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DISCUSSION PAPER

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Trends in Venture Capital Finance in Developing Countries

Anthony Aylward



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DISCUSSION PAPER NUMBER 36

Trends in Capital Finance in Developing Countries

Anthony Aylward

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Foreword

This discussion paper focuses on venture capital finance in developing countries, the structuring of these funds, and how they are managed to maximize investment value. The paper documents what is happening in private equity markets in developing countries – a relatively new sector in most emerging capital markets and one that is attracting increasing international investor interest. In discussing the investment management techniques common to these funds, the findings offer lessons for private sector participants where significant investment restructuring activity is underway, as is currently taking place in East Asia. The paper is pioneering work, presenting new information and analysis on the nature of venture capital finance in developing countries.

A handwritten signature in black ink, appearing to read 'G. Pfeffermann', with a long horizontal line extending to the right.

Guy Pfeffermann
Director, Economics Department
& Economic Adviser to the Corporation

Abstract

This paper presents an analysis of new data on venture capital in developing countries gathered from two main sources: i) regional venture capital associations in Asia and Europe, and ii) a survey administered by IFC on the portfolio structure of some 410 investments made by 53 venture capital funds in 19 developing countries. The data from the regional venture capital associations details sources and uses of venture financing flows by region, country, industry, type of investing institution, and stage of venture investment. The survey data details fund organization, deal screening, capital structure, agency cost characteristics of asset structure, measures of entrepreneur human capital, and investment monitoring and control. The paper identifies several factors critical to venture fund investment performance and the organizational structures with which they are associated.

Acknowledgments

In writing this paper the author benefited greatly from contributions, comments, and criticisms received from a number of people. Most important were the individuals in the venture capital organizations in emerging market countries who completed detailed survey responses and provided further insights into their businesses in conversations during company visits conducted in May 1997 (listed in Annex C). Thanks are also due to members of the IFC Economics Department, and in particular Guy Pfeffermann, Jack Glen, and Robert Miller for research guidance and to members of the Asia, Europe, and Central Capital Markets Departments of the IFC. I am further indebted to faculty at the George Washington University Finance and Economics Departments, especially Mark Klock, Jim Jordan, Chris Snyder, and Isabelle Bajoux, and also to Robert Hauswald and James Brickley for helpful comments and criticisms. Financial assistance was provided by the IFC Economics Department and through World Bank research grant # BB68151M.

Executive Summary

The volume of venture capital finance in developing countries has followed a steeply rising trend in recent years. Venture capital finance has a longer history in Asia, and at over \$6 billion, the stock of venture capital outstanding in developing countries in that region is more than double that in Central and Eastern Europe (CEE). The distribution of investment is weighted toward start-up and turn-around finance in the CEE while expansion and mezzanine financing dominate in the developing countries in Asia. The industry distribution of venture capital is similar in both regions however. Compared to venture capital funds in industrial countries, venture funds in developing countries invest to a greater extent in private debt securities of portfolio companies.

Deal flow is critical to venture fund investment performance. Deal flow tends to be higher for funds organized on a joint venture basis. Where parent companies are involved in the deal screening process, deal flow is significantly higher. However, where a parent company shares a fund's operating costs, appraisal rates are higher, but so are droppage rates while initial screening rates are not significantly affected. Thus a parent company may add value to the venture fund in the critical investment identification stage via the parent's business network but this is not assured and parent involvement may also raise costs borne by investors. Finally, deal flow depends on the caliber of the fund management and high management fees are associated with droppage rates that are statistically significantly lower.

Investment performance depends critically on a fund's investment policies. Investment policies that limit size of shareholding in individual companies tend to improve investment performance because they serve to both manage risks and preserve the performance incentives the investee company management has to maximize investment value. Investment policies that limit industry or company concentrations relative to fund capital or assets tend to be tighter the larger the size of fund but they are generally less critical to fund performance. Moreover, investment policies are responsive to market constraints. Where low screening rates indicate that deal flow may constrain a fund's activity, looser investment policies prevail.

Investment performance also depends critically on how the fund is managed by the fund managers. First, funds that are structured to give the fund manager a share of the carry produce higher expected returns for investors. Second, fund managers that target investment sales by IPO rather than by corporate sale or merger also produce higher expected returns for investors. Third, fund manager time and effort spent on advising portfolio companies adds most value in industry funds where fund managers have superior market knowledge and expected returns are generally higher in these cases as a result. Finally, board representation does not appear to be a critical factor for investment performance nor does frequency of reporting from portfolio companies.

Analysis of the incidence of investment renegotiation reveals that expected returns are lower in these events and that financial distress is typically involved. *Active fund management is important in distress situations to restructure and renegotiate investments so as to maximize value.* In the event of renegotiation, investment value is more likely to be realized via merger rather than IPO. In these cases, the portfolio company may not have achieved the financial performance necessary to make a

successful IPO leaving recourse to a merger sale at a higher discount the only viable exit option. Active management of distress events is more likely when fund manager's pay depends to a greater extent on portfolio performance or where a parent company is also involved in fund management.

I. Introduction

Venture capital finance is intermediated external investment in small-and-medium-sized companies that offer the prospect of above average earnings growth coupled with above average levels of investment risk. The investment process consists of raising a fund, then screening, selecting, structuring and monitoring investments. Finally, investments must be sold and the capital repaid to investors.

The experience with venture capital finance in developing countries is more limited than in industrial countries. Nevertheless, there are probably more than 250 venture capital funds operating in Eastern Europe and Asia and as many as 400 operating in developing countries worldwide. The relatively short history of most venture capital investments in developing countries and the inherent lack of documentation of private financing arrangements means that there is little published analysis at even a basic descriptive level on the scope of venture capital operations in developing countries. This paper is an attempt to fill this gap by reporting on an empirical analysis of the financial instruments and governance structures that are employed in managing venture capital in developing countries.

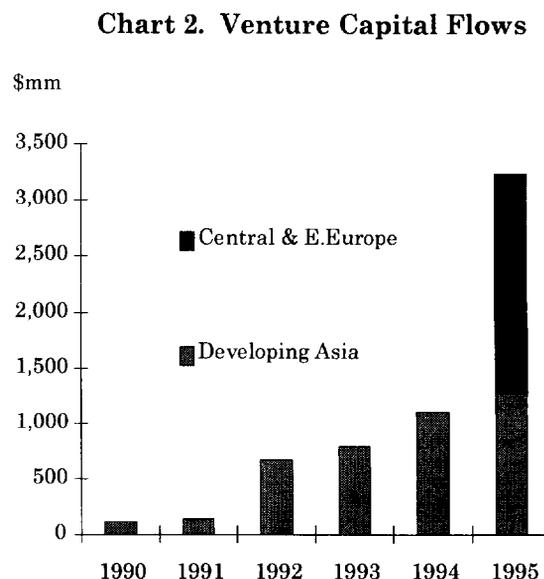
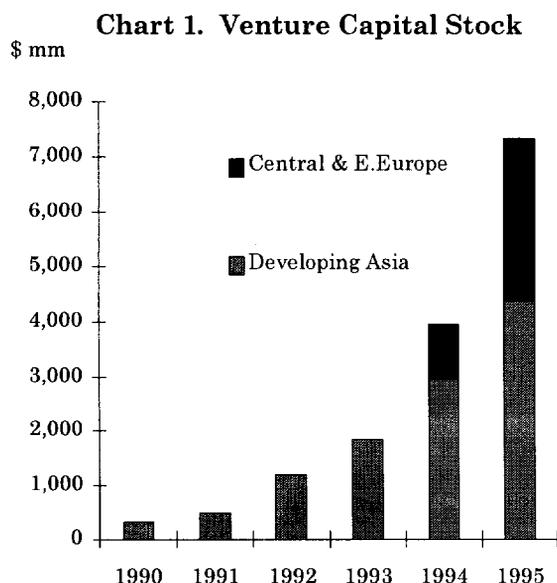
The primary emphasis of the analytical work is the contractual relationship between venture capitalists and the entrepreneurs in which they invest. The main questions that the research reported in this paper addresses are the following:

- i) What are the recent trends in venture capital financing activity in developing countries in terms of source of investment funds by country and type of investing institution, the rate of investment of these funds, the distribution of investments across industries, and the distribution of investments by maturity of the recipient companies;
- ii) what patterns are evident in the organizational form and incentive features of the venture capital funds and how do these vary by industry and country;
- iii) what is the extent of managerial discretion and what investment policies are followed;
- iv) how are investment portfolios selected and what role do parent or affiliate companies have in this process; and
- v) what patterns are evident in investee company capital structure, governance arrangements, expected returns and renegotiation experience and how do these depend on exogenous factors such as the characteristics of the investee company assets, and the organization, and incentive features of the venture capital fund?

