship or risk taking across countries. This indicates that the demand for venture capital financing from later stage ventures is greater in countries with a higher propensity for entrepreneurship. That is, entrepreneurs that own mature ventures are more likely to invest if they are located in a high propensity for entrepreneurship country relative to a low propensity for entrepreneurship

country. This finding possesses implications for studies that compare firm growth rates across countries given that these studies are usually based on older, more mature firms (later stage firms) that are publicly quoted.

## **D Interpretation of Results and Robustness Tests**

The results obtained in the preceding subsections indicate that the quality of property rights protection is not a risk factor. The results suggest that the quality of property rights protection primarily affects the demand for venture capital financing. Two possibilities arise. If the results indicate that the demand for venture capital financing is greater in better quality property rights environments, then it is expected that the propensity to hold concentrated portfolios will be greater in better quality legal environments. On the other hand, if the results indicate that the demand for venture capital financing is greater in poor quality legal environments, then the propensity to hold concentrated portfolios will be greater in poor quality legal environments.

Table VII reports empirical results for the propensity to concentrate investments in the four different classes of firms considered. The results indicate that for three out of the four classes of firms, the propensity to hold concentrated portfolios decreases with the quality of property rights protection. Furthermore, this result only breaks down for concentration in later stage non-technology intensive ventures. Ueda (2004) predicts that venture capitalists will be more likely to invest in high growth, high risk, and low collateral value ventures. Amongst the different classes of firms considered in this paper, later stage non-technology intensive ventures least conform to the characteristics of firms that are best suited to venture capital financing per the prediction in Ueda (2004).

Obrimah (2005) finds that venture capitalists in better quality property rights environments have a greater propensity to invest in large firms relative

to venture capitalists in poor quality property rights environments. Obrimah concludes that poor quality legal environments primarily hinder the development of informal capital markets in poor quality legal environments. The results obtained in this paper pertaining to the quality of property rights protection are consistent with the empirical findings and conclusions in Obrimah (2005). That is, the results indicate that the gap between the supply and demand of external financing is greater in poor quality property rights environments. Hence, financial development, that is, the emergence of venture capitalists, has a greater effect on small firms' access to external financing in poor quality property rights environments relative to small firms' access to external financing in better quality property rights environments.

## **IV Conclusions**

In this paper, I find that venture capitalists' propensity to hold diversified portfolios decreases with the quality of contract enforcement, indicating that the quality of contract enforcement is a risk factor. Venture capitalists' propensity to hold diversified portfolios also decreases with the extent to which capital markets are market based, and the propensity for entrepreneurship across countries. Given that the propensity to hold diversified portfolios decreases with the level of demand, this indicates that the demand for venture capital financing is greater in market-based economies relative to bank-based economies as postulated in Black and Gilson (1998). This also indicates that the demand for external financing is greater in countries with a higher propensity for entrepreneurship.

However, the propensity to hold diversified portfolios increases with the quality of property rights protection. This finding is not consistent with a characterization of the quality of property rights protection as a risk factor in Ueda (2004) and Claessens and Laeven (2003). Robustness test results



indicate that the gap between the supply and demand of external financing is greater in poor quality property rights environments relative to better quality property rights environments. That is, the robustness results show that venture capitalists in poor quality property rights environments have a greater propensity to hold concentrated portfolios relative to venture capitalists in better quality property rights environments.

Hence, the totality of the results indicate that poor quality property rights protection hinders the development of informal capital markets, hence the greater need for financial intermediation during the early stages of a firm's growth cycle. This relatively greater need for financial intermediation during the early stages of a firm's growth cycle is one possible explanation for why countries characterized by poor quality legal environments tend to be bank-based. This interpretation of the results is consistent with the conclusions in Obrimah (2005).

The interpretation of the empirical results possesses implications for developmental policies in emerging countries and developmental policies for emerging countries by multilateral institutions such as the World Bank. That is, encouraging the growth of venture capital financing, which is better suited to ameliorating moral hazard problems (investments in small firms and technology intensive ventures) relative to bank or debt financing, will facilitate faster economic growth in poor quality legal environments.

## Notes

<sup>12</sup>Gompers (1996), Ozbilgin (2005b).

<sup>13</sup>The Guide to Venture Capital in Asia (2000).

<sup>14</sup>We note here that discussions with Venture Economics indicate that the coverage of Asia venture capital transactions in the VentureXpert database simply reflects the data that they have been able to obtain so far and does not represent any bias on their part whatsoever. The fact that macro characteristics of this unique data set correspond to macro data on Asian countries and Israel obtained from the GVCA further lends credence to this assertion

<sup>15</sup>These statistics are not reported, but are available upon request from the author.

## A Data descriptions, constructions, and sources as appropriate

Table AI: Data Descriptions, and Sources

This table describes all the data utilized in our analyses. The first 11 variables are items related to venture capital transactions and are obtained from VentureXpert. Sources are cited for all other variables. The three terciles of concentration in a particular class of firms,  $j$  are constructed as follows. For each venture capital fund in the sample, I determine total dollar disbursements to all portfolio companies as well as the proportion of the total disbursed to  $j$ -type firms. Venture capitalists are then divided into three terciles based on the proportion of their assets in  $j$ -type firms.

Symbol	Description/Construction
<i>Nonhitech</i>	Dummy variable = 1 if a portfolio company is a non-technology intensive venture.
<i>Nonhitechqt</i>	The three terciles of concentration in non-technology intensive ventures.
<i>Early</i>	Dummy variable = 1 if a portfolio company is in the early stages of a firm's growth cycle.
<i>Earlyqt</i>	The three terciles of concentration in early stage ventures.
<i>Laterqt</i>	The three terciles of concentration in later stage ventures.
<i>Hitechqt</i>	The three terciles of concentration in technology intensive ventures.
<i>Firmyear</i>	The year a venture capital firm was set up.
<i>Invbankaffvc</i>	Dummy variable = 1 if a venture capital fund is affiliated with an investment bank.
<i>Corporatevc</i>	Dummy variable = 1 if a venture capital fund is affiliated with a non-financial corp.
<i>Commbankaffvc</i>	Dummy variable = 1 if a venture capital fund is affiliated with a commercial bank.
<i>Govtaffvc</i>	Dummy variable = 1 if a venture capital fund is government-owned or affiliated.
<i>Entrepreneurship</i>	Country ranking of entrepreneurship and innovation by the World Economic Forum. Taken from the Global Competitiveness Report (1996). Higher rankings imply higher innovation capabilities.
<i>Lawenforcement*</i>	Measures the relative degree to which contractual agreements are enforced and complications presented by language and mentality differences. Scored 1-4, with higher scores for superior quality, averaged over 1980-1989, and 1990- 995; Source: Knack and Keefer (1995) using data from Business Environmental Risk Guide (BERG).
<i>Propertyrights*</i>	Rating of property rights on a scale of 1 to 5. The more protection private property receives, the higher the score. Source: LLSV (1998b), using data from 1997 Index of Economic Freedom.
<i>Marketstructure*</i>	Constructed as the ratio of stock market capitalization to GDP in any given year; Stock market capitalizations are obtained from the Emerging Stock Markets Factbook, while GDP data are from the World Development Indicators (2002) database.

\* descriptions obtained from Demirgüç-Kunt and Levine (2001).

Table AII: Industry and investment stage classifications

This table reports the industry, and investment stage classification schemes employed in this paper. *Hitech* are technologically intensive inventories; *Nonhitech* are non-technologically intensive ventures; while *Medical* are medical/health-related ventures. Actual classifications are obtained from VentureXpert. Portfolio companies in the Start-up/Seed or Early stages of a firm's life cycle are firms that are still in the early stages of a firm's growth cycle. Firms classified as early stage firms tend to be older and further on along the firm's life cycle relative to those classified as Start-up/Seed firms. Portfolio companies in the expansion or later stages of a firm's growth cycle are relatively established firms who need financing primarily to fund growth opportunities. These are larger and older firms relative to Early Stage and Start-up firms. Firms classified as later stage firms tend to be further along on a firm's life cycle relative to those classified as expansion stage firms.

Actual Classifications	Broad Classifications in this paper		
Panel A: Industry Classifications			
	Hitech	Nonhitech	Medical
Agr/Forestry/Fish		×	
Biotechnology			×
Business Services		×	
Communications	×		
Computer Hardware	×		
Computer Other	×		
Computer Software	×		
Construction		×	
Consumer Related		×	
Industrial/Energy		×	
Internet Specific	×		
Manufacturing		×	
Medical/Health			×
Other		×	
Semiconductor/Electr.	×		
Transportation		×	
Utilities		×	
Panel B: Classifications by Investment Stage			
	Later Stage	Early Stage	
Early Stage		×	
Expansion	×		
Later Stage	×		
Startup/Seed		×	

Table AIII: Classification of venture capitalists by organizational structure

This table reports the ‘venture capital type’ classification scheme employed in this paper. The row items are the actual classifications of venture capital firms by organizational structure. These classifications are obtained from VentureXpert. *SBIC NEC* are Small Business Investment Companies (SBICs) not classified within any of the other VentureXpert classes. *Fund of funds* are venture capital funds that invest in other venture capital funds rather than investing directly in firms in need of venture capital financing. All other ‘actual’ classifications are self-explanatory. The Broad classifications in this paper are five. These are *IVC* (Independent Venture Capitalist; *Invbankaffvc* (Investment Bank affiliated venture capitalist); *Corporatevc* (Corporate venture capitalist; *Commbankaffvc* (Commercial Bank affiliated venture capitalist); and *Govtaffvc* (Government affiliated venture capitalist).

Actual Classifications	Broad Classifications in this paper				
	IVC	Invbankaffvc	Corporatevc	Commbankaffvc	Govtaffvc
Affiliate of Other Financial Institution				×	
Bank Group				×	
Business Development Fund					×
Commercial Bank Affiliate				×	
Corporate (non-financial) Affiliate			×		
Corporate (non-financial) Venture Program			×		
Investment Management Firm		×			
Investment Bank & Affiliates		×			
Other Government Program					×
Fund of Funds	×				
Independent Private Partnership	×				
SBIC NEC					×
State Govt. Affiliated Program					×

Table AIV: Correlations Table for the cross-country sample

This table reports correlations between independent variables utilized in this paper. The data comes from fourteen emerging and developed countries. The developed countries based on World Bank classifications are: Australia, Hong Kong (China), New Zealand, Japan and Singapore; while the emerging countries are: China, India, Indonesia, Israel, Malaysia, Philippines, Korea, Republic, Taiwan (China) and Thailand. The data consists of 4,200 distinct venture capital transactions between entrepreneurs and venture capitalists located within the sample countries. *Firmyear* is the year a venture capital firm commenced operations; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Entrepreneurship* is a ranking of the propensity for entrepreneurship/innovation across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Invbankaffvc* are Investment Bank affiliated venture capitalists; *Corporatevc* are venture capitalists affiliated with non-financial corporations; *Commbankaffvc* are Commercial Bank affiliated venture capitalists; *Govtaffvc* are government affiliated venture capitalists; *Early* is an indicator variable equal to one if a firm was in the early stages of a firm's growth cycle when it received its first round of financing; *Gdppercapita* is annual GDP Per Capita.

	Firm-year	Lawenforcement	Marketstructure	Propertyrights	Entrepreneurship	Fundcountry
Firmyear	1.0000					
Lawenforcement	0.0425	1.0000				
Marketstructure	0.0336	0.7267	1.0000			
Propertyrights	0.2298	0.4990	0.2933	1.0000		
Entrepreneurship	0.1021	-0.4193	-0.4199	-0.2764	1.0000	
Fundcountry	0.0456	-0.7865	-0.7633	-0.3428	0.6220	1.0000
Invbankaffvc	-0.0246	0.1518	0.1402	-0.0799	-0.0116	-0.1904
Corporatevc	0.0806	-0.0375	0.0102	0.0986	0.0168	0.0688
Commbankaffvc	-0.1864	-0.2134	-0.1306	-0.3308	0.0842	0.1919
Govtaffvc	-0.2620	-0.0484	-0.0499	-0.0990	-0.0634	-0.1462
Early	-0.0091	-0.1197	-0.0871	-0.0954	0.0878	0.1479

  

	Invbankaffvc	Corporatevc	Commbankaffvc	Govtaffvc	Early
Invbankaffvc	1.0000				
Corporatevc	-0.1250	1.0000			
Commbankaffvc	-0.1677	-0.1408	1.0000		
Govtaffvc	-0.1051	-0.0883	-0.1184	1.0000	
Early	-0.0999	0.0531	0.0454	0.1281	1.0000

Table I: Summary statistics for venture capital data by country

This table reports the industry, and investment stage distribution of the venture capital data utilized in this paper. These data are obtained from VentureXpert and consist of 6,552 venture capital transactions between entrepreneurs located in the fourteen sample countries and (1) venture capitalists located in these sample countries (sample VCs); and (2) venture capitalists located primarily in the U.S. and the U.K. ('Other VCs'). *Hitech* are technology intensive ventures; *Nonhitech* are non-technology intensive ventures; and *Medical* are medical or health related ventures. *Early Stage* firms are firms in the early stages of a firm's growth cycle, while *Later Stage* firms are firms in the expansion stages of a firm's growth cycle. Details of industries classified as *Hitech*, *Nonhitech* or *Medical* as well as firms classified as early stage or later stage firms are provided in Table AII of the Appendix.