The paper is organized as follows. Section II discusses trends in venture capital in developing countries. Section III presents and analyses the survey data collected on attributes of venture funds. Section IV presents and analyses the survey data collected on investee companies. Section V concludes.

II. Trends in Venture Capital Finance in Developing Countries

The discussion in this section is based on data collected from regional industry associations and trade publications. The pool of professionally-managed funds available for investment in growing small and medium-sized business ventures in developing countries multiplied dramatically over the 1990s. The total stock of venture capital funds in the two developing regions for which data are available - Asia and Central and East Europe (CEE)- totaled over \$7 billion at the end of 1995, up from a little over \$300 million at the start of the decade (*Charts 1 and 2*).



The outstanding stock of venture capital in developing Asia stood at \$6 billion US dollars at the end of 1995, a nineteen-fold increase in real terms over the level in 1990. It is apparent that venture investment is highly concentrated in larger developing countries in the region. China alone accounted for almost two-thirds of the total pool of venture capital funds in developing Asian countries. A sizable stock of venture capital was also outstanding in 1995 in Malaysia, India, Vietnam, Indonesia and Thailand (*Table 1*). When these amounts are placed in context by scaling them against the size of the recipient country economy, however, and excluding Hong Kong (China), Singapore and Taiwan (China) as special cases, the order of the ranking changes somewhat. In declining order, the outstanding stock of venture capital as a percent of 1995 real GDP ranges from 1.1 percent in Malaysia and Vietnam, to 1.0 percent in China and Sri Lanka, 0.3 percent in Indonesia and the Philippines, 0.2 percent in Thailand, and 0.1 percent India.¹

Professionally managed venture investment funds have also proliferated in the fledgling capital markets in Eastern Europe. The pool of funds in Central and Eastern Europe raised for investment in new ventures was estimated to stand at almost \$3 billion at the end of 1995 and by all accounts has

¹ While these shares appear small, it is important to take account of both the growth potential of the equity investments they represent and the special capacity equity investments have for mobilizing additional external debt financing.

continued to grow rapidly since then.² Much of this total was committed in the years 1994 and 1995 when the prospects for economic stability in the region improved.

Table 1. Venture Capital Pool in Asia

	1990	1991	1992	1993	1994	1995
<i>(constant 1990 US dollars, millions)</i>						
China	113.0	176.6	817.5	1,285.7	2,102.3	2,965.7
India	98.0	89.2	99.2	113.2	171.3	266.7
Indonesia	23.6	65.4	45.9	73.5	160.6	213.7
Malaysia	18.1	58.8	115.2	124.2	133.1	379.6
Philippines	15.3	12.4	20.3	42.7	55.2	108.0
Sri Lanka	7.2	6.4	13.0	14.8	34.7	57.8
Thailand	42.0	53.1	70.8	73.1	81.9	143.3
Vietnam		9.6	20.9	118.9	217.8	259.9
<i>Developing Asia — Total</i>	<i>317.2</i>	<i>471.5</i>	<i>1,202.8</i>	<i>1,846.1</i>	<i>2,957.0</i>	<i>4,394.7</i>
Hong Kong (China)	1,806.0	2,049.9	2,473.0	2,798.4	5,323.6	6,898.8
Japan	11,024.3	13,616.8	14,301.3	16,174.2	16,752.2	19,068.7
Republic of Korea	1,291.1	1,439.3	1,489.8	1,537.1	1,692.0	2,984.3
Singapore	699.4	754.2	814.1	909.2	1,592.3	3,686.0
Taiwan (China)	304.2	346.8	429.9	459.1	506.2	837.1
<i>All-Asia — Total</i>	<i>15,442.1</i>	<i>18,678.5</i>	<i>20,710.9</i>	<i>23,724.0</i>	<i>28,823.4</i>	<i>37,869.6</i>

Source: The 1996 Guide to Venture Capital in Asia.

In 1995, three countries - Poland, Hungary and the Czech Republic - accounted for over two-thirds of the total stock of venture capital funds in the region. Poland itself represented 40 percent of the regional total. Romania and the Ukraine each accounted for another 10 percent followed by Russia with 4 percent of the total. After these countries come the smaller Slovenia and Estonia, along with Bulgaria, a larger economy but one that has been slower to adopt liberal economic reforms.

Measuring the size of the venture capital sector as a percentage of GDP, the top five venture capital countries in the region are: Hungary at 0.5 percent of GDP; Poland, 0.4 percent; Romania, Slovenia and the Czech Republic, all with a venture capital pool equal to 0.3 percent of current GDP. In contrast, the venture capital sector is relatively small in the larger economies of Russia and the Ukraine, at under 0.1 percent of GDP in each case.

Investment Flows

Venture capital markets are more advanced in the Asian region than they are in the CEE region and the flows to the former account for the greater share of total flows to the two regions combined. In 1992, a sharp increase in new venture capital flows to Asia occurred - in part a reflection of the buoyant investment climate that then prevailed in the region. In subsequent years capital continued

² Estimates are compiled from funds reporting to the European Venture Capital Association, and include the \$906 mm Romanian Moldova II and Transylvania III privatization related funds.

to flow into venture funds in Asia despite the less favorable valuations in the public equity markets from 1993 onwards. In the CEE region economic stabilization and the development of stock markets has recently contributed to a business environment that can support venture capital investment operations in these countries as well.

New venture capital funds raised in the whole of Asia, including the Asian Tigers and Japan, posted a fourth consecutive annual increase in 1995 to a record level of \$6.3 billion, up from \$4.9 billion in 1994, when sharp increases in fund raising occurred in Japan, Republic of Korea and Singapore, more than offsetting a downturn in funds raised in Hong Kong (China). Nevertheless, venture funds raised in Hong Kong (China) in 1995 still totaled over \$1.7 billion - a significant sequel year to 1994 when the \$2.7 billion of venture capital raised there accounted for over half of the All-Asia total in that year (*Table 2*).

Table 2. New Venture Funds Raised in Asia

	1990	1991	1992	1993	1994	1995
<i>(constant 1990 US dollars, millions)</i>						
China	1.0	15.4	542.8	612.1	791.9	881.6
India	48.6	23.1	28.3	10.3	66.4	48.3
Indonesia	15.4	47.1	0.0	24.4	87.4	25.6
Malaysia	14.0	32.4	58.2	18.4	14.1	197.7
Philippines	0.0	0.0	8.1	25.3	22.7	36.3
Sri Lanka	1.8	0.0	4.3	4.6	14.4	17.6
Thailand	33.1	15.1	20.8	5.5	10.0	25.2
Vietnam		9.6	11.6	98.6	101.9	45.5
<i>Developing Asia — Total</i>	<i>114.0</i>	<i>142.6</i>	<i>674.1</i>	<i>799.1</i>	<i>1,108.8</i>	<i>1,277.7</i>
Hong Kong (China)	652.0	508.6	661.1	711.6	2,731.0	1,698.1
Japan	796.2	669.6	705.9	472.9	449.8	1,541.9
Republic of Korea	409.2	186.1	125.2	75.8	194.7	765.3
Singapore	375.9	45.6	34.8	236.3	447.3	906.6
Taiwan (China)	98.9	40.8	22.9	50.8	33.4	136.3
<i>All-Asia — Total</i>	<i>2,446.1</i>	<i>1,593.2</i>	<i>2,224.0</i>	<i>2,346.5</i>	<i>4,965.1</i>	<i>6,325.8</i>

Source: The 1996 Guide to Venture Capital in Asia.

In the developing Asian countries the trend in private venture investment also remained firmly upwards, though the volume of new funds declined in 1995 after a bumper year in 1994 in some countries. The \$0.9 billion of new venture funds raised in China alone in 1995 marked the fourth year in a steeply rising investment trend in that country as investors continued to take advantage of business opportunities related to the large domestic market and significant tax incentives favoring equity investment. Fund raising in the Malaysia venture capital sector sprang to life in 1995 when almost \$200 million in new funds were raised - an annual figure that exceeds the total new funds raised in Malaysia over the previous six years.

The Philippines and Thailand also both posted sharply higher capital raising in 1995, in the latter case in part because of the tighter credit conditions binding on an over-extended corporate sector.

Fund raising declined in India, Indonesia and Vietnam in 1995, countries which, like Hong Kong (China), also experienced bumper years in 1994. Despite the downturn in these countries in 1995, the upward trend in the size of the industry in the developing Asian region has kept pace with comparable rapid growth in other sectors of the emerging capital markets over the 1990s.

Country Source of Venture Capital Flows

For the Asian region as a whole, about 64 percent of the total stock of venture capital was sourced locally. Among the developing countries in the region, the industry in India, Sri Lanka, and Malaysia is predominantly financed indigenously while China, Indonesia, the Philippines, Thailand and Vietnam rely to a much greater extent on foreign sourced funds. In the case of China, Indonesia, and Vietnam, a large part of this capital comes from outside Asia

Singapore and Hong Kong (China) occupy unique positions in the region. Both perform a coordinating function raising more than two thirds of their venture funds internationally and investing up to half this total in other countries in the region. Hong Kong (China) is the more internationally integrated center in venture capital. It has the greatest share of non-Asian sources of venture capital and runs a net investment position with Singapore, a development which may reflect to some extent capital flight out of the former colony in recent years. In lesser measure, Taiwan (China) is also a source of outward venture capital investment in other countries in the region.

**Table 3. Venture Capital in Asia:
Sources by Geographic Region, 1995**

	National % total	Other Asia % total	Non Asia % total
<i>Developing-Asia — Average</i>	57.0	15.6	27.5
Hong Kong (China)	19.3	17.3	63.4
Japan	86.9	1.9	11.2
Republic of Korea	65.8	19.2	15.0
Singapore	30.2	49.2	20.6
Taiwan (China)	88.5	8.5	3.0

Source: The 1996 Guide to Venture Capital in Asia.

Institutional Source of Venture Capital Flows

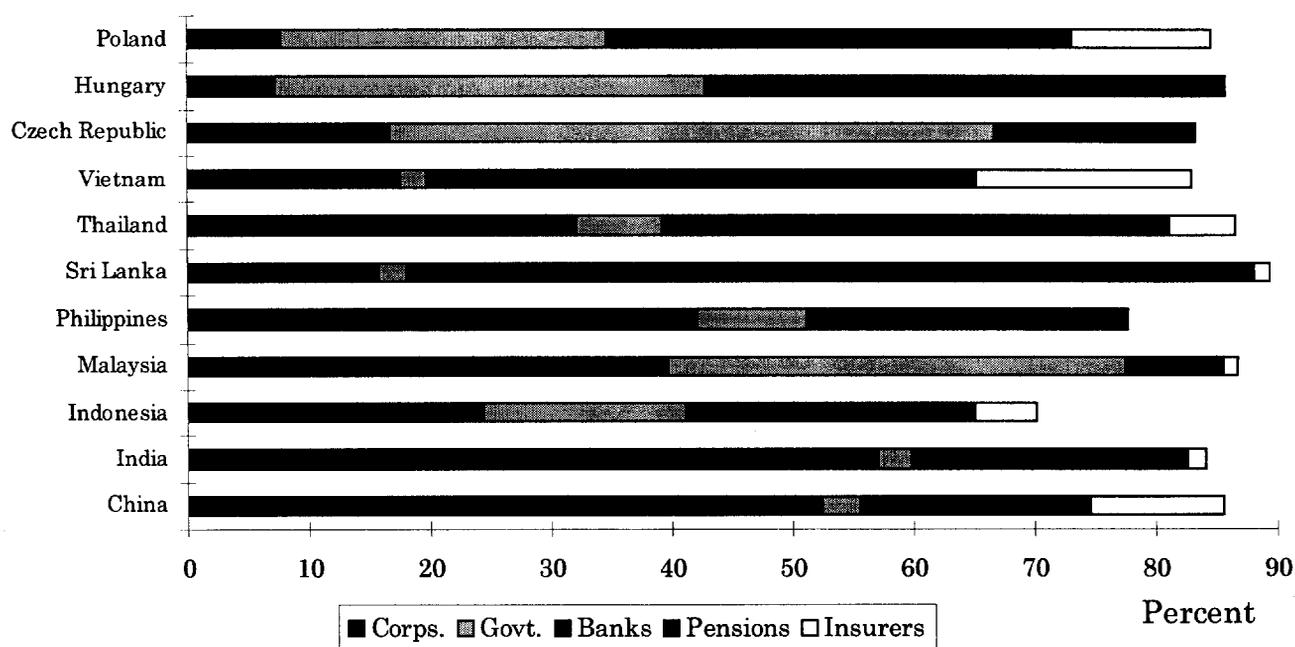
In Asia corporations are the main investing institutions in the venture capital sector while in CEE, government and multilateral financial institutions are the main investors, consistent with the generally larger participation by government in economic activity in the latter countries.

In contrast to the United States (US), where venture capital is mainly provided by institutional investors, the main source of funds in Asia is private companies. These comprise both investment companies and subsidiaries or affiliates of industrial companies, which together contribute almost 40 percent of the total stock of venture capital. After these, banks contribute about 20 percent of venture funds, somewhat higher than the bank share of the private equity market in the US, while

pension and insurance companies together account for another 20 percent of the total, lower than the comparable share of these institutions in the US. Banks are the leading investors in venture capital in Sri Lanka and Thailand, where they provide, respectively, 70 percent and 39 percent of total funds, and they are also important investors in India, Philippines and Singapore but not in Hong Kong (China).

Vietnam stands out as the one country where both pension funds and insurance companies are important investors, together accounting for almost 60 percent of the Vietnamese venture market.³ In Indonesia, pension funds are also large investors. With the notable exception of Malaysia, Korea and Indonesia, where the state is a significant source of venture capital, government provision of venture capital is negligible throughout developing Asia, accounting for only 5 percent of the \$38 billion in total venture funds outstanding in the region.⁴

Chart 3. Institutional Source of Venture Capital in Developing Countries (1995)



Sources: *The 1996 Guide to Venture Capital in Asia, Central and Eastern Europe Directory of Private Equity Capital Companies, 1996.*

As noted, a large share of venture capital funds in CEE comes from government or multilateral financial institutions. In 1995, the share of these official investors was highest in the Czech Republic and somewhat lower in Poland. (Chart 3). Alongside official investors, corporate investors

³ These may be both national and foreign investors

⁴ The significant state involvement in the venture capital industry in India is not evident in the figures since the corporation total may include government corporations. However, government activity is more evident in the orientation of venture investment toward the high technology and start-up sectors that have been a target of government policy.

were also relatively important in the Czech Republic. Bank backing of venture investment was most significant in Hungary where banks contributed 35 percent of total capital, while the Polish venture capital sector is notable in the region as the only one with a significant share of capital contributed by pension funds and insurance companies.

Investment Rate

Of the \$38 billion in total venture funds outstanding in Asia at the end of 1995, \$17.8 billion had been invested by the end of 1995.⁵ While the low investment rate undoubtedly reflects the young vintage of many of the venture funds in the region, the investment rate has managed to keep pace with the level of new capital raising and actually rose slightly in 1994. Korean funds are the most mature by this metric, with two-thirds of the total pool of venture capital invested, ahead of Japan where the industry is only 45 percent invested; Hong Kong (China), 35 percent; and Singapore, only 30 percent invested. By the end of 1995, 16,122 Asian companies had received venture capital financing. The average investment size was \$1.1 million.⁶

While the stock of venture capital in CEE doubled in 1995, a modest rise in the investment rate from an average of 38 percent in 1994 to 41 percent in 1995 also occurred, indicating that supply and demand for venture capital were in rough balance in the region.⁷ With the exception of the Czech Republic where the investment rate fell from 34 percent in 1994 to 23 percent in 1995, the rise in the investment rate was uniform throughout the region. However, at the end of 1995 the actual level of the investment rate differed markedly across countries, ranging from highs of 84 percent in Hungary and 51 percent in Estonia to lows of 11 percent in Ukraine and 2 percent in Russia.

Distribution of Investments by Financing Stage

By financing stage, expansion investments dominate the venture sector in both Asia and CEE, but these type of investments are relatively more prevalent in Asia where they account for 42 percent of the total compared to only 28 percent in CEE.⁸ Lower risk-lower return bridging (or “mezzanine”) finance is more prevalent in Asia, indicative of the more ready access to stock markets to exit investment in that region. Interestingly, the share of early stage investments is about 30 percent of the total in both regions, but in Europe there is more seed investment than in Asia. But there is also more later stage buy-out finance in the CEE region - an observation that is consistent with the ongoing industrial restructuring in the CEE economies.

⁵ Including the Asian Tigers and Japan.