	Transactions with sample VCs			Transactions with other VCs			
Panel A: Data descriptions by country and industry classification							
Country	Hit-ech	Med-ical	Nonhi-tech	Hit-ech	Med-ical	Nonhi-tech	Total
Australia	444	122	287	160	34	90	1,137
China	72	15	34	100	11	39	271
Hong Kong	84		45	143		40	312
India	389	69	319	180	8	33	998
Indonesia	12	1	18	7		18	56
Israel	187	64	8	460	135	22	876
Japan	65	10	49	91	15	140	370
Korea	1,076	138	249	213	24	36	1,736
Malaysia	24	1	12	6	2	13	58
New Zealand	30	4	21	16		9	80
Philippines	9		7	8		25	49
Singapore	106	6	26	122	16	32	308
Taiwan	139	1	36	65	1	22	264
Thailand	4		13	6	5	9	37
Total	2,644	431	1,125	1,577	251	528	6,552

	Transactions with sample VCs		Transactions with other VCs		
Panel B: Data descriptions by country and investment stage classification					
Country	Later Stage	Early Stage	Later Stage	Early Stage	Total
Australia	577	276	181	103	1,137
China	72	49	94	56	271
Hong Kong	100	29	141	42	312
India	368	409	134	87	998
Indonesia	28	3	19	6	56
Israel	156	103	352	265	876
Japan	90	34	172	74	370
Korea	817	646	146	127	1,736
Malaysia	21	16	16	5	58
New Zealand	45	10	25		80
Philippines	15	1	26	7	49
Singapore	86	52	117	53	308
Taiwan	157	19	62	26	264
Thailand	12	5	10	10	37
Total	2,547	1,653	1,495	861	6,552

Table II: Industry- and investment stage-based test-of-means results

This table reports the results of industry and investment stage based test-of-means. The data consists of 4,200 funding transactions between entrepreneurs and venture capitalists located within the sample countries from 1982 to 2003. *Nonhitech* are non-technology intensive ventures, *Hitech* are technology intensive ventures, while *Health Related* are medical/health related ventures. *Early Stage* firms are firms in the early stages of a firm's growth cycle. *Later Stage* firms are firms in the expansion stages of a firm's growth cycle. *Capital* is total capital under management by a venture capital firm (includes funds committed to venture capitalists but not yet disbursed and investments from which venture capitalists are yet to exit). *t - stats* are the t-statistics associated with the test-of-means. The test-of-means does not assume that the variances of the two groups utilized in the tests are equal. All numbers are actual except noted otherwise.

Item	# of obs.	Mean Values		t-stats
		Developed Country	Emerging Country	
Panel A: Mean number of portfolio companies by industry and investment stage classification				
Later Stage & Nonhitech	361	21.73	36.49	-6.517***
Early Stage & Nonhitech	102	15.84	32.25	-4.443***
Later Stage & Hitech	770	16.98	35.7	-12.064***
Early Stage & Hitech	497	15.28	34.34	-10.213***
Later Stage & Health Related	91	20.83	31.65	-2.152***
Early Stage & Health Related	78	9.35	42.39	-6.440***
Panel B: Mean per company investment by industry and investment stage classification (\$'000s)				
Later Stage & Nonhitech	361	5,507	1,340	1.447
Early Stage & Nonhitech	102	3,650	625	-2.541**
Later Stage & Hitech	770	7,751	2,279	5.733***
Early Stage & Hitech	497	6,132	2,126	4.246***
Later Stage & Health Related	91	6,806	4,721	1.246
Early Stage & Health Related	78	5,082	2,532	1.178
Panel C: Mean venture capital firm capitalization (\$ Millions) and number of venture funds				
Capital	177	192	73	3.208***
# of funds per venture capital firm	1899	2.698	4.273	-12.722***

\*\*\* indicates significance at the 1%, confidence level



Table III: Propensity to mildly concentrate investments in technology intensive ventures

The dependent variables are the three terciles of concentration in technology intensive ventures, while independent variables are as described in Table AI. Tests are implemented using a multinomial logit model that generates White (1980) robust z-statistics, and three specifications are reported.

*Hitechqt2* is the middle tercile of concentration in technology intensive ventures. Venture capitalists in the middle tercile are mildly concentrated in technology intensive ventures. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. Coefficients reported are the marginal effects, (the effects at the mean) while z-statistics are reported in parentheses.

Independent Variables	Dependent Variable: Hitechqt2		
	(1)	(2)	(3)
Firmyear	-.00785 (-3.47)***	-.00780 (-2.52)**	-.00608 (-2.69)***
Early	-.0483 (-2.18)**	-.0543 (-2.52)***	-.0176 (-0.73)
Lawenforcement	-.1528 (-5.56)***		
Marketstructure		-.2015 (-6.46)***	
Propertyrights			.1041 (6.08)***
Entrepreneurship	-.0302 (-0.90)	.0113 (0.38)	-.0451 (-1.17)
Invbankaffvc	-.0168 (-0.43)	.00910 (0.23)	.0429 (0.93)
Corporatevc	-.0660 (-1.84)*	-.0425 (-1.19)	-.1018 (-2.90)***
Commbankaffvc	.0231 (0.42)	.0422 (0.76)	.0652 (1.10)
Govtaffvc	.0724 (1.99)**	.0723 (2.05)**	.1070 (2.78)***
Pseudo $R^2$	0.0958	0.1037	0.1273
$p$ -value	0.0000	0.0000	0.0000
# of obs	2603	2727	2489

\*\*\*,\*\*,\*, indicate significance at the 1% , 5%, and 10% confidence levels respectively

Table IV: Propensity to mildly concentrate investments in non-technology intensive ventures

The dependent variables are the three terciles of concentration in non-technology intensive ventures, while independent variables are as described in Table AI. Tests are implemented using a multinomial logit model that generates White (1980) robust z-statistics, and three specifications are reported. *Nonhitechqt2* is the middle tercile of concentration in non-technology intensive ventures. Venture capitalists in the middle tercile are mildly concentrated in non-technology intensive ventures. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. Coefficients reported are the marginal effects, (the effects at the mean) while z-statistics are reported in parentheses.

Independent Variables	Dependent Variable: Nonhitechqt2		
	(1)	(2)	(3)
Firmyear	-.00376 (-2.09)**	-.00420 (-2.39)**	-.00425 (4.02)***
Early	.0454 (2.15)**	.0325 (1.57)	.0911 (4.02)***
Lawenforcement	-.1940 (-6.90)***		
Marketstructure		-.2868 (-8.79)***	
Propertyrights			.1099 (6.48)***
Entrepreneurship	.00810 (0.21)	.0500 (1.55)	-.0324 (-0.87)
Invbankaffvc	-.00178 (-0.05)	.0354 (0.97)	.1268 (2.83)***
Corporatevc	.1551 (4.32)***	.1690 (4.78)***	.1501 (4.16)***
Commbankaffvc	-.1696 (-3.58)***	-.1405 (-2.97)***	-.1230 (-2.24)**
Govtaffvc	.0845 (2.40)***	.0769 (2.25)**	.1471 (3.78)***
Pseudo $R^2$	0.1107	0.1149	0.1211
$p$ -value	0.0000	0.0000	0.0000
# of obs	2603	2727	2489

\*\*\*,\*\*,\* indicate significance at the 1% , 5%, and 10% confidence levels respectively

Table V: Propensity to mildly concentrate investments in early stage ventures

The dependent variables are the three terciles of concentration in early stage ventures, while independent variables are as described in Table AI. Tests are implemented using a multinomial logit model that generates White (1980) robust z-statistics, and three specifications are reported. *Earlyqt2* is the middle tercile of concentration in early stage ventures. Venture capitalists in the middle tercile are mildly concentrated in early stage ventures. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. Coefficients reported are the marginal effects, (effects at the mean) while z-statistics are reported in parentheses.

Independent Variables	Dependent Variable: Earlyqt2		
	(1)	(2)	(3)
Firmyear	.00149 (1.05)	.00134 (0.96)	-.00107 (-0.72)
Nonhitech	.0549 (2.22)**	.0580 (2.43)**	.0399 (1.59)
Lawenforcement	-.0683 (-2.38)**		
Marketstructure		-.1417 (-4.75)***	
Propertyrights			.0543 (3.37)***
Entrepreneurship	-.0356 (-0.98)	.000386 (0.01)	.0218 (0.66)
Invbankaffvc	-.0251 (-0.76)	-.00421 (-0.13)	-.00373 (-0.11)
Corporatevc	-.0556 (-1.75)*	-.0462 (-1.49)	-.1129 (-3.94)***
Commbankaffvc	-.1682 (-4.36)***	-.1667 (-4.56)***	-.1739 (-4.34)***
Govtaffvc	-.2588 (-11.33)***	-.2484 (-11.46)***	-.3047 (-13.86)***
Pseudo $R^2$	0.0949	0.1042	0.1247
$p$ -value	0.0000	0.0000	0.0000
# of obs	2359	2727	2489

\*\*\*,\*\*,\* indicate significance at the 1% , 5%, and 10% confidence levels respectively

Table VI: Propensity to mildly concentrate investments in later stage ventures

The dependent variables are the three terciles of concentration in later stage ventures, while independent variables are as described in Table AI. Tests are implemented using a multinomial logit model that generates White (1980) robust z-statistics, and three specifications are reported. *Laterqt2* is the middle tercile of concentration in later stage ventures. Venture capitalists in the middle tercile are mildly concentrated in later stage ventures. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. Coefficients reported are the marginal effects, (effects at the mean) while z-statistics are reported in parentheses.

Independent Variables	Dependent Variable: Laterqt2		
	(1)	(2)	(3)
Firmyear	-.00470 (-2.42)**	-.00469 (-2.53)**	-.00405 (-2.02)**
Nonhitech	.0250 (0.99)	.0256 (1.06)	.0165 (0.65)
Lawenforcement	-.1259 (-4.53)***		
Marketstructure		-.2290 (-6.93)***	
Propertyrights			.0360 (2.40)**
Entrepreneurship	-.0934 (-2.72)***	-.0523 (-1.81)*	-.0394 (-1.21)
Invbankaffvc	-.0791 (-2.35)**	-.0645 (-1.99)**	-.0850 (-2.43)**
Corporatevc	-.0255 (-0.70)	-.0152 (-0.42)	-.0600 (-1.68)*
Commbankaffvc	-.0623 (-1.28)	-.0651 (-1.44)	-.0500 (-0.95)
Govtaffvc	-.0515 (-1.47)	-.0491 (-1.49)	-.00571 (-0.155)
Pseudo $R^2$	0.0727	0.0813	0.0906
$p$ -value	0.0000	0.0000	0.0000
# of obs	2359	2481	2489

\*\*\*,\*\*,\* indicate significance at the 1% , 5%, and 10% confidence levels respectively

Table VII: Propensity to hold concentrated portfolios

The dependent variables are the three terciles of concentration in later stage ventures, early stage ventures, technology and non-technology intensive ventures, while independent variables are as described in Table AI. Tests are implemented using a multinomial logit model that generates robust z-statistics. and four specifications are reported. *Laterqt3*, *Earlyqt3*, *Nonhitechqt3*, and *Hitechqt3* are the third terciles of concentration in later stage ventures, early stage ventures, technology and non-technology intensive ventures. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. Coefficients reported are the marginal effects, (effects at the mean) while z-statistics are reported in parentheses.

Independent Variables	Earlyqt3	Hitechqt3	Nonhitechqt3	Laterqt3
Firmyear	-.00584 (-4.12)***	.00778 (2.50)**	-.00616 (-3.78)***	.00212 (1.29)
Nonhitech	-.1432 (-5.75)***			.0896 (3.65)***
Early		.0466 (2.15)**	-.1297 (-5.58)***	
Propertyrights	-.1650 (-10.46)***	-.0286 (-2.02)**	-.1063 (-7.41)***	.1287 (7.62)***
Entrepreneurship	.0497 (1.27)	.1216 (3.07)***	-.1522 (-3.56)***	-.1059 (-2.40)**
Invbankaffvc	-.1372 (-3.82)***	.0683 (1.68)*	-.0453 (-1.24)	.2581 (6.66)***
Corporatevc	.1350 (3.55)***	.0706 (2.11)**	-.2226 (-7.94)***	-.0312 (-0.94)
Commbankaffvc	.1042 (1.61)	.0466 (0.80)	.1614 (2.42)***	.1303 (2.24)**
Govtffvc	.4778 (14.83)	-.1384 (-4.47)***	-.1190 (-4.01)***	-.2306 (-8.46)***
Pseudo $R^2$	0.1236	0.1273	0.1211	0.0891
$p$ -value	0.0000	0.0000	0.0000	0.0000
# of obs	2489	2489	2489	2489

\*\*\*,\*\*, \* indicate significance at the 1% , 5%, and 10% confidence levels respectively

## Chapter III

# Law, Growth Rates, and Venture Capitalists' Asset Allocation Decisions

Lewis (1954) postulates that emerging countries are poor because they lack a professional entrepreneurial class that continually reinvests earnings, instead of consuming the earnings as rent. That is, the maximization of firm value by taking advantage of current growth opportunities is secondary to the maximization of current personal consumption or social status in emerging countries (or poor quality legal environments). Equivalently, entrepreneurs in emerging countries are characterized by sub-optimally low rate-of-time preferences. This is a behavioral proposition.

Claessens and Laeven (2003), on the other hand, hypothesize that entrepreneurs in poor quality property rights environments are unwilling to invest in intangible assets because of the risk of expropriation. Hence, they predict that the demand for external financing in poor quality property rights environments is sub-optimal. Ueda (2004) makes similar predictions. He predicts that entrepreneurs in poor quality property rights environments will be

less likely to demand venture capital financing due to the risk of expropriation by venture capitalists.