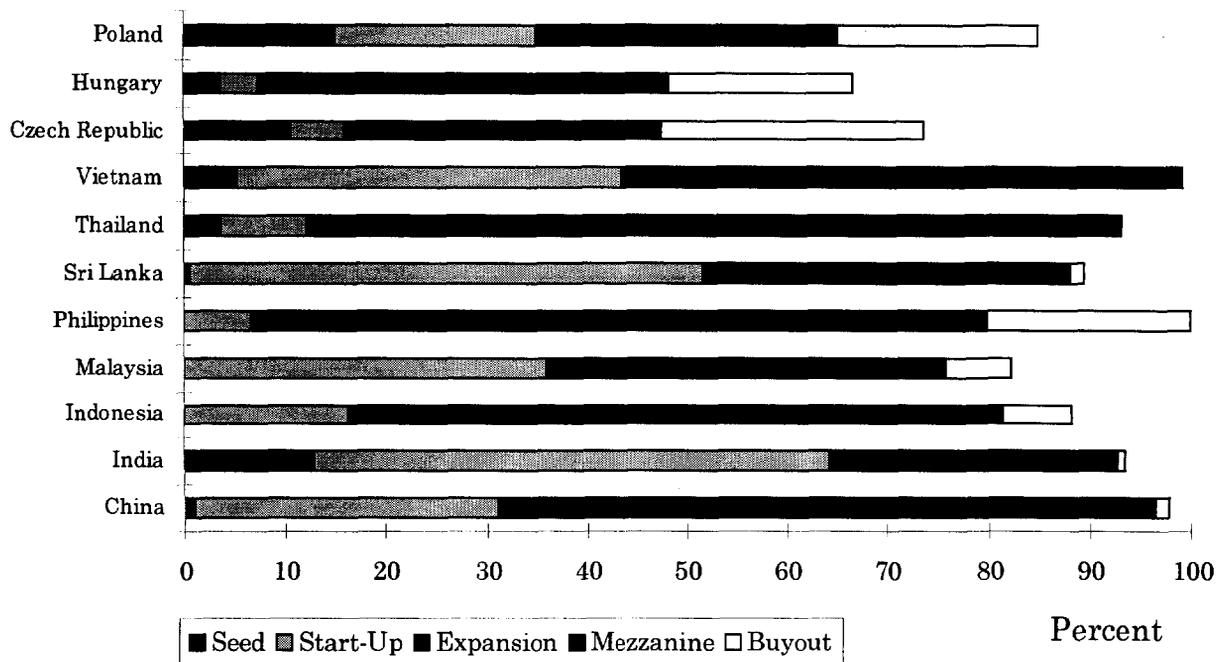
⁶ The Guide to Venture Capital in Asia, 1996, p.6

⁷ Calculations exclude the large \$906 Romanian Moldova II and Transylvania III privatization funds raised in 1995. These are reported by the European Venture Capital Association, but their aim is to finance privatization of state-owned industry rather than investment in small and medium scale enterprises.

⁸ The definitions for the different financing stages in venture capital are as follows: i) seed - finance for the initial R&D to develop a new product prototype; ii) start-up - finance for product development from prototype to initial production; iii) expansion - working capital finance to increase production and sales; iv) mezzanine - finance to prepare a company for listing; v) buy-out/buy-in - finance to match management teams with companies; vi) turn-around - finance to restructure an unprofitable but potentially profitable company.

While investments are predominantly made in the expansion and mezzanine phases of company growth, the trend in Asia appears to be mirroring recent developments in the US back towards a greater share of early stage seed and start-up financing. The share of seed investment rose marginally to a little over 5 percent in 1995 but the share of start-up investments in the total almost doubled in 1995 to 18 percent, led by new business creation in China, and accompanied by a continued strong level of start-up investment in India. Venture funds in Malaysia, however, tended to diversify away from start-ups in 1995, but this category still stood at a high 36 percent of the Malaysian total.

Chart 4. Venture Capital in Developing Countries by Financing Stage (1995)



Sources: *The 1996 Guide to Venture Capital in Asia, Central and Eastern Europe Directory of Private Equity Capital Companies, 1996.*

By financing stage, CEE venture investment is weighted toward expansion financing, but has significant components of seed, buyout and turnaround investment (*Chart 4*). The Polish sector is oriented more toward earlier stages and has less investment in turnaround situations than elsewhere in the CEE while the Hungarian venture capital sector is oriented more toward later stage investments with a 15 percent share of the total represented by mezzanine financing and 33 percent in turnaround.

Industry Distribution of Investments

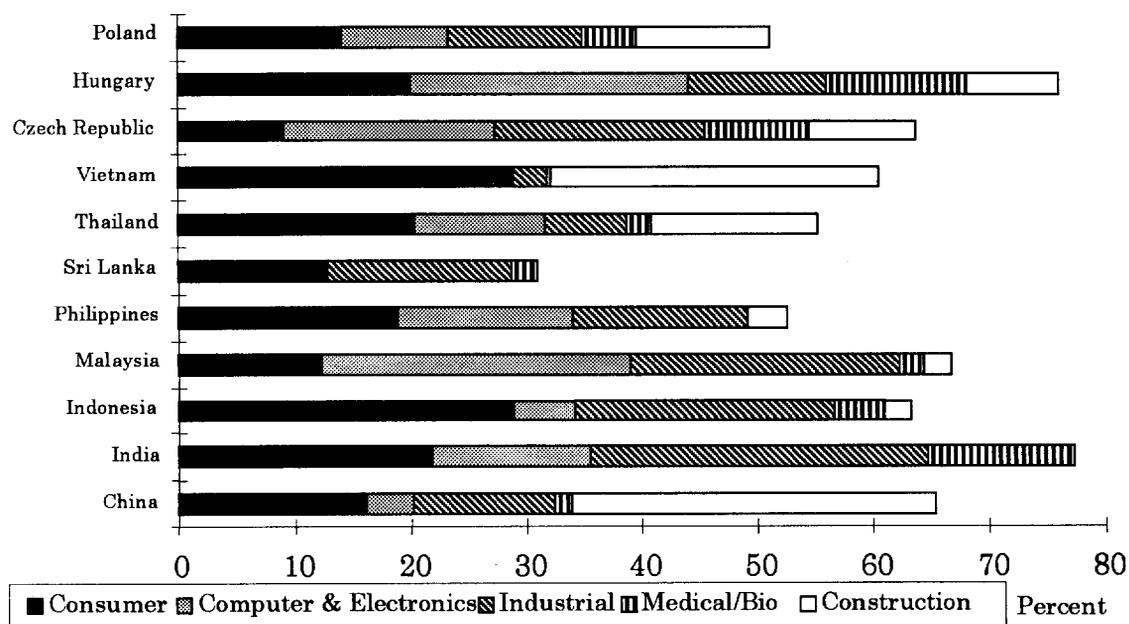
In contrast to the marked differences in the distribution of the aggregate venture portfolio by financing stage, the industry distribution of investments is surprisingly similar in Asia and CEE. The four leading industry groups are the same in both regions: consumer goods, industrial products, communications and construction. These four industries combined account for about half of all

venture investment in both regions and, moreover, represent roughly the same proportions, with the exception that the concentration in consumer and industrial products is greater in Asia than in CEE. The only notable differences in the industry distributions between Asia and CEE are: i) a greater weight on computers and electronics in CEE, ii) more financial sector investments in Asia and iii) a greater share of other service sector investments in CEE, an industry category that specifically includes pollution control and environmental services in the CEE region statistics.

In Asia, the industry distribution of investment continues to be concentrated on the industrial products and consumer goods sectors with each representing around 15 percent of the total followed by construction and electronics, each representing another 10 percent of total investment. However, the sector shares that grew most rapidly in 1995 were infrastructure, communications, transport and energy, each rising to around 5 percent of the total.

As noted, the distribution of venture capital activity across industries in the CEE region is broadly similarly to that in Asia. However, there are striking differences across countries. Hungarian venture investment is concentrated to a greater extent in consumer goods and higher technology industries such as computers, electronics, medical, and biotechnology and consists of negligible investment in service industries apart from construction.

Chart 5. Venture Capital in Developing Countries by Sector



Sources: *The 1996 Guide to Venture Capital in Asia, Central and Eastern Europe Directory of Private Equity Capital Companies, 1996.*

In the Czech Republic there is similar concentration in high technology industries such as computers, medical, and biotechnology, but not electronics. Moreover, there is a concentration in industrial products relative to the CEE average. In contrast to other countries in the CEE region, Czech venture capital is invested in communications and energy services, with each comprising 9 percent of the total investments but is relatively underweight in consumer goods. In Poland, the industry

distribution conforms closely to the norm - well diversified overall but with higher concentrations in consumer goods, medium technology industrial products, and construction services and lower concentrations in financial, energy, communications, transport and other services.

III. Venture Capital Fund Structure and Governance

This section discusses summary statistics on venture capital fund structure and governance.⁹ Based on survey data, the median reporting fund has a committed capital of \$58.4 million and a 10-year life.¹⁰ All capital has been called from investors and 60 percent has been invested in about 23 investments. For each investment commitment, the median fund screens 10 investment prospects, 2 or 3 of which go to a detailed appraisal. The venture fund manager receives compensation in the form of management fees at the rate of 2.5 percent per annum and a 20 percent carried interest in the capital gain on the fund's portfolio above some preferred return paid to investors.