In this paper, I examine whether poor quality legal environments (poor quality contract enforcement and property rights protection) adversely affect the demand for additional rounds of venture capital financing (growth financing), once a financing relationship has been established. I also examine whether venture capitalists' asset allocation decisions are correlated with long-run country growth rates. This is a test of the efficiency of venture capitalists' asset allocation decisions.

The empirical methodology utilized in this paper also enables me to distinguish between the effect that the quality of the legal environment has on the demand and supply of external financing. Hence, the results indicate whether poor quality legal environments primarily affect the demand for growth financing, the supply of growth financing, or both. Four classes of firms are included in the empirical study: early stage technology, and non-technology intensive ventures, and later stage technology, and non-technology intensive ventures. Early stage ventures are in the early stages of a firm's growth cycle, while later stage ventures are in the expansion stages of a firm's growth cycle.

I find that the demand for growth financing is for the most part lower in poor quality property rights environments. The only exception is the demand for growth financing from later stage technology intensive ventures. For the most part, the demand for growth financing is no lower in poor quality contract enforcement environments relative to better quality contract enforcement environments. The only exception is the demand for growth financing from later stage technology intensive ventures.

The supply of growth financing is no lower in poor quality property rights environments relative to better quality property rights environments. The supply of growth financing in poor quality contract enforcement environments, on the other hand, is lower for early stage technology intensive ventures, and

later stage non-technology intensive ventures. Relative to high propensity for entrepreneurship countries, the demand for growth financing in low propensity for entrepreneurship countries is higher for early stage ventures, while it is lower for later stage ventures.

The results in this paper indicate that once a financing relationship is established, poor quality contract enforcement may either affect the demand for or the supply of growth financing, but not both. The supply-related result is consistent with the empirical findings in Rajan and Zingales (1998) and Demirgüç-Kunt and Maksimovic (1998), which find that firms have better access to external financing to fund growth opportunities in better quality legal environments.

The quality of property rights protection, on the other hand, only affects the demand for growth financing once a financing relationship has been established. This finding is consistent with the prediction in Lewis (1954) that the reason why emerging countries are poor is because they lack a professional entrepreneurial class that continually reinvests earnings, rather than consuming them as rent. The results are also consistent with the prediction in Claessens and Laeven (2003) that entrepreneurs in poor quality property rights environments are characterized by unwillingness to invest due to the risk of expropriation. However, Obrimah (2005b) finds that the quality of property rights protection is not a risk factor. This indicates that the results are only consistent with the prediction in Lewis (1954).

The prediction in Lewis (1954) is a behavioral proposition. However, rent seeking behavior may also be a rational response to a lack of separation between consumption and investment decisions. This is because entrepreneurs in countries where access to consumption finance is relatively limited may start firms primarily to finance consumption. In such countries, the marginal rate of transformation will be sub-optimally low because the entrepreneur cannot take on all positive net present value projects within his investment opportunity set.



Consequently, the marginal rate of substitution will also be sub-optimally low; the Fisher separation theorem<sup>16</sup> will not hold; and the demand for external financing will be sub-optimal.

This rational interpretation of the results possesses implications for developmental policies in and towards emerging countries. For the most part, micro-credit schemes in emerging countries focus on the facilitation of entrepreneurship via the provision of small business financing. However, developmental policies that only provide funds for investment will be less successful relative to developmental policies that also increase access to consumption finance. Hence, the results indicate that the facilitation of consumption finance, which encompasses access to credit, insurance, savings, and transactional services is as important as the facilitation of entrepreneurial finance in emerging countries.

Furthermore, if the Lewis (1954) postulation is accurate, the facilitation of consumption finance in emerging countries will assist in the creation and growth of a professional entrepreneurial class that continually reinvests earnings rather than consuming them as rent. This increase in the size of the professional entrepreneurial class, and the attendant increase in savings, investments, and the demand for external financing will contribute towards a higher level of financial development. Hence, as argued in Barr (2005), micro-finance can play an important role in financial development and strengthen the link between financial development, economic growth, and poverty alleviation.

The empirical results also show that venture capitalists' asset allocation decisions are significantly and positively correlated with long-run country growth rates. This indicates that venture capitalists are allocating funds to their best uses in poor quality legal environments. Obrimah (2005) finds that the most constrained firms in poor quality legal environments are early stage non-technology intensive ventures, followed by early stage technology intensive ventures and later stage technology intensive ventures. In this paper, I find

that the economic significance of the correlations between long-run country growth rates and venture capitalists' asset allocation decisions is greatest for early stage non-technology intensive ventures, followed by early stage technology intensive ventures and later stage technology intensive ventures.

These results provide additional corroboration for the efficiency of venture capitalists' asset allocation decisions in poor quality legal environments. Furthermore, the results are consistent with the finding in Beck, Demirgüç-Kunt, Laeven, and Levine (2005) that financial development has a greater effect on the growth rates of industries that rely on small firms for technological reasons. That is, the results indicate that higher country growth rates in poor quality legal environments are driven by the loosening of financial constraints on small firms. This indicates that improving access to external financing for small and medium scale enterprises is critical for economic growth and development in poor quality legal environments (emerging countries).

The rest of the paper is structured as follows. Section I outlines the analytical framework. Section II discusses the venture capital data utilized in the empirical tests. Empirical results are reported in Section III. Robustness and specification tests are reported in Section IV. Section V concludes.

## **I Analytical Framework**

Venture capitalists' propensity to concentrate investments in a particular class of firms is utilized as a proxy for economic profits associated with investing in that class of firms. Economic profits may exist either because supply lags demand or due to venture capitalists' ability to earn risk premiums for providing financing in poor quality legal environments. The probability that venture capitalists will specialize in providing financing to a particular class of firms,  $j$ , increases with the size of economic profits associated with the provision of financing to  $j$ -type firms. Hence, if economic profits associated with the

provision of financing to *j-type* firms are greater than those associated with *k-type* firms, venture capitalists will have a greater propensity to concentrate investments in *j-type* firms relative to *k-type* firms.

This argument also extends across countries whenever capital markets are not segmented. If economic profits associated with the provision of venture capital financing to *j-type* firms are greater in country *m* relative to country *n*, venture capitalists in country *m* will have a greater propensity to concentrate investments in *j-type* firms relative to venture capitalists in country *n*. However, as venture capitalists make investments beyond the first round of venture capital financing, their investments become concentrated in a small number of firms, that is they lose diversification benefits.

Hence, changes in venture capitalists' asset allocation decisions between the first and subsequent rounds of venture financing are indicative of venture capitalists' responses to the increased risk of their portfolios. Changes in asset allocation decisions between the first and subsequent rounds of venture financing are also indicative of changes in demand-supply equilibrium during the course of financing relationships. The empirical findings in Rajan and Zingales (1998) and Demirgüç-Kunt and Maksimovic (1998) suggest that the demand for growth financing will be lower in poor quality legal environments relative to better quality legal environments.

This leads to the following hypothesis:

## **A The Demand for Growth Financing**

**Hypothesis 4** *The demand for growth financing in poor quality legal environments is lower than the demand for growth financing in better quality legal environments.*

Hypothesis four is tested using probit models, which are specified as follows:

$$\begin{aligned}
probability(j\text{-}type_i) = & \beta_0 + \beta_1 growth_{j,c} + \beta_2 lawenforcement_{j,c} \\
& + \beta_3 bankregulation_{j,c} + \beta_4 marketstructure_{j,c} + \beta_5 propertyrights_{j,c} \\
& + \beta_6 firmyear_i + \beta_7 firmtype_i + \beta_8 entrepreneurship_{j,c} \\
& + \beta_9 fundcountry_i + \beta_{10} firstyear_j + \epsilon_i. \quad (III.1)
\end{aligned}$$

The probit models are implemented twice for each specification using data on all financing rounds, and then using data only on first financing rounds. The results from these two sets of empirical results are then compared. Empirical results that utilize data on first financing rounds are reported in Obrimah (2005) and are included in Appendix B, Tables BI through BIV.

The subscript  $j, c$  refers to company  $j$  located in country  $c$ ,<sup>17</sup> while the subscript  $i$  refers to a venture capitalist providing financing. The dependent variable is an indicator variable equal to one if a venture capitalist's investments are concentrated in  $j$ -type firms. Four classes of  $j$ -type firms are considered. These are early stage non-technology intensive ventures; early stage technology intensive ventures; later stage non-technology intensive ventures; and later stage technology intensive ventures. Early stage ventures are in the early stages of a firm's growth cycle (small firms), while later stages are in the expansion stages of a firm's growth cycle (relatively large firms). Agency problems associated with investing in early stage and technology intensive ventures are relatively more severe than those associated with investing in later stage and non-technology intensive ventures. Appendix A (Table AII) details the specific classes that make up these broad groupings.

Concentration in early stage non-technology intensive ventures is determined as follows. For each venture capital fund in the sample with investments in non-technology intensive ventures, I determine total dollar disbursements

to all non-technology intensive ventures in its portfolio as well as proportions of the total disbursed to early stage non-technology intensive ventures. I then divide the venture capital funds into three terciles based on the proportion of their total investments disbursed to early stage non-technology intensive ventures and venture capital funds located in the third tercile are deemed to be ‘concentrated’ in early stage non-technology intensive ventures. Concentration is similarly determined for all other classes of *j-type* firms.

The variable *lawenforcement* is a country’s ranking on the contract enforcement index developed by the Business Environmental Risk Guide (BERG), while *propertyrights* is a country’s ranking on the property rights protection index obtained from LLSV (1998). These variables are motivated in Section I. Following, I motivate the other independent variables included in the empirical tests. Detailed descriptions of all variables are provided in Table AI in the Appendix, while correlations between the independent variables are reported in Table AIV.

**Country growth rates** The financial development literature finds that financial development is strongly linked with economic growth. This literature includes King and Levine (1993), Beck, Levine and Loayza (2000) and Luintel and Khan (1999). This link between financial development and faster economic implies that faster economic growth may lead to the development of a venture capital market. Furthermore, venture capitalists will be more likely to concentrate investments in industries that are responsible for faster economic growth. In this paper, I include GDP growth rates as an independent variable that proxies for country-specific growth opportunities. This variable is termed *growth*.

**Banking regulation** The supply of venture capital funds may be larger in countries where banks can only hold the equity of non-financial firms in a

venture capital subsidiary. This implies that the demand for growth financing will increase with the extent to which banks are precluded from holding the equity of non-financial firms. The banking regulation variable ranks countries on a scale of one through four. A ranking of one indicates that commercial banks are free to hold the equity of non-financial firms, while a ranking of two indicates that they can only do this within an independent subsidiary. A ranking higher than two indicates more restrictions on commercial banks' abilities to hold non-financial equity. I obtain country classifications based on this banking regulation from Demirgüç-Kunt and Levine (2001). This variable is termed *bankregulation*.

**Market structure** Black and Gilson (1998) find that capital market structure (market-based versus bank-based) is a determinant of the level of venture capital activity across countries. In market-based economies, the incentive of an IPO exit, which creates a liquid asset for the entrepreneur increases the demand for venture capital funds, which in turn leads to a greater supply of venture capital funds and a higher level of venture capital activity. A larger supply of venture capital financing is expected to increase the demand for additional rounds of venture capital financing. The market structure variable is constructed as the ratio of stock market capitalization to GDP. This variable is termed *marketstructure*.

**Entrepreneurship** Given that I only observe completed deals, there is a need to account for possible differences in deal flow across countries. Consequently, I include measures of the propensity to take risks, or the propensity for entrepreneurship in the tests implemented. Furthermore, the demand for growth financing is expected to increase with the propensity for entrepreneurship across countries. These variables are taken from the Global Competitiveness Report published by the World Economic Forum. The two variables

considered, one for the propensity to take risks and the other for the propensity to innovate have a correlation of 0.83. Both variables have similar effects when included in the tests implemented, but only results with the propensity for entrepreneurship/innovation are reported. These are continuous variables and the entrepreneurship/innovation variable is termed *entrepreneurship*.

**Location of venture capital fund** The variable *fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country (equivalently, poor quality legal environment). A positive regression coefficient ( $\beta_9$ ) on this variable indicates that venture capitalists in poor quality legal environments have a greater propensity to concentrate investments in *j-type* firms relative to venture capitalists in better quality legal environments. Hence, this variable indicates whether economic profits that accrue to venture capitalists are greater in poor quality legal environments relative to better quality legal environments. If the coefficient of *fundcountry* is significant with the expected sign (positive), while the quality of legal environment variables are not, this suggests that economic profits in poor quality legal environments are also driven by venture capitalists' ability to earn risk premiums.

**Venture capital fund related variables** Venture capital firm specific variables are included as independent variables in the tests implemented. *firmtype* is the organizational form of a venture capital firm, which has been shown to contain information about venture capitalists' risk preferences (Obrimah (2004), Hellmann, Lindsey, and Puri (2003)). Appendix A (Table AIII) reports the classification of venture capitalists according to organizational form. *firmyear* is the year in which a venture capital firm commenced operations. This variable is included in the empirical tests because it is expected that venture capitalists' asset allocations are affected by how long they

have been in business. *firstyear* is a dummy variable for the year in which a financing relationship commenced. This variable accounts for possible changes in venture capitalists' investment opportunity sets over time.

**Venture capital firm reputation** The number of deals a venture capitalist has participated in is utilized as a weight in the tests performed. This is based on the following argument. Suppose at time  $t = 0$ , there exist four VCs (*vca*, *vcb*, *vcc* and *vcd*), one of which (*vca*) is concentrated in technology intensive ventures, while the others are not. Assume that at time  $t = 1$ , the demand for venture capital financing from technology intensive ventures increases significantly. Given that reputation and specialization are important in the venture capital market,<sup>18</sup> *vca* attracts a significant chunk of the increased demand, but due to risk considerations is only able to soak up half of the increased demand. *vcb*, on the other hand, is able to soak up more of the residual demand (35 percent) relative to *vcc* and *vcd* and ends up being classified as a concentrated VC at time  $t = 1$ .

If *vca* and *vcb* are given equal weight in the empirical tests at  $t = 1$ , *vcb*'s importance is overstated, while *vca*'s importance is understated. Hence, in order to capture the demand dynamics, which is central to the research question, it is important to capture the relative importance of *vca* and *vcb*. The same argument applies to the country variables. If the demand for venture capital financing is greater in better quality property rights environments, then there may be more financing transactions in these countries and this ought to be reflected in the empirical tests. This argument is supported by the finding in Rajan and Zingales (1998) that financial development has a significant impact on the growth of the number of firms. All empirical tests, except the switching regressions are based on first financing rounds only.



## B Growth rates and venture capitalists' asset allocation decisions

**Hypothesis 5** *Venture capitalists' asset allocations are efficient, hence, they are positively and significantly related to long-run economic growth in the cross-section of countries. Venture capitalists' asset allocation decisions are good proxies for the level of financial development, or the efficiency of capital allocations across countries.*

Most studies that examine the finance-growth nexus utilize measures of stock market and banking sector development as proxies for financial development. However, a vibrant venture capital market may exist in countries whose level of financial development is relatively poor by these conventional measures. Over time, there occurs a spillover from the venture capital market to stock markets as more firms are able to go public; a spillover to the banking sector also occurs because firms that receive venture capital financing are better capitalized and possess larger debt capacity.

The utilization of venture capitalists' asset allocations as measures of venture capital activity also provides a means of determining whether venture capitalists allocate fund resources to their most productive use. Tests of the relationship between venture capitalists' asset allocations and long-run economic growth are specified as follows:

$$\begin{aligned} Growth_{i,c} = & \alpha_0 + \alpha_1 Earlynontech_{i,c} + \alpha_2 Earlynontech_{i,c} \\ & + \alpha_3 Entrepreneurship_{j,c} + \alpha_4 Propertyrights_{j,c} + \alpha_5 Structur_{j,c} \\ & + \alpha_6 Privatecredit_{j,c} + \alpha_7 Banksvschn_{j,c} + \epsilon_i \quad (III.2) \end{aligned}$$

where  $Privatecredit_{i,c}$  (private credit by banks as a proportion of GDP),  $Banksvschn_{i,c}$  (the proportion of aggregate financing to the private sector un-

dertaken by private banks) and  $Structur_{i,c}$  (the extent to which capital markets are market-based), and are financial development, and legal environment indicators taken from Demirgüç-Kunt and Levine (2001).

## II Venture capital data

Venture capital markets in the sample countries are emerging markets that for the most part, developed concurrently and experienced significant growth starting in the late 1990s. Hence, differences in venture capitalists' asset allocation decisions cannot be attributed to differences in the relative maturities of the venture capital markets in these countries. Furthermore, venture capital markets in the sample emerging and developed countries are not segmented. In fact, venture capitalists in some developed countries (Singapore and Hong Kong in particular) raise venture capital funds for investments in the sample emerging countries.<sup>19</sup>

Data on venture capital transactions are obtained from VentureXpert, which is owned by Ventureconomics. The cross-country data set consists of 6,552 distinct venture capital investments during 4,264 distinct rounds of venture financing. Venture capital firms located in the sample countries are responsible for 67 percent of all sample transactions (4,200 observations), while venture capitalists located primarily in the U.S. and the U.K. are responsible for 33 percent of all sample transactions (2,352 observations).

These investments involve 2,857 portfolio companies located in Asia and Israel that received their first round of funding from venture capitalists (VCs) between 1982 and December 2000. The developed countries based on World Bank classifications are: Australia, Hong Kong (China), New Zealand, Japan and Singapore; while the emerging countries are: China, India, Indonesia, Israel, Malaysia, Philippines, Korea, Republic, Taiwan (China) and Thailand.

This sample is obtained from a total database of 10,192 venture capital

and private equity transactions. From this total sample, I eliminate:

1. All buyout transactions, since these are not standard venture capital transactions (1,042 observations);
2. All venture capital relationships that did not commence prior to December 31, 2000 (1,815 observations); this ensures that I have at least two-and-a-half years of data on each financing relationship;
3. All investments in the financial services industry (180 observations); as well as any observation that does not specify the dollar value of each round investment; the investment stage; the industry; and the name of the portfolio company (603 observations).

This process resulted in the elimination of 3,640 data records. These investments involve 818 venture capital firms with 465 or 57 percent of these venture capital firms located in the sample countries.<sup>20</sup> Table I reports industry and investment stage statistics by sample country for this data set. The statistics reported in Table I indicate that technology intensive deals outnumber non-technology intensive deals in practically all of the sample countries regardless of the location of the venture capitalists providing financing. Also, later stage deals outnumber early stage financing deals across all sample countries regardless of the location of the venture capitalists providing financing.

Panels A and B of Table II show that venture capitalists in poor quality legal environments invest smaller amounts in a larger number of firms relative to venture capitalists in better quality legal environments. On average, the number of firms in emerging country-based venture capitalists' portfolios is 2x the number of firms in developed country-based venture capitalists' portfolios. The amount disbursed by emerging country-based venture capitalists to a single firm are about 0.2x to 0.33x the amounts disbursed by developed

country-based venture capitalists. This is consistent with test-of-means statistics reported in Panel C of Table II, which indicate that average capital under management for emerging country-based venture capital firms is about 0.38x average capital under management for developed country-based venture capital firms. These means are significantly different at the 5 percent confidence level.

About thirty percent of portfolio companies are non-technology intensive companies in the cross-country sample. This proportion is very similar to that reported in Obrimah (2004) for VCs in the U.S. Total funding committed to all sample companies amounts to \$1.56 billion, with 31 percent (61 percent) being disbursed to non-technology intensive (respectively, technology intensive) ventures.

Independent private partnerships, corporate venture funds and commercial bank-affiliated venture capitalists (VCs), in that order, are responsible for most of the sample transactions. All venture capital types invest in non-technology intensive companies. The venture capital types with the largest proportions of non-technology intensive companies in their portfolios are commercial bank-affiliated VCs (33 percent), independent private partnerships (26 percent) and corporate VCs (15 percent). Investments in early stage companies constitute between 29 percent (for investment bank-affiliated VCs) and 60 percent (for government-affiliated VCs) of all investment transactions.

Forty-three percent of sample portfolio companies are early stage ventures at the first round of venture financing. Early stage ventures constitute a significant minority amongst non-technology intensive ventures (32 percent), a slight minority amongst technology intensive ventures (47 percent) and a significant majority amongst medical/health-related ventures (60 percent). A total of \$780 million was disbursed to portfolio companies receiving their first round of venture capital financing and 31 percent of this total went to early stage ventures.

Syndication is not very prevalent within this sample. Deals involving syndications between the different classes of VCs are also very few. The percentage of deals involving independent private partnerships and at least one other venture capital class range from 8 percent for commercial bank affiliated VCs, to 16 percent for investment bank affiliated VCs. Syndication with other classes of VCs, other than independent private partnerships is even less prevalent. The proportion of deals involving a single class of VCs ranges from 79 percent for investment bank affiliated VCs, to 91 percent for independent private partnerships. This lack of extensive syndication may be rational in markets that are far from perfect, since information rents are likely to exist in such markets.<sup>21</sup>

### **III Empirical Results and Interpretations**

Results obtained from tests based on all financing rounds have to be juxtaposed with those obtained using only first round financing deals. However, results based only on first round financing deals are reported in Obrimah (2005). The relevant tables from Obrimah (2005) are included in Appendix B, Tables BI through BIV.

#### **A Early stage non-technology intensive ventures**

Test results reported in Table III indicate that the demand for growth financing decreases with *Propertyrights*, and *Entrepreneurship*. However, while the initial demand for external financing is 18 percent higher in poor quality property rights environments (Table BI), the total demand for external financing is only 12 percent higher in Table III. This reduction, which is economically significant, indicates that the demand for growth financing is lower in poor quality property rights environments.

The coefficientS of *Fundcountry* in specifications (2) and (5) are similar in Tables III and BI, respectively. This indicates that venture capitalists' propensity to concentrate investments in early stage non-technology intensive ventures does not decrease significantly as they provide additional rounds of financing. Hence, the results indicate that poor quality legal environments only affect the demand for growth financing and not the supply for this class of firms. The coefficient of *Entrepreneurship* in Table III is significant in all specifications and is about 300 to 400 percent higher relative to the corresponding coefficient in Table BI. This indicates that the demand for growth financing is significantly higher in low propensity for entrepreneurship countries.

## **B Early stage technology intensive ventures**

Table IV reports test results where the dependent variable is an indicator variable equal to one if a venture capitalist is concentrated in early stage technology intensive ventures. The results indicate that the total demand for external financing from this class of ventures decreases with *Lawenforcement*, while it increases with *Growth*, and *Bankregulation*. The coefficient of *Lawenforcement* has about the same magnitude (see Table BII) as in Obrimah (2005), indicating that the demand for growth financing is no different from the initial demand for external financing. However, the coefficient of *Fundcountry* is statistically insignificant in specification (2) of Table IV. A comparison with specification 2 of Table BII indicates that the supply of growth financing is lower in poor quality contract enforcement environments.

The coefficient of *Propertyrights* is significant in Table BII, while it is not significant in Table IV. This indicates that the demand for growth financing is lower in poor quality property rights environments relative to better quality legal environments. The difference in the coefficients of *Fundcountry* in

specification (5) of tables BII and IV, is not economically significant, however, indicating that venture capitalists in poor quality legal environments are no less likely to provide growth financing relative to those in better quality legal environments. The demand for external financing also reduces with *Entrepreneurship*, and the coefficient is between 80 and 200 percent higher relative to corresponding coefficients in Table BII. This indicates that the demand for growth financing is higher in low propensity for entrepreneurship countries.

### **C Later stage technology intensive ventures**

Table V reports test results where the dependent variable is concentration in later stage technology intensive ventures. The results indicate that the total demand for external financing increases with *Lawenforcement*, *Marketstructure*, and *Propertyrights*. Relative to the initial demand for external financing (see Table BIII), the coefficients indicate that the demand for growth financing from this class of firms is lower in poor quality contract enforcement environments. The demand for growth financing is no lower in poor quality property rights environments. The demand for growth financing is also higher in countries that possess a higher propensity for entrepreneurship.

The coefficient of *Fundcountry* is not significant in specification 2 of Table V. This indicates that the supply of growth financing is no lower in poor quality contract enforcement environments. The coefficient of *Fundcountry* in specification 5 of Table V, on the other hand, is about 28 percent smaller than the corresponding coefficient in Table BIII. This indicates that venture capitalists in poor quality legal environments are more likely to supply growth financing relative to those in better quality legal environments.

## D Later stage non-technology intensive ventures

Test results reported in Table VI indicate that the demand for growth financing from later stage non-technology intensive ventures decreases with *Lawenforcement* and *Marketstructure*, while it increases with *Propertyrights*. Hence, while the initial demand for external financing is higher in better quality contract enforcement environments (Table BIV), the demand for growth financing is significantly higher in poor quality contract enforcement environments. The results in Tables VI and BIV also indicate that the demand for growth financing is higher in better quality property rights environments, and more bank-based capital markets. The results indicate, also, that the demand for growth financing is higher in high propensity for entrepreneurship countries.

The coefficient of *Fundcountry* is significant and negative in all specifications of Table VI. However, the coefficient of *Fundcountry* is not significant in specification 2 of Table BIV. This indicates that the supply of growth financing is not lower in poor quality contract enforcement environments relative to better quality contract enforcement environments. The coefficients in all other specifications of Tables VI and BIV except for specification 5, also indicate that the supply of growth financing is lower in poor quality legal environments. However, the supply of growth financing is not lower in poor quality property rights environments.

## E Discussion of Hypotheses one and two

Tables III through VI indicate that, for the most part, the demand for growth financing is lower in poor quality property rights environments. The only exception is the demand for growth financing from later stage technology intensive ventures. The demand for growth financing is no lower, for the most part in poor quality contract enforcement environments relative to better qual-



ity contract enforcement environments . The only exception being the demand for growth financing from later stage technology intensive ventures.

The supply of growth financing is no lower in poor quality property rights environments. The supply of growth financing in poor quality contract enforcement environments is lower for early stage technology intensive ventures, and later stage non-technology intensive ventures. The demand for growth financing from entrepreneurs in low propensity for entrepreneurship countries is higher for early stage ventures, while it is lower for later stage ventures relative to the demand for growth financing from entrepreneurs in high propensity for entrepreneurship countries.

The results support the conjecture in hypothesis four that the demand for growth financing is lower in poor quality property rights environments. The results also indicate that once a financing relationship is established, poor quality property rights environments only affect the demand for growth financing. These results are consistent with the prediction in Lewis (1954) that the reason emerging countries are poor is because they lack a professional entrepreneurial class that continually reinvests earnings rather than consuming them as rent. However, rent-seeking behavior in emerging countries may also be a rational response to a lack of separation between consumption and investment decisions.