The fund and the management company are likely to be separate legal entities to aid transparency and sharpen management incentives, but the fund is unlikely to be listed on a stock exchange. The fund may invest in more than one country, but this is the exception rather than the rule. The fund may target investments in just a few industrial sectors. Funds tend to have either an industry focus or a regional focus but not both. Where funds are structured as industry funds, they often focus on computer-related technologies. These funds also tend to have a larger number of smaller investments in the portfolio. Moreover, industry focused funds tend to make investments of longer duration using more financing stages. Funds with a regional focus however, are larger on average and tend to take a passive role in the governance of portfolio investments. Finally, regional funds are relatively un-invested compared to the norm, suggesting they are perhaps of a younger vintage.

Fund Size

Mezzanine and turnaround funds are larger than funds which target earlier stage investment. Funds that have a regional investment focus (*noted above*) and funds that are limited partnerships tend to be larger on average than funds that are not organized along these lines, while funds managed by insurance companies are reportedly larger than independently managed funds. Furthermore, larger funds also tend to have stronger deal flow, measured by a higher ratio of deals of screened to portfolio investments. On the other hand, funds that have parent company involvement in management tend to be smaller on average, as are older funds, measured by proportion of capital called.

Fund Organization and Managerial Discretion

The fund manager is typically an independent venture capital management firm that is usually structured as a corporation, and less frequently as a limited partnership.¹¹ The venture capital management firm itself sometimes has a divisional and multinational structure and is sometimes an

⁹ Data tables are available from IFC's web site (<http://ifc.org/DEPTS/OPS/ECON/ECONHOM.HTM>)

¹⁰ While the median fund size was \$58.4 million, the mean fund size was \$128 million with a standard deviation of \$176 million. Thus the distribution of fund size is somewhat right skewed and shows considerable cross-sectional variation. Both effects are due to the inclusion of a small number of large sized funds in the sample.

¹¹ This stands in marked contrast to the US venture capital sector where the limited partnership is the leading organizational form.

affiliate, subsidiary or a division of an investment bank or a commercial banking firm. While the fund manager usually exercises considerable operational freedom, this operating latitude is not unlimited, and there is a reasonable probability that the fund manager has to share control over decisions on investment screening, investment policy and liquidity management with a parent or affiliate organization. The parent or affiliate sometimes enters into cost sharing arrangements with the venture capital manager. When a parent or affiliate is involved in one area of a fund's activities, it is likely to participate in other functions as well.

Investment Policy

Fund management is usually subject to an investment policy that is designed to limit investment risks. The median fund can invest no more than 10 percent of its capital in one company and no more than 25 percent of its capital in one industry sector. Moreover, where a policy exists, the minimum holding that the fund can take in an investee company is typically 10 percent and the maximum holding is usually 49 percent.

There is evidence that larger regional funds and mezzanine funds have tighter policies when it comes to limiting concentrations in individual companies, a finding consistent with the maintenance of a passive investor role in portfolio companies. Funds managed by insurance companies, pension funds or state sector institutions also tend to have looser policy limits on both company and industry concentrations. Moreover investment policy appears also to be responsive to market constraints. Where low screening rates indicate that deal flow may constrain a fund's activity, looser investment policies prevail in that both permitted sector and company concentrations as a share of the total fund are higher and the maximum permitted share holding in an investee company's common stock is higher.

Screening of Investments

As noted above, for each investment held in the portfolio of the median fund, over 10 investment prospects are screened and 2 to 3 of these are appraised in detail. The survey data indicate that only 5 percent of deals appraised are referrals from parent or affiliated companies. Almost half the prospects appraised are approved for investment and 5 out of 6 approvals are ultimately invested. The aggregate statistics on screening, appraisal and investment rates mask variation in these rates across countries. Screening rates are significantly above average for funds that invest in Malaysia and Russia. Appraisal rates are higher than average in Russia and Vietnam. The ratio of approvals to investments - a measure of the droppage rate - was higher in the Czech Republic, Indonesia and Russia while the droppage rate was lower for funds in Sri Lanka and Thailand.

Screening rates are also correlated with other aspects of fund design. Screening rates tend to be higher for funds organized on a joint venture basis. High management fees are associated with droppage rates that are statistically significantly lower. Where parent companies are involved in the screening process, screening rates are significantly higher. Where a parent company shares a fund's operating costs, appraisal rates are higher, but so are droppage rates while initial screening rates are not significantly affected.

IV Investee Company Structure and Governance

This section discusses the characteristics of investee companies and their relation to fund structure.¹² The approach taken is to treat the parameters of the fund structure as pre-determined so as to inspect how these factors affect contracting with the sub-investments. This contracting problem is solved at the level of venture portfolio management by appropriate choice of investee capital structure and governance measures employed by the fund manager.

The median fund investment in the sample was \$0.77 million disbursed in a single tranche in exchange for an 11 percent share in common voting stock of the venture. Investments were held on average for 4.7 years. Venture capital managers work 3 hours per week on the typical investment and hold 1 of 5 seats on the investee company board. The median ratio of tangible-to-total assets on the balance sheet of the venture was 89 percent and the median market-to-book value multiple for the investment was 1.2. The investee company manager typically has 10 years of job experience and a graduate education. It is likely that investment value will be realized at the end of the holding period through an initial public offering on the stock market.

The venture capital manager most likely receives quarterly or monthly reports from the Investee Company. In 1 out of 4 investments there is a need to renegotiate the terms of the finance to deal with adverse developments or unforeseen contingencies. In around half of these cases renegotiation takes the form of raising the venture capitalist's equity share in the venture. In a quarter of these distress events, the venture capitalists waive claims to dividends or interests and finally, in a quarter of the cases, the investee company manager is replaced. The median realized return on investment is around 26 percent per annum while the median expected return on investment is 37 percent per annum.

Capital Structure

Outside capital structure refers to the share of each type of financial claim in the firm's total long-term capital. The average level of the debt-to-total long-term capital ratio in the sample of companies surveyed is 28 percent and the median common stock to total long-term capital ratio is 65 percent. Thus, overall, the businesses surveyed are conservatively geared. In contrast to the US industry, where convertible preferred stock is the pre-dominant financial instrument, preferred stock in the developing country sample accounted for only 5 percent of long-term capital on average while convertible stock averaged less than 2 percent of the capital structure.

The inside capital structure is the proportion of debt and equity held by the fund and investee company management, respectively. In the sample, the median level of equity held by investee company management was 28 percent and the median level of outside equity was 11 percent. Although venture capital funds in developing countries are usually investors in private or "inside equity" they are not exclusively so since the data indicate that venture funds hold 6 percent of investee company debt, on average, along with their equity holdings. Inside capital structure is

¹² Data tables are available from IFC's web site (<http://ifc.org/DEPTS/OPS/ECON/ECONHOM.HTM>)

important because the relationship between inside and outside capital structure determines the incentive properties of debt and equity.

Although the average level of debt-to-total long-term capital (gearing) ratio is 28 percent, there is variation in the sample across countries, industries, investment stage and when other factors are taken into account. The average gearing ratio was significantly below 28 percent in China (13 percent) and in Taiwan (China). Gearing was higher on average in the Philippines (44 percent) India (45 percent) and Korea (53 percent).

The evidence also shows that the gearing of investee companies was significantly different from the average in some industries. Gearing was higher than average in the industrial products industry (38 percent) but lower than average in the computer hardware industry. The ratio of tangible-to-total assets in the industrial products industry was also significantly higher than average, thus it appears that assets in the industrial products industry are better able to secure loan finance and this supports higher gearing of investments in this industry. This suggests that differences between industries in leverage are related to differences in the collateral value of assets across industries.

In further analysis, the total sample was grouped by industry and regressions of leverage ratios on ratios of tangible-to-total assets were run for each industry sub-sample in an attempt to identify the relationship between leverage and collateral value of assets within industries (*not reported*). In 11 of the 17 industry regressions, the tangible asset ratio variable had a positive coefficient, significantly so in 2 of these cases, while for the six industries where the estimated relationship was negative, the coefficient was small in magnitude and not significant statistically.

Not surprisingly, gearing was significantly higher for investments in funds in buyout and turn-around situations, since the later stage of development of the subject companies implies a longer track record that would support more debt finance. Investments in buyout situations also had higher collateral values that might explain the higher leverage of these investments but regressions of leverage on both these variables (*not reported*) suggest that the buyout stage effect is independent of collateral value.

Surprisingly, and in contrast to comparable results for the US industry [Gompers, 1995], gearing was higher for investments in funds that focus on seed and start up investments, when, all else equal, these types of companies would appear to have less ability to support debt and would be expected to have lower gearing levels. We conjecture first that the explanation lies in the concentration of start up and seed investments in India. In that country markets for debt instruments such as conditional loans and debentures are well developed and there are tax and regulatory disadvantages to holding private equity.¹³ However, further analysis does not support this conjecture.