## **F Growth rates and venture capitalists' asset allocation decisions**

Empirical results reported in Table VII indicate that higher asset allocations to early stage non-technology intensive ventures are correlated with faster economic growth. This result is robust to the inclusion of financial development, and quality of legal environment variables that have been shown to be associated with, or possess predictive power for long-run economic growth.

However, the economic importance of venture capitalists' asset allocation decisions, as expected, are not as large as the economic effects of *Privatecredit* and *Banksvschn*. These results are in line with hypothesis five, which postulates that venture capitalists' asset allocations are significantly related to country-level long-run economic growth rates.

Test results reported in Tables VIII and IX also indicate that higher asset allocations to early and later stage technology intensive ventures, respectively, are correlated with faster long-run economic growth. However, while both middle and third terciles of concentration in early stage technology intensive ventures are correlated with faster economic growth, only mild concentration in later stage technology intensive ventures is consistently correlated with faster long run economic growth. Furthermore, it is noteworthy that the coefficient of the third tercile of concentration ceases to be significant in specifications that include private credit as a proportion of GDP as an independent variable.

The coefficient of *Banksvschn* is not significant in specification (7) of both tables VIII and IX, while the coefficient of *Privatecredit* remains significant. Also, though not reported, tests with asset allocations to later stage non-technology intensive ventures as independent variables indicate that higher asset allocations to this class of ventures are negatively associated with faster long-run economic growth.

A comparison of the coefficients of the asset allocation variables across Tables VII through IX indicates that the coefficients, and R-squareds in specification (7) are highest in Table VII, followed by those in Table VIII, while they are lowest in Table IX. The reduction in the coefficients between Tables VII and VIII is about 50 percent, while that between Tables VIII, and IX is only 28 percent.

This is in line with the findings in Obrimah (2005) that early stage non-technology intensive ventures are the most financially constrained in poor quality legal environments followed by early and later stage technology intensive

ventures, respectively. These results indicate that venture capitalists' asset allocations are significantly correlated with long-run economic growth. The results also indicate that venture capitalists are rational in their asset allocation decisions.

## IV Robustness and specification tests

One possible interpretation of test results in Tables III through VI is that the relatively lower demand for growth financing in poor quality property rights environments is due to the fact that venture capitalists in these countries are financially constrained. Hence, they are either not able to meet additional demands for external financing fully, or it takes longer to muster the funds required for such growth investments. In the latter case, the duration between financing rounds will be longer in poor quality legal environments, while fund size will have a negative impact on the duration between financing rounds. This leads to the following hypothesis.

**Hypothesis 6** *Duration between financing rounds decreases with capital under management by venture capitalists, the quality of contract enforcement, capital market structure, long-run country growth rates, and the quality of the property rights environment if supply constraints are at least partly responsible for the results in Tables III through VI.*

The dependent variable is the duration between funding rounds. The tests are implemented using a duration model such as those utilized in the labor economics literature. A firm is assumed to have a certain probability of receiving financing in each period. The instantaneous probability of receiving financing is called the hazard rate,  $\lambda(t)$ .  $\lambda(t)$  is defined as:

$$\lambda(t) = \frac{\textit{Probability of receiving funding between } t \textit{ and } t + \Delta t}{\textit{Probability of receiving funding after } t}. \quad (\text{III.3})$$

To implement this methodology, I assume a Weibull distribution, which is either an increasing, constant, or decreasing hazard distribution function. In this study, failure is the receipt of funding given that a company has already received at least one round of funding. The hazard function for the Weibull distribution with parameters  $\gamma > 0$  and  $\alpha > 0$  is specified as,

$$\lambda(t) = \gamma \alpha t^{\alpha-1},$$

and increases or decreases monotonically. For parametric analysis, I adopt an Accelerated Failure Time Model. That is, the hazard function  $\lambda(t)$  is specified as,

$$\lambda(t; x) = \lambda_0 \left[ t e^{-Z'\beta} \right] \exp(-Z'\beta), \quad (\text{III.4})$$

where  $\lambda_0$  is the baseline hazard corresponding to  $\exp(\cdot) = 1$  or  $Z = 0$ . This is a log-linear regression model with the covariates having a multiplicative effect on  $t$  rather than the hazard function and consequently,  $\lambda_0$  does not need to be estimated. The covariates then have the effect of accelerating (or decelerating) the time to failure.<sup>22</sup> The coefficients  $\beta_m$ ,  $i = 1, \dots, m$ , are estimated via Maximum Likelihood. Duration models have the added advantage of being able to cater to censored data. In this particular analysis, some observations are right-censored. That is, although I know when the funding relationship begins, I cannot ascertain if the relationship is ongoing or not given certain criteria. In this study, transactions involving companies that receive funding after December 2001 are deemed to be ongoing relationships, and consequently are right censored. This cutoff point is appropriate given the mean sample

duration of 0.92 years, and the fact that eighty five percent of all sample durations are less than 1.5 years.<sup>23</sup>

The model specification is:

$$\begin{aligned}
Duration_{j,r} = \exp[ & -(\omega_0 + \omega_1 Rndnmb_{j,r} + \omega_2 Rndtotl_{j,r} + \omega_3 Early_{j,r}, \\
& + \omega_4 Pubstat_j + \omega_5 Mktbk_j + \omega_6 Tanfxast_j \\
& + \omega_7 Lawenforcement_{j,c} + \omega_8 Propertyrights_{j,c} \\
& + \omega_9 Marketstructure_{j,c} + \omega_{10} Growth_{j,c} + \omega_{11} Entrepreneurship_{j,c} \\
& + \omega_{12} Capital_i + \omega_{13} Firmtype_i + \omega_{14} Firstyear_j + \epsilon_{j,r})] \quad (III.5)
\end{aligned}$$

where  $Duration_{j,r}$  is the time duration in months between rounds  $r$  and  $r + 1$  for company  $j$ , and all other variables are as described in Appendix A, Table AI.

## A Robustness results

The results of the duration model are reported in specifications (1) through (5) of Table X. In line with hypothesis six, I find that the duration between financing rounds decreases with *Growth*, *Marketstructure*, and *Propertyrights*. However, venture capitalists located in poor quality legal environments are also characterized by shorter time durations between financing rounds. Furthermore, the coefficients of *Fundcountry* are economically and statistically more significant relative to the macroeconomic variables in all specifications. This indicates that these variables are capturing demand effects, while the *Fundcountry* variable captures the risk or supply effects. The coefficient of *Fundcountry* is in line with expectations that venture capitalists in poor quality legal environments will monitor more intensely relative to those in better quality legal environments.

## B Specification test

Specification tests indicate that the probit models utilized in the analyses are well specified. The test of goodness-of-fit for the probit model where the dependent variable is an indicator variable equal to one if a venture capitalist is concentrated in early stage non-technology ventures yields a Pearson  $\chi^2$  statistic of 1410.26 that is significant at the one percent confidence level. A stricter test of goodness of fit, the Hosmer-Lemeshow<sup>24</sup>  $\chi^2$  goodness of fit statistic yields a test statistic of 113.38, which is significant at the one percent confidence level. Furthermore, using the sample mean third tercile concentration of 0.35 as a cutoff point, I find that 77 percent of venture capital firms that are classified as concentrated in non-technology intensive ventures are correctly predicted by the model, while 80 percent of those classified as ‘not concentrated’ in non-technology intensive ventures are correctly classified. In all, the model correctly classifies 79 percent of the data. All of these statistics indicate that the probit models are well specified.

## V Conclusions

This paper finds that poor quality contract enforcement either affects the demand for or the supply of growth financing, but not both. Poor quality property rights protection, on the other hand, only affects the demand for growth financing, with supply unaffected. The result pertaining to the quality of property rights protection is consistent with the prediction in Lewis (1954) that the reason why emerging countries are poor is because they lack a professional entrepreneurial class that continually reinvests earnings rather than consuming it as rent. The paper argues that rent seeking behavior may be a rational response to a lack of separation between consumption and investment decisions, which implies that the facilitation of consumption finance

is as important as the facilitation of entrepreneurial finance in poor quality legal environments or emerging countries.

This paper also finds that venture capitalists' asset allocation decisions are significantly and positively correlated with long-run economic growth. Furthermore, the economic significance of these correlations increases with the extent to which a particular class of firms is constrained with respect to access to external financing in poor quality legal environments. The results indicate that venture capitalists asset allocations in poor quality legal environments are efficient. That is, venture capitalists are allocating funds to their best uses. The results are also consistent with the prediction in Beck, Demirgüç-Kunt, Laeven, and Levine (2005) that financial development leads to faster economic growth because of its effect on small firms' access to external financing. This indicates that improving access to external financing for small and medium scale enterprises is critical for economic growth and development in emerging countries.

This paper finds that improving access to external financing for small and medium scale enterprises is critical for economic growth and development in emerging countries. However, this paper does not examine whether some financing vehicles are better suited to achieving this objective relative to others. For instance, is equity financing better suited to this purpose relative to debt financing? This is a subject for future research.

## Notes

<sup>16</sup>The Fisher separation theorem states that: Given perfect and complete capital markets, the production decision is governed solely by an objective market criterion (represented by maximizing attained wealth) without regard to individuals' subjective preferences that enter into their consumption decisions (Copeland and Weston (1992, pg. 12).

<sup>17</sup>Venture capital funds providing financing to company  $j$  may be located in different countries.

<sup>18</sup>Gompers (1996), Hsu (2004)

<sup>19</sup>The Guide to Venture Capital in Asia (2000).

<sup>20</sup>We note here that discussions with Ventureconomics indicate that the coverage of Asia venture capital transactions in the VentureXpert database simply reflects the data that they have been able to obtain so far and does not represent any bias on their part whatsoever. The fact that macro characteristics of this unique data set correspond to macro data on Asian countries and Israel obtained from the GVCA further lends credence to this assertion

<sup>21</sup>These statistics are not reported, but are available upon request from the author.

<sup>22</sup>Kalbfleisch, J. D., and R. L. Prentice, 2002, *The Statistical Analysis of Failure Time Data*, Wiley-Interscience.

<sup>23</sup>Duration models are surveyed in Kiefer (1988).

<sup>24</sup>The Hosmer-Lemeshow goodness of fit statistic is utilized instead of the standard Pearson goodness of fit statistic when the number of observations per covariate pattern is small. In this study, the number of observations per covariate pattern is about 2, hence the Hosmer-Lemeshow goodness of fit statistic provides a stricter goodness of fit test relative to the Pearson statistic. In Using the Hosmer-Lemeshow goodness of fit test, the number of groups is usually limited to ten.



## A Data descriptions, constructions, and sources as appropriate

Table AI: Data Descriptions

This table describes all the data utilized in our analyses. The first 18 variables are items related to the venture capital transactions and are obtained either from VentureXpert or the Guide to Venture Capital in Asia. Sources are cited for all other variables. A venture capital firm is deemed to be concentrated in a particular industry or portfolio item if its portfolio share in that industry or item lies in the third tercile of portfolio shares of all sample venture capitalists.

Symbol	Description/Construction
<i>Earlynontechfm</i>	Dummy variable = 1 if a venture capital fund is concentrated in early stage non-technology intensive ventures.
<i>Laternontechfm</i>	Dummy variable = 1 if a venture capital fund is concentrated in later stage non-technology intensive ventures.
<i>Earlyhitechfm</i>	Dummy variable = 1 if a venture capital firm is concentrated in early stage technology intensive ventures.
<i>Laterhitechfm</i>	Dummy variable = 1 if a venture capital firm is concentrated in early stage technology intensive ventures.
<i>Onetime</i>	Dummy variable = 1 if a financing deal involves only one round of financing.
<i>Pubstat</i>	Dummy variable = 1 if a portfolio company eventually goes public, and 0 otherwise.
<i>Nonhitechqt</i>	The three terciles of concentration in non-technology intensive ventures.
<i>Fundcountry</i>	Dummy variable = 1 if a venture capital fund is located in a sample emerging country.
<i>Age</i>	Portfolio company's age at first round of venture capital financing.
<i>Firmyear</i>	The year a venture capital firm was set up.
<i>Early</i>	Dummy variable = 1 if portfolio company in early stages of firm's growth cycle.
<i>IVC</i>	Dummy variable = 1 if a venture capital fund is an independent private partnership.
<i>Invbankaffvc</i>	Dummy variable = 1 if a venture capital fund is affiliated with an investment bank.
<i>Corporatevc</i>	Dummy variable = 1 if a venture capital fund is affiliated with a non-financial corp.
<i>Commbankaffvc</i>	Dummy variable = 1 if a venture capital fund is affiliated with a commercial bank.
<i>Govtaffvc</i>	Dummy variable = 1 if a venture capital fund is government-owned or affiliated.
<i>Capital</i>	Venture capital firm-reported capital under management ('\$Millions).

Table AI: Continued

Symbol	Description/Construction
<i>Entrepreneurship</i>	Country ranking of entrepreneurship and innovation by the World Economic Forum. Taken from the Global Competitiveness Report (1996). Higher rankings imply higher innovation capabilities.
<i>Markettobook</i>	Industry-wide ratios of market to book value based on 2-digit sic codes. Ratios are calculated separately for portfolio companies located in the emerging and developed country sub-samples. Data are obtained from Compustat's Global Vantage Database.
<i>Tangibleassets</i>	Industry-wide ratios of property, plant, and equipment based on 2-digit sic codes. Ratios are calculated separately for portfolio companies located in the emerging and developed country sub-samples. Data are obtained from Compustat's Global Vantage Database.
<i>Lawenforcement*</i>	Measures the relative degree to which contractual agreements are enforced and complications presented by language and mentality differences. Scored 1-4, with higher scores for superior quality, averaged over 1980-1989, and 1990- 995; Source: Knack and Keefer (1995) using data from Business Environmental Risk Guide (BERG).
<i>Growth</i>	Annual GDP growth; Source: World Development Indicators (2002).
<i>Propertyrights*</i>	Rating of property rights on a scale of 1 to 5. The more protection private property receives, the higher the score. Source: LLSV (1998b), using data from 1997 Index of Economic Freedom.
<i>Marketstructure</i>	Constructed as the ratio of stock market capitalization to total bank assets in any given year; stock market capitalizations are obtained from the Emerging Stock Markets Factbook, while total bank assets are obtained from Demirgüç-Kunt and Levine(2001).
<i>Bankregulation*</i>	Ability of banks to own and control non-financial firms. Source: Barth, Caprio, and Levine (1998). 1 indicates "unrestricted" (banks can engage in the full range of the activity directly in the bank), 2 indicates "permitted" (the full range of those activities can be conducted, but all or some of the activity must be conducted in subsidiaries), 3 indicates "restricted" (banks can engage in less than the full range of those activities, either in thebank or subsidiaries) and 4 indicates "prohibited" (the activity may not be conducted by the bank or subsidiaries).

\* descriptions obtained from Demirgüç-Kunt and Levine (2001).

Table AII: Industry and investment stage classifications

This table reports the industry, and investment stage classification schemes employed in this paper. *Hitech* are technologically intensive inventures; *Nonhitech* are non-technologically intensive ventures; while *Medical* are medical/health-related ventures. Actual classifications are obtained from VentureXpert. Portfolio companies in the Start-up/Seed or Early stages of a firm's life cycle are firms that are still in the early stages of a firm's growth cycle. Firms classified as early stage firms tend to be older and further on along the firm's life cycle relative to those classified as Start-up/Seed firms. Portfolio companies in the expansion or later stages of a firm's growth cycle are relatively established firms who need financing primarily to fund growth opportunities. These are larger and older firms relative to Early Stage and Start-up firms. Firms classified as later stage firms tend to be further along on a firm's life cycle relative to those classified as expansion stage firms.

Actual Classifications	Broad Classifications in this paper		
Panel A: Industry Classifications			
	Hitech	Nonhitech	Medical
Agr/Forestry/Fish		×	
Biotechnology			×
Business Services		×	
Communications	×		
Computer Hardware	×		
Computer Other	×		
Computer Software	×		
Construction		×	
Consumer Related		×	
Industrial/Energy		×	
Internet Specific	×		
Manufacturing		×	
Medical/Health			×
Other		×	
Semiconductor/Electr.	×		
Transportation		×	
Utilities		×	
Panel B: Classifications by Investment Stage			
	Later Stage	Early Stage	
Early Stage		×	
Expansion	×		
Later Stage	×		
Startup/Seed		×	

Table AIII: Classification of venture capitalists by organizational structure

This table reports the ‘venture capital type’ classification scheme employed in this paper. The row items are the actual classifications of venture capital firms by organizational structure. These classifications are obtained from VentureXpert. *SBIC NEC* are Small Business Investment Companies (SBICs) not classified within any of the other VentureXpert classes. *Fund of funds* are venture capital funds that invest in other venture capital funds rather than investing directly in firms in need of venture capital financing. All other ‘actual’ classifications are self-explanatory. The Broad classifications in this paper are five. These are *IVC* (Independent Venture Capitalist; *Invbankaffvc* (Investment Bank affiliated venture capitalist); *Corporatevc* (Corporate venture capitalist); *Commbankaffvc* (Commercial Bank affiliated venture capitalist); and *Govtaffvc* (Government affiliated venture capitalist).

Actual Classifications	Broad Classifications in this paper				
	IVC	Invbankaffvc	Corporatevc	Commbankaffvc	Govtaffvc
Affiliate of Other Financial Institution				×	
Bank Group				×	
Business Development Fund					×
Commercial Bank Affiliate				×	
Corporate (non-financial) Affiliate			×		
Corporate (non-financial) Venture Program			×		
Investment Management Firm		×			
Investment Bank & Affiliates		×			
Other Government Program					×
Fund of Funds	×				
Independent Private Partnership	×				
SBIC NEC					×
State Govt. Affiliated Program					×

Table AIV: Correlations Table for the cross-country sample

This table reports correlations between independent variables utilized in this paper. The data comes from fourteen emerging and developed countries. The developed countries based on World Bank classifications are: Australia, Hong Kong (China), New Zealand, Japan and Singapore; while the emerging countries are: China, India, Indonesia, Israel, Malaysia, Philippines, Korea, Republic, Taiwan (China) and Thailand. The data consists of 4,200 distinct venture capital transactions between entrepreneurs and venture capitalists located within the sample countries. *Firmyear* is the year a venture capital firm commenced operations; *Growth* is annual GDP growth; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Entrepreneurship* is a ranking of the propensity for entrepreneurship/innovation across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Invbankaffvc* are Investment Bank affiliated venture capitalists; *Corporatevc* are venture capitalists affiliated with non-financial corporations; *Commbankaffvc* are Commercial Bank affiliated venture capitalists; *Govtaffvc* are government affiliated venture capitalists; *Early* is an indicator variable equal to one if a firm was in the early stages of a firm's growth cycle when it received its first round of financing; *Gdppercapita* is annual GDP Per Capita.

	Firm-year	Growth	Lawenforcement	Bankregulation	Marketstructure	Propertyrights	Entrepreneurship
Firmyear	1.0000						
Growth	0.1338	1.0000					
Lawenforcement	0.0425	-0.5028	1.0000				
Bankregulation	-0.0994	0.6686	-0.6043	1.0000			
Marketstructure	0.0336	-0.4845	0.7267	0.4052	1.0000		
Propertyrights	0.2298	0.3707	0.4990	-0.1151	0.2933	1.0000	
Entrepreneurship	0.1021	0.1262	-0.4193	-0.3299	-0.4199	-0.2764	1.0000
Fundcountry	0.0456	0.5692	-0.7865	0.3856	-0.7633	-0.3428	0.6220
Invbankaffvc	-0.0246	-0.2964	0.1518	-0.2206	0.1402	-0.0799	-0.0116
Corporatevc	0.0806	0.1899	-0.0375	0.1034	0.0102	0.0986	0.0168
Commbankaffvc	-0.1864	-0.0469	-0.2134	0.1313	-0.1306	-0.3308	0.0842
Govtaffvc	-0.2620	-0.0029	-0.0484	0.1112	-0.0499	-0.0990	-0.0634
Early	-0.0091	0.0564	-0.1197	0.0735	-0.0871	-0.0954	0.0878
Gdppercapita	0.1036	-0.2073	0.8987	-0.4031	0.5648	0.7253	-0.5220

  

	Fundcountry	Invbankaffvc	Corporatevc	Commbankaffvc	Govtaffvc	Early	Gdppercapita
Fundcountry	1.0000						
Invbankaffvc	-0.1904	1.0000					
Corporatevc	0.0688	-0.1250	1.0000				
Commbankaffvc	0.1919	-0.1677	-0.1408	1.0000			
Govtaffvc	-0.1462	-0.1051	-0.0883	-0.1184	1.0000		
Early	0.1479	-0.0999	0.0531	0.0454	0.1281	1.0000	
Gdppercapita	-0.6736	0.0418	0.0133	-0.2834	-0.0422	-0.1217	1.0000

## B Tables from Obrimah (2005)

Table BI: Concentration in early stage non-technology intensive ventures

The probit model estimated is

$$\begin{aligned} \text{Earlynontechfm} = & \beta_0 + \beta_1 \text{growth} + \beta_2 \text{Lawenforcement} + \beta_3 \text{Bankregulation} \\ & + \beta_4 \text{Marketstructure} + \beta_5 \text{Propertyrights} + \beta_6 \text{Firmyear} \\ & + \beta_7 \text{Firmtype} + \beta_8 \text{Entrepreneurship} + \beta_9 \text{Fundcountry} \\ & + \beta_{10} \text{Firstyear} + \epsilon. \end{aligned}$$

*Earlynontechfm* is an indicator variable equal to one if a venture capital fund's investments are concentrated in early stage non-technology intensive ventures. *Growth* is the growth rate of GDP; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Firmyear* is the year a venture firm was founded; *Firmtype* is a venture capital firm's organizational form (*IVC*, *Invbankaffvc*, *Corporatevc*, *Commbankaffvc*, and *Govtaffvc*); *Entrepreneurship* is a ranking of the propensity for entrepreneurship across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Firstyear* is the year a portfolio company received its first round of venture capital financing. Data on venture capital transactions are obtained from VentureXpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), while z-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)
Firmyear	-.00736 (-2.13)**	-.00657 (-1.89)*	-.0104 (-3.22)***	-.00768 (-2.22)**	-.00922 (-2.89)***
Growth	.000387 (0.05)				
Lawenforcement		.0171 (0.21)			
Bankregulation			.0603 (1.09)		
Marketstructure				.0372 (0.49)	
Propertyrights					-.1819 (-5.77)***
Entrepreneurship	-.0907 (-1.49)	-.1073 (-1.31)	-.1204 (-1.49)	-.1329 (-1.68)*	-.0801 (-1.04)
Fundcountry	.3915 (8.22)***	.3993 (5.70)***	.4066 (7.00)***	.4105 (6.55)***	.2841 (5.08)***
Invbankaffvc	.00541 (0.07)	.0352 (0.43)	.00899 (0.11)	.0205 (0.27)	-.1645 (-2.00)**
Corporatevc	.0367 (0.46)	.0587 (0.70)	.0375 (0.45)	.0407 (0.51)	.0728 (0.85)
Commbankaffvc	.0520 (0.57)	.0893 (0.95)	.0471 (0.51)	.0764 (0.85)	-.0474 (-0.50)
Govtaffvc	.3112 (4.29)***	.3352 (4.67)***	.4054 (5.10)***	.3132 (4.41)***	.3154 (3.87)***
Pseudo $R^2$	0.1787	0.1595	0.2150	0.1767	0.2565
<i>p</i> -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	732	696	690	746	690

\*\*\*,\*\*,\*, indicate significance at the 1% , 5%, and 10% confidence levels respectively

Table BII: Concentration in early stage technology intensive ventures

The probit model estimated is

$$\begin{aligned} \text{Earlytechfm} = & \beta_0 + \beta_1 \text{growth} + \beta_2 \text{Lawenforcement} + \beta_3 \text{Bankregulation} \\ & + \beta_4 \text{Marketstructure} + \beta_5 \text{Propertyrights} + \beta_6 \text{Firmyear} \\ & + \beta_7 \text{Firmtype} + \beta_8 \text{Entrepreneurship} + \beta_9 \text{Fundcountry} \\ & + \beta_{10} \text{Firstyear} + \epsilon. \end{aligned}$$

*Earlytechfm* is an indicator variable equal to one if a venture capital fund's investments are concentrated in early stage technology intensive ventures. *Growth* is the growth rate of GDP; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Firmyear* is the year a venture firm was founded; *Firmtype* is a venture capital firm's organizational form (*IVC*, *Invbankaffvc*, *Corporatevc*, *Commbankaffvc*, and *Govtaffvc*); *Entrepreneurship* is a ranking of the propensity for entrepreneurship across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Firstyear* is the year a portfolio company received its first round of venture capital financing. Data on venture capital transactions are obtained from Venture-Xpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), while z-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)
Firmyear	-.00175 (-1.34)	-.00230 (-1.79)*	-.00191 (-1.37)	-.00153 (-1.16)	-.00188 (-1.37)
Growth	.00214 (0.44)				
Lawenforcement		-.0939 (-1.72)*			
Bankregulation			.0172 (0.62)		
Marketstructure				-.0102 (-0.24)	
Propertyrights					-.0751 (-3.96)***
Entrepreneurship	-.1099 (-2.82)***	-.1254 (-2.60)***	.0250 (0.42)	-.1043 (-2.42)**	-.00986 (-0.19)
Fundcountry	.1255 (3.86)***	.0929 (1.69)*	.1207 (3.40)***	.1213 (2.81)***	.1011 (3.01)***
Invbankaffvc	.0894 (2.09)**	.0864 (2.00)**	.0609 (1.45)	.0843 (2.04)**	-.0102 (-0.24)
Corporatevc	-.0206 (-0.52)	-.0342 (-0.83)	-.0570 (-1.37)	-.0170 (-0.43)	-.0496 (-1.20)
Commbankaffvc	.0144 (0.21)	.0202 (0.28)	-.00912 (-0.13)	.0147 (0.21)	-.0175 (-0.24)
Govtaffvc	.1890 (4.13)***	.1541 (3.33)***	.2197 (4.60)***	.1874 (4.12)***	.1917 (3.92)***
Pseudo $R^2$	0.0685	0.0746	0.0801	0.0717	0.0889
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	1725	1663	1563	1735	1563

\*\*\*,\*\*,\*, indicate significance at the 1% , 5%, and 10% significance levels respectively

TableBIII: Concentration in later stage technology intensive ventures

The probit model estimated is

$$\begin{aligned} Latertechfm = & \beta_0 + \beta_1 growth + \beta_2 Lawenforcement + \beta_3 Bankregulation \\ & + \beta_4 Marketstructure + \beta_5 Propertyrights + \beta_6 Firmyear \\ & + \beta_7 Firmtype + \beta_8 Entrepreneurship + \beta_9 Fundcountry \\ & + \beta_{10} Firstyear + \epsilon. \end{aligned}$$