In further analysis, the total sample was grouped by country and the seed and start-up stage indicator variables were both regressed on the leverage variable for each country sub-sample (*not reported*) in an attempt to isolate the relationship between early stage investments and high leverage discussed

¹³ See Ramesh & Gupta [1995], p.128. An additional consideration is that while gearing was higher for start up companies at approximately 1:1 for debt:equity compared to 1:2 for the overall average, perhaps neither of these ratios should be considered to be "high" in general corporate finance terms where debt:equity ratios below 2:1 are considered to be "low."

above. For the seed stage variable, significant coefficients were obtained only in the sub-sample regressions for Thai and Korean investments. For the start-up stage variable, the coefficient on leverage was marginally significant only for the Korean sub-sample regression. This suggests that the results are peculiar to sample data from these industries.

Next, the total sample was grouped by industry and the regressions above were run for each industry sub-sample (not reported) in an attempt to further identify the relationship between early stage investments and high leverage. For the seed stage variable, significant coefficients were obtained only in the sub-sample regressions for the “construction” and the “other manufacturing” categories, while for the start-up stage variable, significant coefficients were obtained only in the sub-sample regressions for the “industrial products” and the “energy” industry categories. This suggests that the results are peculiar to sample data from these industries.

Investee company leverage levels showed some dependence on pre-determined characteristics of venture capital fund structure. Leverage levels were higher for funds that were either subsidiaries or divisions of financial institutions or funds managed by affiliates of financial institutions. Leverage levels averaged a low 10 percent of total long-term capital for investments made by funds that have a dual legal structure, independent management, or where incentives of investors and the fund manager are aligned by giving the manager a share of the carry suggesting that these funds tend to conform closely to the model of the US private equity intermediary in respect of investee capital structure as well as fund design. Investee company leverage level was also significantly positively correlated with the intensity of screening measured by the ratio of deals-screened-to-deals-invested.

Investment Staging

The practice of staging investment commitments in more than one tranche over time occurred in only 27 percent of all investments, a finding that may reflect the heterogeneity of venture capital finance in developing countries compared to industrial countries where staging of investments is more prevalent. The number of stages or financing rounds reported for investments ranged from 1 to 8 and averaged 1.4 rounds. There is evidence that the number of stages was significantly higher for investments by funds that target start-up companies and seed investments, though in the latter case, the result was not significant statistically. By country, staging of investments was most prevalent in India where investments were focused on the seed and start-up phases. By industry, staging investment commitments was most prevalent in the communications industry where the average number of financing rounds was 2, consistent with the greater uncertainty attaching to relatively higher technology investments in communications.

Staging of investments was uncommon in investments by funds with a dual legal structure, independent management, or where incentives of investors and the fund manager are aligned by giving the manager a share of the carry.¹⁴ Staging was used more by funds that reported parent involvement and by funds that had longer lives.

¹⁴ It is difficult to rationalize this result. We conjecture that it may be a peculiarity of the data sample analyzed here arising from the sub-sample of observations on Taiwan (China) investments which share these characteristics and which are all structured as single tranche investments.

Monitoring of Investments

Survey data were collected on a range of measures of monitoring activities. These were: i) hours worked by the fund manager per week per investee company, ii) board representation, and iii) measures of information flow in the frequency of financial reports. The manager must monitor performance in many areas and multiple monitoring and control instruments may be used with this objective in mind. Assuming that fund financial performance is readily verifiable, leading investee performance variables that the manager must watch are: i) tendencies to shirk on effort, ii) asset substitution, and iii) consumption of perks.

The data suggest that hours worked on monitoring were significantly lower in Korea and higher in Poland. Korean managers worked only 2 hours per week per investment on average while Polish venture fund managers were reported to work 24 hours per week per investment.¹⁵ Monitoring hours worked were higher on funds with an industry focus and lower on funds with: a regional investment mandate, a dual structure, or independent management. Interestingly, since bank affiliated funds tend to rely less upon performance incentives to motivate managerial effort, monitoring hours worked were not significantly lower for bank affiliated funds compared to funds with other affiliations.

Venture fund representation on the board averaged 20 percent overall.¹⁶ By investment stage, board representation was lower for mezzanine and buyout stage investments, but also for seed investments. The negative sign on board representation in probit regressions for the seed stage indicator is unexpected since younger businesses would be expected to require more external oversight. A possible explanation for this result is that board representation and frequent reporting are substitute monitoring techniques and reporting levels for seed investments are high, reducing the need for board representation. However board representation and reporting frequency are positively correlated in the sample data so there is no support for this hypothesis. Moreover, the result persists in regressions that control for investment policy, screening rates and leverage - three variables correlated with the seed stage indicator variable - a finding that argues against the relationship between seed stage and board representation being merely a spurious correlation.

In further analysis, the total sample was grouped by industry and the seed stage indicator variable was regressed on the board representation indicator variable and leverage for each industry sub-sample in an attempt to isolate the relationship between seed stage investments and low board

¹⁵ There are several explanations for the light monitoring of Korean investments. The reason may be: i) the relative maturity of the venture capital sector in this country, ii) the large government role in the sector, or iii) portfolio composition. This latter consideration also explains the relatively greater incidence of debt finance in Korean venture capital.

¹⁶ Board representation was lower for investments in Thailand (12 percent), Philippines (10 percent) and Indonesia (8 percent) and was higher in China (28 percent) and Poland (40 percent). By industry, the sample evidence is that board representation was lower in the industrial products and communications industry, but was higher for construction companies. Board representation was also lower on investments that expect to exit via IPO (12 percent) and higher on those that expect to exit via merger (28 percent).

representation discussed above.¹⁷ Significant coefficients were obtained only in the sub-sample regressions for the “agribusiness” and “construction” categories, suggesting that the results are peculiar to sample data from these industries. Next, this analysis was repeated for country sub-samples. The results here show that when controlling for leverage, a significant association between seed stage investments and low board representation is found for the data from several countries: China, Indonesia, India and Thailand.

Financial or operating reports are provided on a quarterly basis by 43 percent of all investee companies, on a monthly basis by 32 percent, semi-annually by 18 percent, and only annually by 6 percent of sampled investments. The frequency of reports shows evidence of some statistical dependency across regions and industries and on fund characteristics. Reporting frequency is higher in Sri Lanka, but lower in Korea and Taiwan (China). Reporting is also of a higher frequency in Poland. Reporting is lower frequency on investments in computer software, computer hardware, and electronics.¹⁸ Reporting frequency is higher the higher the intensity of screening and is higher for investments by funds that have some parent management involvement. Finally, reporting by investees is lower frequency where fund management has an investment bank affiliation.

Expected Returns

Excluding 3 influential observations, the median realized return on investment in the sample was 26 percent per annum while the median expected return on investment is 37 percent per annum. Confirmed data on realized returns were only reported for 29 individual investments while the reporting sample for expected returns was 274 observations. Thus discussion will be limited to an analysis of the expected returns data.¹⁹

The mean level of expected returns in the sample was 39 percent. Reported expected returns in Hungary and Poland were, respectively, 50 and 53 percent but only the latter was statistically different from overall sample return. Expected returns on investments in the computer hardware industry were estimated to be higher than average at 56 percent. Sample expected returns varied by investment stage. Expected returns on investments in funds targeting start-up and expansion companies were lower than average at 31 percent and 28 percent respectively.

Expected returns on funds that gave the manager a share of the carry were some 14 percent higher than average at 53 percent while returns on investments that investors intended to exit from by merger were some 14 percent lower than average at 25 percent.²⁰ Moreover, expected returns on large funds were higher than average, when measured by either the dollar size of the fund or the

¹⁷ These regressions control for capital structure (leverage) to account for the negative correlation between leverage and board representation implied when leverage reduces the share of outside equity and associated control rights. Results not reported.

¹⁸ This is a result that may be indistinguishable here from low reporting in Taiwan, China since most of the investments in these industries in the sample occur in that country.

¹⁹ Note that survey respondents were requested to report both expected and realized returns on an investment-by-investment basis. thus the expected return data was reported in the survey returns rather than calculated from them.

²⁰ These two findings corroborate the recommendations on fund structure made in Barger et. al. 1996]

number of investments. However, expected returns were lower the larger the size of the venture funds investment in the investee company.²¹ Funds with an industry focus also offered higher expected returns. Expected returns were decreasing in the years job experience possessed by the investee manager, and finally, expected returns were lower where it had been necessary to renegotiate the finance contract.

Renegotiation Experience

Renegotiation of the financing contract occurred in 25 percent of investments reported in the survey. Probability of renegotiation was estimated to be increasing in: i) size of venture fund share in the investment; ii) number of investment stages, and iii) duration of the investment. After controlling for these factors in probit regressions (not reported), probability of renegotiation was also increasing in iv) the intensity of fund manager performance incentives; v) funds where the parent screens deals or shared operating costs; vi) the investment value was expected to be realized via merger or rather than IPO. Furthermore, renegotiation of investments was associated with more time spent monitoring the investment by the venture capitalist.

On the other hand, after controlling for size, number of investment stages and duration, probability of renegotiation was estimated to be lower for investments by large funds and to the extent that collateral value of investment assets was high.²² Finally, probability of renegotiation was higher for investments in Philippines but lower for investments in India.

²¹ Taken together these results suggest that in the sample, expected returns would be also be high on large funds that made a large number of small investments but this is not tested.

²² The latter coefficient was significant at the 20% level only.

V. Conclusions

It is apparent that venture capital finance has a longer history in the Asian region than in CEE but in both regions, volumes of new venture financing have followed a steeply rising trend in recent years. At \$6 billion, the stock of venture capital outstanding in developing countries in Asia is more than double that in the CEE region. Moreover, the distribution of investments is weighted toward start-up and turnaround finance in the CEE while expansion and mezzanine financing dominate in the developing countries in Asia. Despite these differences, the industry distribution of venture capital is similar in both regions.

Overall, the empirical survey identified patterns in the organization of venture funds. Funds may have an industry focus or may invest throughout a geographic region. Industry funds tend to make large number of small investments and investments of longer duration while regional funds are larger on average, take a passive role in portfolio management, and tend to be of a younger vintage.

Funds differ according to size. Large funds have stronger deal flow, while small funds have more parent company involvement in management. Funds also differ according to investment policies. Larger regional funds and mezzanine funds have tighter exposure policies consistent with the maintenance of a passive investor role in portfolio companies. Funds managed by insurance companies, pension funds or state sector institutions have looser policy limits on both company and industry concentrations.

Furthermore, investment screening rates are correlated with fund characteristics. High management fees are associated with droppage rates that are statistically significantly lower. Where parent companies are involved in the screening process, screening rates are higher but where a parent shares a fund's operating costs, appraisal rates are higher but so are droppage rates.

The analysis revealed that investee company capital structure and governance arrangements used in venture capital in developing countries depend on characteristics of investee company assets in ways that they typically do in standard corporate finance practice elsewhere. There do not appear to be any inherent differences in venture capital in developing countries that would make corporate finance norms generally inapplicable.

Use of leverage depends on external factors such as the country and industry in which a venture is located and on design characteristics of the venture fund that provides the financing. Gearing was higher on average for ventures in the Philippines, India, and Korea, and lower on average in China and Taiwan (China). Gearing was also higher in the industrial products industry where it is likely that assets have higher collateral value but lower for companies in the riskier computer hardware industry. After controlling for collateral value of assets, gearing was higher for investments in buyout and turn-around situations, perhaps because companies in these situations have a longer track record that supports more debt finance. Leverage was also higher for seed and start-up investments, a result that is difficult to explain but that we attributed to the sample data on Thai and Korean investments. Leverage levels were higher in funds that were either subsidiaries, divisions or affiliates of financial institutions but lower for investments by funds that conform closely to the model of the US private equity limited partnership in respect of control arrangements.

The practice of staging investment commitments in more than one tranche over time was less prevalent in developing countries than is the case in the venture capital sector in industrial countries. However, despite this difference, the number of stages was higher for investments in start-up companies - something that is also true for the venture capital industry in industrial countries. By industry, staging commitments was most prevalent in the communications industry, consistent with relatively greater uncertainty attaching to investments in this industry. Staging was used more by funds with active parents and by funds that had longer lives. The latter suggests that, despite its other incentive design advantages, a possible drawback of structuring a fund with a finite life is that it may inhibit the use of staging to control agency risks in the portfolio of investee companies.

The paper reported on three measures of monitoring activities: i) hours worked by the fund manager per week per investee company, ii) board representation, and iii) measures of information flow in the frequency of financial reports. The key findings here were that: monitoring hours worked was higher on funds with an industry focus and lower on funds with: a regional investment mandate, a dual structure, or independent management. Taken together, these results indicate that active monitoring by fund managers occurs in industry funds where fund managers can be expected to have superior market knowledge and there is more potential for monitoring to add value.

Furthermore, the survey showed that board representation was lower for mezzanine and buyout stage investments as is the case in industrial countries, but it was also lower for investments in the seed stage. The latter result is difficult to explain. Further analysis attributed the result to investment data from the agribusiness and construction industry and from investments in China, Indonesia, India and Thailand. We conjecture that reluctance on the part of entrepreneurs to share control over early stage investments in these industries and countries as a possible explanation for this finding.

Reporting frequency is higher the higher the intensity of screening and is higher for investments by funds that have some parent management involvement. Reporting frequency was found to be lower where fund management have an investment bank affiliation, a result that may arise from the greater use of performance incentives by bank affiliated funds.

The paper also considered how expected returns on individual venture investments are related to exogenous factors such as the country and industry of the investment and the design features of the venture capital fund. Reported expected returns in Poland were higher than average. Expected returns on investments in the computer hardware industry were higher than average while expected returns in start-up and expansion companies were lower than average. Expected returns on funds that gave the manager a share of the carry were higher than average and expected returns on investments that targeted an exit by merger were lower than average, substantiating conventional wisdom about two necessary conditions for successful venture fund investments. Expected returns on large funds were higher than average perhaps because of better diversification possible with larger funds.

Furthermore, analysis of investment renegotiation data revealed that renegotiation was more likely where: the investment value was expected to be realized via merger rather than IPO; fund managers had high performance incentives, and a parent company was involved in management. On the other

hand, renegotiation was less likely for investments by large funds and to the extent that collateral value of investment assets was high. Finally, renegotiation of investments was associated with more time spent monitoring the investment by the venture capitalist.

Annex A. Annotated Bibliography

The relatively short history of most venture capital investments in developing countries and the inherent lack of public documentation of private financing arrangements means that there is little published analysis at even a basic descriptive level on the scope of venture capital operations in developing countries. With few exceptions, analysis is found mainly in operational reviews and research papers prepared at international development finance institutions.

Asian Venture Capital Directory, The Asian Venture Capital Journal, Hong Kong, 1996

This annual publication provides a detailed description of the Asian venture capital sector with analysis of financing flows by sources and uses of funds.

Barger, T., Carter, L., and Kuczynski, I., "IFC's Experience With Promoting Funds in Emerging Markets: 1977-1995", November 1995.

In its study of the investment experience gained from its involvement in 66 venture capital funds in 42 developing countries over 1977-95, the IFC identified several factors that may threaten the viability of venture capital investment in developing countries: Chief among these were management inexperience and poorly designed fund structures. The paper concluded with recommendations aimed at improving the incentive properties of fund structures.

Boocock, J Grahame and Presley, John R., "Equity Capital For Small And Medium-Sized Enterprises In Malaysia: Venture Capital Or Islamic Finance. Managerial Finance 1993.

A journal article on the Malaysian venture capital sector that examines financing choices available and focuses on the role of government in entrepreneurial finance.

Central and Eastern Europe Directory of Private Equity Capital Companies, European Venture Capital Association, EU Phare Program, Brussels, 1996.

This directory provides firm and industry data on venture capital operations in Central and Eastern Europe. Brief analysis of the regulatory and institutional structure surrounding venture capital in each country in the region is also provided.

IFC Annual Report, International Finance Corporation, Washington D.C., various years.

Fox M., "Venture Capital in Developing Countries: the USAID Experience", USAID Discussion Paper, 1995.

This study reports on the experience of 12 venture capital investments approved by USAID over the period 1971-89. Unlike IFC's portfolio experience reported in Barger et. al. [1996], where realized portfolio returns were reported to be low but positive, USAID's portfolio had declined in value and the investments were judged ex-post to have been failures overall. The reasons

identified in Fox [1995] for this poor performance were consistent, in the main, with the findings of the IFC report.

Gompers, P. "Optimal Investment, Monitoring and the Staging of Venture Capital", Journal of Finance, December 1995.

A study of capital structure and governance arrangements based on an analysis of 695 US venture capital investments.

Ibanez, F., "Venture Capital And Entrepreneurial Development", World Bank, Policy, Planning, And Research Working Papers; WPS 53, 1989.

A paper that considers the prospects and challenges for the development of viable venture capital industries in developing countries from a social and economic viewpoint.

Ramesh, S. and Gupta, Arun, "Venture Capital And The Indian Financial Sector", Oxford University Press, 1995.