*Latertechfm* is an indicator variable equal to one if a venture capital fund's investments are concentrated in later stage technology intensive ventures. *Growth* is the growth rate of GDP; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Firmyear* is the year a venture firm was founded; *Firmtype* is a venture capital firm's organizational form (*IVC*, *Invbankaffvc*, *Corporatevc*, *Commbankaffvc*, and *Govtffvc*); *Entrepreneurship* is a ranking of the propensity for entrepreneurship across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Firstyear* is the year a portfolio company received its first round of venture capital financing. Data on venture capital transactions are obtained from VentureXpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), while z-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)
Firmyear	.00336 (1.65)*	.00370 (1.67)*	.00450 (2.21)**	.00359 (1.69)*	.00402 (2.06)**
Growth	.00148 (0.44)				
Lawenforcement		.0436 (0.89)			
Bankregulation			.0183 (0.69)		
Marketstructure				.0656 (1.80)*	
Propertyrights					.0392 (2.15)**
Entrepreneurship	.0454 (1.12)	-.0121 (-0.25)	.0451 (0.81)	.0135 (0.30)	.0346 (0.68)
Fundcountry	-.1472 (-4.31)***	-.0676 (-1.26)	-.1742 (-4.78)***	-.0815 (-1.84)*	-.1459 (-4.35)***
Invbankaffvc	.0596 (1.31)	.0473 (1.03)	.0859 (1.97)**	.0626 (1.40)	.1176 (2.49)**
Corporatevc	-.0217 (-0.57)	-.0354 (-0.93)	-.00589 (-0.16)	-.0303 (-0.80)	-.00457 (-0.12)
Commbankaffvc	.2411 (3.53)***	.2273 (3.22)***	.2406 (3.43)***	.2439 (3.55)***	.2560 (3.62)***
Govtffvc	-.2021 (-4.86)***	-.1944 (-4.75)***	-.2452 (-5.62)***	-.2042 (-4.92)***	-.2420 (-5.47)***
Pseudo $R^2$	0.0506	0.0462	0.0743	0.0544	0.0770
<i>p</i> -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	1725	1663	1563	1735	1563

\*\*\*,\*\*, \* indicate significance at the 1%, 5%, and 10% significance levels respectively



Table BIV: Concentration in later stage non-technology intensive ventures

The probit model estimated is

$$\begin{aligned} Laternontechfm = & \beta_0 + \beta_1 growth + \beta_2 Lawenforcement + \beta_3 Bankregulation \\ & + \beta_4 Marketstructure + \beta_5 Propertyrights + \beta_6 Firmyear \\ & + \beta_7 Firmtype + \beta_8 Entrepreneurship + \beta_9 Fundcountry \\ & + \beta_{10} Firstyear + \epsilon. \end{aligned}$$

*Laternontechfm* is an indicator variable equal to one if a venture capital fund's investments are concentrated in later stage non-technology intensive ventures. *Growth* is the growth rate of GDP; *Lawenforcement* is a ranking of the quality of contract enforcement across countries; *Bankregulation* is the extent to which commercial banks are precluded from holding the equity of non-financial firms; *Marketstructure* is the ratio of stock market capitalization to GDP; *Propertyrights* is the extent to which property rights are protected across countries; *Firmyear* is the year a venture firm was founded; *Firmtype* is a venture capital firm's organizational form (*IVC*, *Invcbankaffvc*, *Corporatevc*, *Commbankaffvc*, and *Govtaffvc*); *Entrepreneurship* is a ranking of the propensity for entrepreneurship across countries; *Fundcountry* is an indicator variable equal to one if a venture capital firm is located in an emerging country; *Firstyear* is the year a portfolio company received its first round of venture capital financing. Data on venture capital transactions are obtained from VentureXpert and consist of 4,200 funding transactions between venture capitalists and entrepreneurs located in Asia and the Middle East from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), while z-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)
Firmyear	.00597 (2.24)**	.00420 (1.62)	.00395 (1.36)	.00565 (2.17)**	.00358 (1.24)
Growth	-.00907 (-1.67)*				
Lawenforcement		.1107 (1.87)*			
Bankregulation			-.0924 (-2.40)**		
Marketstructure				.0689 (1.28)	
Propertyrights					.0650 (2.40)**
Entrepreneurship	-.0594 (-1.29)	-.1589 (-2.47)**	-.0681 (-1.25)	-.1069 (-1.81)*	-.0451 (-0.84)
Fundcountry	-.2470 (-6.07)***	-.1054 (-1.56)	-.2236 (-5.36)***	-.1999 (-3.46)***	-.2257 (-4.79)***
Invcbankaffvc	-.0176 (-0.36)	.0460 (0.88)	-.0326 (-0.69)	-.0021 (-0.04)	.0181 (0.35)
Corporatevc	-.1790 (-3.03)***	-.1598 (-2.79)***	-.1777 (-3.07)***	-.1863 (-3.46)***	-.1844 (-3.26)***
Commbankaffvc	-.0795 (-1.00)	-.0473 (-0.61)	-.0536 (-0.68)	-.0699 (-0.89)	-.0178 (-0.22)
Govtaffvc	-.2191 (-4.32)***	-.2061 (-4.41)***	-.2835 (-5.70)***	-.2170 (-4.47)***	-.2698 (-5.08)***
Pseudo $R^2$	0.1321	0.1303	0.1674	0.1263	0.1674
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	732	696	690	746	690

\*\*\*,\*\*, \* indicate significance at the 1%, 5%, and 10% confidence levels respectively

Table I: Summary statistics for venture capital data by country

This table reports the industry, and investment stage distribution of the venture capital data utilized in this paper. These data are obtained from VentureXpert and consist of 6,552 venture capital transactions between entrepreneurs located in the fourteen sample countries and (1) venture capitalists located in these sample countries (sample VCs); and (2) venture capitalists located primarily in the U.S. and the U.K. ('Other VCs'). *Hitech* are technology intensive ventures; *Nonhitech* are non-technology intensive ventures; and *Medical* are medical or health related ventures. *Early Stage* firms are firms in the early stages of a firm's growth cycle, while *Later Stage* firms are firms in the expansion stages of a firm's growth cycle. Details of industries classified as *Hitech*, *Nonhitech* or *Medical* as well as firms classified as early stage or later stage firms are provided in Table AII of the Appendix.

	Transactions with sample VCs			Transactions with other VCs			
Panel A: Data descriptions by country and industry classification							
Country	Hit-ech	Med-ical	Nonhi-tech	Hit-ech	Med-ical	Nonhi-tech	Total
Australia	444	122	287	160	34	90	1,137
China	72	15	34	100	11	39	271
Hong Kong	84		45	143		40	312
India	389	69	319	180	8	33	998
Indonesia	12	1	18	7		18	56
Israel	187	64	8	460	135	22	876
Japan	65	10	49	91	15	140	370
Korea	1,076	138	249	213	24	36	1,736
Malaysia	24	1	12	6	2	13	58
New Zealand	30	4	21	16		9	80
Philippines	9		7	8		25	49
Singapore	106	6	26	122	16	32	308
Taiwan	139	1	36	65	1	22	264
Thailand	4		13	6	5	9	37
Total	2,644	431	1,125	1,577	251	528	6,552
Panel B: Data descriptions by country and investment stage classification							
Country	Later Stage	Early Stage	Later Stage	Early Stage	Total		
Australia	577	276	181	103	1,137		
China	72	49	94	56	271		
Hong Kong	100	29	141	42	312		
India	368	409	134	87	998		
Indonesia	28	3	19	6	56		
Israel	156	103	352	265	876		
Japan	90	34	172	74	370		
Korea	817	646	146	127	1,736		
Malaysia	21	16	16	5	58		
New Zealand	45	10	25		80		
Philippines	15	1	26	7	49		
Singapore	86	52	117	53	308		
Taiwan	157	19	62	26	264		
Thailand	12	5	10	10	37		
Total	2,547	1,653	1,495	861	6,552		

Table II: Industry- and investment stage-based test-of-means results

This table reports the results of industry and investment stage based test-of-means. The data consists of 4,200 funding transactions between entrepreneurs and venture capitalists located within the sample countries from 1982 to 2003. *Nonhitech* are non-technology intensive ventures, *Hitech* are technology intensive ventures, while *Health Related* are medical/health related ventures. *Early Stage* firms are firms in the early stages of a firm's growth cycle. *Later Stage* firms are firms in the expansion stages of a firm's growth cycle. *Capital* is total capital under management by a venture capital firm (includes funds committed to venture capitalists but not yet disbursed and investments from which venture capitalists are yet to exit). *t - stats* are the t-statistics associated with the test-of-means. The test-of-means does not assume that the variances of the two groups utilized in the tests are equal. All numbers are actual except noted otherwise.

Item	# of obs.	Mean Values		t-stats
		Developed Country	Emerging Country	
Panel A: Mean number of portfolio companies by industry and investment stage classification				
Later Stage & Nonhitech	361	21.73	36.49	-6.517***
Early Stage & Nonhitech	102	15.84	32.25	-4.443***
Later Stage & Hitech	770	16.98	35.7	-12.064***
Early Stage & Hitech	497	15.28	34.34	-10.213***
Later Stage & Health Related	91	20.83	31.65	-2.152***
Early Stage & Health Related	78	9.35	42.39	-6.440***
Panel B: Mean per company investment by industry and investment stage classification (\$'000s)				
Later Stage & Nonhitech	361	5,507	1,340	1.447
Early Stage & Nonhitech	102	3,650	625	-2.541**
Later Stage & Hitech	770	7,751	2,279	5.733***
Early Stage & Hitech	497	6,132	2,126	4.246***
Later Stage & Health Related	91	6,806	4,721	1.246
Early Stage & Health Related	78	5,082	2,532	1.178
Panel C: Mean venture capital firm capitalization (\$ Millions) and number of venture funds				
Capital	177	192	73	3.208***
# of funds per venture capital firm	1899	2.698	4.273	-12.722***

\*\*\* indicates significance at the 1%, confidence level

Table III: Concentration in early stage non-technology intensive ventures

The dependent variable is an indicator variable equal to one if a venture capital firm's investments are concentrated in early stage non-technology intensive ventures, while independent variables are as described in Table AI. Tests are implemented using a probit model that generates White robust z-statistics, and five specifications are reported. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. Coefficients reported are the marginal effects, (mean effects) while z-statistics are reported in parentheses. Tests utilize data on all financing rounds from a financing relationship.

Independent Variables	Dependent Variable: Earlynontechfm				
	(1)	(2)	(3)	(4)	(5)
Firmyear	-.00513 (-1.40)	-.00434 (-1.17)	-.0132 (-4.01)***	-.00489 (-1.34)	-.0114 (-3.40)***
Growth	.0104 (1.54)				
Lawenforcement		.1143 (1.23)			
Bankregulation			.1180 (1.84)*		
Marketstructure				.0965 (1.15)	
Propertyrights					-.1283 (-3.87)***
Entrepreneurship	-.3195 (-4.20)***	-.4042 (-3.99)***	-.2260 (-2.22)**	-.3739 (-4.31)***	-.2619 (-2.82)***
Fundcountry	.3341 (6.08)***	.4285 (5.09)***	.3326 (4.99)***	.3921 (6.37)***	.2856 (4.36)***
Invbankaffvc	.3193 (4.46)***	.3676 (4.80)***	.2874 (3.88)***	.3185 (4.56)***	.1340 (1.55)
Corporatevc	.1719 (2.21)**	.1599 (1.97)**	.1464 (1.75)*	.1614 (2.05)**	.1761 (2.08)**
Commbankaffvc	.1582 (1.71)*	.1962 (2.02)**	.1362 (1.32)	.1635 (1.80)*	.0859 (0.86)
Govtaffvc	.4374 (5.83)***	.4588 (5.99)***	.5187 (6.48)***	.4344 (5.76)***	.4712 (5.78)***
Pseudo $R^2$	0.1756	0.1853	0.2054	0.1877	0.2197
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	1098	1046	1043	1112	1043

\*\*\*,\*\*,\* indicate significance at the 1% , 5%, and 10% confidence levels respectively

Table IV: Concentration in early stage technology intensive ventures

The dependent variable is an indicator variable equal to one if a venture capital firm's investments are concentrated in early stage technology intensive ventures, while independent variables are as described in Table AI. Tests are implemented using a probit model that generates heteroskedastic-consistent z-statistics, and five specifications are reported. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), and z-stats are reported in parentheses. Tests utilize data on all financing rounds from a financing relationship.

Independent Variables	Dependent Variable: Earlytechfm				
	(1)	(2)	(3)	(4)	(5)
Firmyear	.00340 (1.71)*	.00300 (1.57)	.00311 (1.34)	.00355 (1.79)*	.00309 (1.30)
Growth	.0123 (3.05)***				
Lawenforcement		-.1075 (-2.22)**			
Bankregulation			.0690 (2.58)***		
Marketstructure				-.0461 (-1.09)	
Propertyrights					-.0248 (-1.34)
Entrepreneurship	-.1860 (-4.56)***	-.2549 (-4.95)***	.0482 (0.82)	-.1936 (-4.48)***	-.0740 (-1.51)
Fundcountry	.0693 (2.10)**	.0584 (1.13)	.0533 (1.50)	.0614 (1.43)	.0853 (2.53)**
Invbankaffvc	.0396 (0.89)	.0226 (0.48)	-.0398 (-0.89)	.0152 (0.35)	-.0641 (-1.40)
Corporatevc	-.0867 (-2.48)**	-.0857 (-2.42)**	-.1367 (-3.66)***	-.0760 (-2.18)**	-.1295 (-3.47)***
Commbankaffvc	.0818 (1.26)	.0815 (1.21)	.0461 (0.64)	.0829 (1.26)	.0515 (0.71)
Govtaffvc	.3930 (7.39)***	.3413 (6.51)***	.3591 (6.75)***	.3844 (7.32)***	.3523 (6.53)***
Pseudo $R^2$	0.0935	0.0938	0.0873	0.0948	0.0851
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	2589	2489	2389	2599	2389

\*\*\*,\*\*,\* indicate significance at the 1% , 5%, and 10% significance levels respectively

Table V: Concentration in later stage technology intensive ventures

The dependent variable is an indicator variable equal to one if a venture capital firm's investments are concentrated in later stage technology intensive ventures, while independent variables are as described in Table AI. Tests are implemented using a probit model that generates heteroskedastic-consistent z-statistics, and five specifications are reported. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. Coefficients reported are the marginal effects (mean effects), and z-stats are reported in parentheses. Tests utilize data on all financing rounds from a financing rounds from a financing relationship.

Independent Variables	Dependent Variable: Latertechfm				
	(1)	(2)	(3)	(4)	(5)
Firmyear	.000420 (0.21)	.000576 (0.29)	.00303 (1.68)*	.000595 (0.30)	.00269 (1.54)
Growth	-.00319 (-0.78)				
Lawenforcement		.0928 (1.91)*			
Bankregulation			-.0135 (-0.59)		
Marketstructure				.0819 (2.22)**	
Propertyrights					.0388 (2.23)**
Entrepreneurship	.1116 (2.53)**	.1231 (2.33)**	-.0208 (-0.37)	.0921 (2.09)**	.0131 (0.30)
Fundcountry	-.0938 (-2.63)***	-.0439 (-0.84)	-.1068 (-2.97)***	-.0328 (-0.74)	-.1050 (-3.07)***
Invbankaffvc	.0855 (1.86)*	.0720 (1.54)	.1517 (3.47)***	.1018 (2.21)**	.1829 (3.95)**
Corporatevc	-.00767 (-0.21)	-.0166 (-0.45)	.0208 (0.60)	-.0187 (-0.51)	.0178 (0.51)
Commbankaffvc	.2918 (3.81)***	.2937 (3.70)***	.2886 (3.60)***	.2937 (3.75)***	.2911 (3.60)***
Govtaffvc	-.2384 (-5.42)***	-.2267 (-5.04)***	-.2364 (-4.76)***	-.2383 (-5.36)***	-.2339 (-4.63)***
Pseudo $R^2$	0.0470	0.0533	0.0609	0.0557	0.0629
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	2589	2489	2389	2599	2389

\*\*\*,\*\*, \* indicate significance at the 1% , 5%, and 10% significance levels respectively

Table VI: Concentration in later stage non-technology intensive ventures

The dependent variable is an indicator variable equal to one if a venture capital firm's investments are concentrated in later stage non-technology intensive ventures, while independent variables are as described in Table AI. Tests are implemented using a probit model that generates heteroskedastic-consistent z-statistics, and five specifications are reported. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. Coefficients reported are the marginal effects, (mean effects) while z-statistics are reported in parentheses. Tests utilize data on all financing rounds from a financing relationship.

Independent Variables	Dependent Variable: Laternontechfm				
	(1)	(2)	(3)	(4)	(5)
Firmyear	.00881 (2.48)**	.00632 (1.83)*	.00888 (2.41)**	.00816 (2.27)**	.00730 (1.94)*
Growth	.00907 (1.61)				
Lawenforcement		-.1012 (-1.80)*			
Bankregulation			-.00273 (-0.06)		
Marketstructure				-.1276 (-2.38)**	
Propertyrights					.1048 (3.50)***
Entrepreneurship	.0723 (1.46)	.000245 (0.00)	.1308 (2.18)**	.1363 (2.26)**	.0981 (1.64)*
Fundcountry	-.3422 (-7.37)***	-.3643 (-5.93)***	-.3288 (-6.52)***	-.4376 (-7.16)***	-.2463 (-4.84)***
Invbankaffvc	-.2138 (-5.35)***	-.2123 (-5.29)***	-.2139 (-5.38)***	-.2384 (-5.63)***	-.1954 (-4.07)***
Corporatevc	-.0480 (-0.73)	-.0384 (-0.58)	-.0512 (-0.77)	-.0318 (-0.46)	-.0643 (-0.99)
Commbankaffvc	-.1405 (-1.90)*	-.1532 (-2.11)**	-.1087 (-1.35)	-.1687 (-2.21)**	-.0755 (-0.86)
Govtaffvc	-.2033 (-5.06)***	-.2160 (-5.86)***	-.2518 (-8.12)***	-.2251 (-5.25)***	-.2411 (-7.46)***
Pseudo $R^2$	0.1937	0.2095	0.2152	0.2299	0.2339
$p$ -value	0.0000	0.0000	0.0000	0.0000	0.0000
# of obs	1098	1046	1043	1112	1043

\*\*\*,\*\*, \* indicate significance at the 1% , 5%, and 10% confidence levels respectively

Table VII: Venture capitalists' asset allocations, and long-run economic growth I

The dependent variable is long-run economic growth, while independent variables are the proportions of venture capitalists' portfolio allocated to early stage non-technology intensive ventures, as well as financial development, and quality of legal environment variables. All of the data, other than the portfolio concentrations and *Entrepreneurship* (see Table A1) are obtained from Demirguc-Kunt and Levine (2001). *Earlynontechqt2*, and *Earlynontechqt3* are the second, and third terciles of portfolio concentration in early stage non-technology intensive ventures. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. The tests are implemented using Ordinary Least Squares (OLS), and White robust t-stats are reported in parentheses.

Independent Variables	Dependent variable: Growth					
	(1)	(2)	(3)	(4)	(5)	(6)
Entrepreneurship	1.8893 (7.31)***	2.1581 (6.76)***	1.6360 (6.38)***	2.6213 (7.54)***	2.9908 (6.05)***	4.4388 (5.84)***
Earlynontechqt2	1.2780 (4.26)***	1.8076 (5.73)***	1.7742 (5.90)***	1.7103 (8.21)***	1.8129 (5.88)***	1.286 (6.00)***
Earlynontechqt3	.6232 (3.21)***	2.0266 (8.86)***	1.6351 (7.69)***	1.7328 (10.83)***	2.2814 (10.67)***	1.114 (5.27)***
Propertyrights		1.1881 (11.36)***				-2.7611 (-2.77)***
Structur			8.6008 (13.05)***			5.3316 (0.58)
Privatecredit				2.9882 (20.68)***		4.6649 (17.91)***
Banksvschn					14.4298 (16.22)***	14.5626 (3.15)***
# of obs	958	935	958	955	888	865
R-squared	0.1024	0.2697	0.2638	0.5145	0.3666	0.6752
<i>p-value</i>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

\*\*\* indicates significance at the 1% significance level.



Table VIII: Venture capitalists' asset allocations, and long-run economic growth II

The dependent variable is long-run economic growth, while independent variables are the proportions of venture capitalists' portfolio allocated to early stage technology intensive ventures, as well as financial development, and quality of legal environment variables. All of the data, other than the portfolio concentrations and *Entrepreneurship* (see Table AI) are obtained from Demirguc-Kunt and Levine (2001). *Earlytechqt2*, and *Earlytechqt3* are the second, and third terciles of portfolio concentration in early stage technology intensive ventures. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. The tests are implemented using Ordinary Least Squares (OLS), and White robust t-stats are reported in parentheses.

Independent Variables	Dependent variable: Growth					
	(1)	(2)	(3)	(4)	(5)	(6)
Entrepreneurship	.5233 (1.59)	.9445 (2.83)***	.4553 (1.60)	.8947 (2.76)***	.4519 (0.95)	4.6969 (3.46)***
Earlytechqt2	.9768 (5.38)***	1.3126 (7.00)***	1.4832 (8.51)***	1.0988 (8.79)***	1.1345 (6.10)***	.5864 (4.58)***
Earlytechqt3	.7380 (3.81)***	1.2276 (5.87)***	1.2714 (6.57)***	1.1609 (8.71)***	1.0704 (5.13)***	.6499 (5.21)***
Propertyrights		1.6335 (22.66)***				1.1781 (1.15)
Structur			7.1889 (15.22)***			3.6857 (1.49)
Privatecredit				3.8779 (27.26)***		6.3693 (16.56)***
Banksvschn					15.8482 (29.37)***	-28.686 (-2.59)***
# of obs	2283	2165	2283	2283	2124	2006
R-squared	0.0299	0.2586	0.1761	0.5072	0.2321	0.6402
<i>p-value</i>	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000

\*\*\* indicates significance at the 1% significance level.

Table IX: Venture capitalists' asset allocations, and long-run economic growth III

The dependent variable is long-run economic growth, while independent variables are the proportions of venture capitalists' portfolio allocated to early stage technology intensive ventures, as well as financial development, and quality of legal environment variables. All of the data, other than the portfolio concentrations and *Entrepreneurship* (see Table AI) are obtained from Demirguc-Kunt and Levine (2001). *Latertechqt2*, and *Latertechqt3* are the second, and third terciles of portfolio concentration in later stage technology intensive ventures. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. The tests are implemented using Ordinary Least Squares (OLS), and White robust t-stats are reported in parentheses.

Independent Variables	Dependent variable: Growth					
	(2)	(3)	(4)	(5)	(6)	(7)
Entrepreneurship	.3622 (1.13)	.8963 (2.80)***	.3166 (1.14)	.8217 (2.50)**	.4301 (0.93)	4.9030 (3.61)***
Latertechqt2	1.3188 (7.22)***	.9389 (4.57)***	1.3193 (7.54)***	.5820 (4.42)***	.8767 (4.32)***	.4222 (4.07)***
Latertechqt3	.8311 (4.68)***	.4540 (2.22)**	.6033 (3.45)***	-.0117 (-0.08)	.4472 (2.24)**	.0770 (0.59)
Propertyrights		1.5047 (18.85)***				1.2307 (1.20)
Structur			6.0854 (14.09)***			3.9641 (1.60)
Privatecredit				3.7274 (25.22)***		6.4475 (17.28)***
Banksvschn					14.3260 (23.64)***	-30.339 (-2.74)***
# of obs	2283	2165	2283	2283	2124	2006
R-squared	0.0540	0.2333	0.1637	0.4764	0.2144	0.6352
<i>p-value</i>	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000

\*\*\* indicates significance at the 1% significance level.

Table X: Duration between financing rounds and agency problems

The dependent variable is the duration to next financing round, and coefficients are interpreted as the time ratio effect of a variable on the mean time to next financing round. Tests are implemented using a duration model that assumes a Weibull distribution, and five specifications are reported. The data consists of 4,200 funding transactions between sample venture capitalists and entrepreneurs from 1982 to 2003. *Rndnmbr* is the number of a particular financing round, *Rndtotl* is the total amount disbursed to portfolio company during a round of venture capital financing. The other independent variables are as described in Table AI, while White (1980) robust z-stats are reported in parentheses.

Independent Variables	Dependent Variable: Duration				
	(1)	(2)	(3)	(4)	(5)
Rndnmbr	.9922 (-1.51)	.9931 (-1.37)	.9932 (-1.37)	.9935 (-1.37)	.9951 (-1.10)
Rndtotl	.9999 (-0.66)	.9999 (-0.77)	.9999 (-0.73)	.9999 (-0.88)	1.0000 (0.98)
Early	.9949 (-0.32)	.9939 (-0.38)	.9946 (-0.35)	.9948 (-0.34)	.9867 (-0.89)
Mktbk	.9927 (-2.75)***	.9925 (-2.78)***	.9924 (-2.83)***	.9930 (-2.82)***	.9933 (-2.74)***
Tangasst	1.013 (1.06)	1.0128 (1.03)	1.0129 (1.06)	1.0127 (1.07)	1.0162 (1.34)
Pubstat	.9567 (-1.90)*	.9596 (-1.73)*	.9584 (-1.84)*	.9563 (-1.97)**	.9700 (-1.50)
Growth	.9952 (-1.65)*				
Lawenforcement		1.0072 (0.26)			
Entrepreneurship			1.0335 (1.01)		
Marketstructure				.9507 (-1.82)*	
Propertyrights					.9751 (-1.76)*
Fundcountry	.9476 (-2.25)**	.9402 (-2.05)**	.9281 (-2.73)***	.9061 (-2.99)***	.9272 (-2.71)***
Invbankaffvc	1.0453 (1.78)*	1.0536 (2.08)**	1.0500 (2.02)**	1.0531 (2.08)**	1.0466 (2.07)**
Corporatevc	1.0266 (0.84)	1.0261 (0.79)	1.0263 (0.83)	1.0258 (0.84)	1.0287 (0.93)
Commbankaffvc	.9773 (-1.19)	.9847 (-0.80)	.9809 (-1.03)	.9810 (-1.08)	.9702 (-1.39)
Govtaffvc	1.0392 (0.96)	1.0334 (0.81)	1.0311 (0.78)	1.0322 (0.82)	1.0483 (1.21)
Capital	.9999 (-1.42)	.9999 (-1.04)	.9999 (-1.52)	.9999 (-1.63)	.9999 (-1.72)*
Wald $\chi^2$	40.34	39.72	40.83	43.97	46.00
<i>p</i> -value	0.0197	0.0229	0.0174	0.0053	0.0030

\*\*\*,\*\*, \* indicate significance at the 1% , 5%, and 10% confidence levels respectively

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