A study of the existing institutions and financing techniques in the Indian venture capital sector. A review of venture capital practice in several industrial countries is also included.

Sagari, Silvia and G. Guidotti, "Venture Capital: Lessons From the Developed World For the Developing Markets", IFC-CEIED Discussion Paper No.13, 1992.

A paper that reviews institutional arrangements employed in venture capital finance in the United states, including limited partnerships and small business investment companies, with an assessment of the prospects for using similar structures in developing countries.

Annex B. Data Sources and Survey Method

The data assembled for this paper came from three sources: i) an existing IFC database on the structure of venture capital funds that are IFC clients; ii) regional industry associations of venture capital firms and associated trade publications, and iii) data collected from a survey of venture capital firms conducted by the author. See *Annex C* for a list of contributing organizations.

There are two regional industry associations that cover the developing world (as well as the industrial countries in these regions) - the Asian Venture Capital Association, and the European Venture Capital Association. The leading data source on Asian venture capital is the *Asian Venture Capital Journal*, which publishes an annual directory with statistical summaries entitled *The Guide to Venture Capital in Asia*. The European Venture Capital Association has published the *Central and Eastern Europe Directory of Private Equity Capital Companies* which contains structural and quantitative information organized by venture capital firm, but does not compile any comprehensive data on total investment flows of venture capital in the countries covered. For other developing regions, we know of no central industry associations or other trade publications that would serve as a reliable and authoritative data source. Nevertheless, the Asian and European publications give a reasonably comprehensive picture of the total magnitude and overall structure of venture capital flows in these regions along with a structural description of venture funds organized by country and by venture capital management firm within country. These data form the basis for the discussion in section V.

The study also uses an existing IFC database on investment funds structure. This database was assembled as part of an IFC financial sector operations review [Barger et.al., 1996]. The IFC database chiefly documents fund structure and governance at the level of investor-venture capital manager contracting. The venture capital fund component of the IFC database consists of an extensive set of characteristics on each of 64 venture capital funds in which IFC had participated (up to June 1995). This database was chiefly used to cross-check and augment the data obtained by survey for those fund units common to both data sets.

Survey data on fund organization and the relevant features of the asset, capital and governance structures of investee businesses were gathered for a final sample of 53 venture capital funds in 19 countries, comprising data on a total of 82 different variables on around 410 individual investments. The sample of reporting funds includes 7 funds from Thailand, 6 each from Hong Kong and India, 5 funds each from Philippines and Singapore, 4 funds each from Poland and Sri Lanka, 3 funds from Hungary and Korea, and 1 fund from each of the following countries: Brazil, the Czech Republic, Indonesia, Malaysia, Russia, Slovakia, Taiwan, China, Tunisia, UK (Central Europe), and the Ukraine.

Survey Design

The venture capital fund manager survey is an essential data source for the analysis. The main rationale for reliance on survey data is simply that the subject companies are private companies for which, under most company law codes and securities regulations, little or no financial information is required to be disclosed to the public domain. Thus the survey instrument was necessary to collect

sample data from which to draw inferences about the population of venture capital funds and investments.

The survey instrument was a 2-page questionnaire that was addressed to venture capital fund managers. The survey instrument was designed in consultation with IFC venture capital experts, IFC Economics Department staff experienced in survey administration and personnel at the Dallas, USA office of Price Waterhouse from which an authoritative quarterly survey of the US national venture capital industry is administered. Robustness was achieved chiefly by framing questions in a way that called for numeric responses.

The survey questions, 45 in total, were organized in two parts. In Part A of the questionnaire, questions 1-16 called for information about the organization of their venture capital fund. In part B, questions 17-45 called for detailed information about characteristics of the 8 largest investments in the fund manager's portfolio.

The population of venture capital fund managers in developing countries was identified with the aid of four sampling frames. These were i) The Guide to Venture Capital in Asia; ii) the Central and Eastern Europe Directory of Private Equity Capital Companies; iii) Pratt's Directory of Venture Capital, and iv) 66 venture capital investments made by the International Finance Corporation up until 1995. After deleting multiple entries, firms that did not have an operational base in a developing country, and firms that had established operations only in the 1995 financial year, a unique list of venture capital firms was compiled. It should be noted that we were unable to identify any sampling frames for venture capital companies in countries in the Latin American or African regions. The representation of venture capital investments from these regions in the survey is thus limited and for this reason therefore we are reluctant to apply the inferences drawn from the analysis to venture capital operations in these regions.

The survey sample was stratified by country in region. All firms in the composite sampling frame were sampled. The survey instrument was sent by fax to 250 venture capital fund managers in developing countries. Participation was chiefly solicited with the promise that the survey results would be disseminated to participants. 120 of the 250 venture capital fund managers were also contacted by telephone to solicit their participation. The deadline for survey returns was extended three times, and at each extension, non-respondents were re-faxed the survey questionnaire and advised of the extension. Finally, 53 venture capital funds in 19 countries provided sufficient data for inclusion in the analysis. Since each fund manager was asked to report on the eight largest companies in his/her portfolio, the cross section database created from the survey returns extends to 410 company units. For each company record the survey provided 82 primary data fields or series. These raw data fields were transformed as required to produce the metrics needed for analysis. The final dataset including raw data series and transformations comprised 147 series for 410 companies.

Since all firms in the sampling frame were sampled and we maintain the sampling frames fairly represent the population of venture capital firms in the developing regions covered, the issue of sample selection bias mainly reduces here to one of controlling for response bias. The response rate was a little over 20 percent. There are two levels of response bias to consider: i) bias because a non-representative sample of funds respond to the survey, and ii) bias because respondents select a non-representative sample of investments from their portfolio to report on. We controlled for the latter

bias by requesting reports on only the 8 largest investments in the portfolio. Thus biases from respondents reporting only on successful investments, biases by industry or by personal involvement in deals are minimized.

The first form of response bias is difficult to control for *ex-ante*. However, four different *ex-post* checks for this response bias were performed from which we were unable to identify any systematic response bias present in the survey data: i) the industry distribution of the investments reported in the survey was compared with that reported in aggregate industry data compiled by the Asian Venture Capital Journal and was found to match closely; ii) the distribution of the organizational type of venture capital firms in the survey was compared with that reported in aggregate industry data compiled by the Asian Venture Capital Journal and was found also to match closely; iii) a “wave analysis” was performed, and iv) a survey of non-respondents was conducted to elicit any systematic reasons for non-response. Wave analysis essentially involves an inspection of “very late respondents” for systematic differences on the assumption that “very late respondents” are likely to be quite similar to “non-respondents”. The survey of non-respondents revealed the following reasons for non-response: i) no investments made; ii) no private equity investments made; iii) too busy/ data not readily available. In ii) there is evidence that non-venture funds that were nevertheless listed in the sampling frames chose to self-select out of the survey.

The survey was structured to collect data on the following categories of variables: i) fund structure and investment policy; ii) investment screening; iii) investee capital structure; iv) investee asset structure; v) investee investment cost and staging; vi) exit alternatives; vii) training and qualifications of the investee company manager; viii) monitoring and control of investments, and ix) renegotiation experience.

Analytic Method

The analysis of section III is based on the sample statistics reported in *Annex Table F1* and OLS and Probit regressions of the form $x_j = \hat{\alpha} + \hat{\beta} x_k + u$, $\forall j, k \in D$, where D is the set of all data series describing fund characteristics (not reported). The maximum sample size for these regressions is $n=53$, the number of reporting funds. Where the x_j 's are continuous (indicator) variables, OLS (probit) regressions are performed. The coefficients $\hat{\alpha}$ and $\hat{\beta}$ in the regressions are estimates of respectively the unconditional mean level of the x_j 's and, the differences between these unconditional means and the mean x_j 's conditional on the x_k 's, i.e.: $\hat{\beta} x_k = E(x_j|x_k) - E(x_j)$. The analysis of section IV is based on the sample statistics reported in *Annex Table F2* and OLS and Probit regressions of the form $x_j = \hat{\alpha} + \hat{\beta} x_k + u$, $\forall j, k \in F$, where F is the set of all data series describing investment characteristics (not reported). The maximum sample size for these regressions is $n=410$, the total number of investments reported by all funds. Where the x_j 's are continuous (indicator) variables, OLS (probit) regressions are performed. The coefficients $\hat{\alpha}$ and $\hat{\beta}$ in the regressions are estimates of respectively the unconditional mean level of the x_j 's and, the differences between mean x_j 's conditional on the x_k 's and the unconditional mean x_j 's.

Annex C. Venture Capital Fund Survey: Contributing Organizations

Fund Manager Name	City	Country
Companhia Riograndense de Participações CRP.....	Porto Alegre	Brazil
Fond Rizikoveho Kapitalu	Prague.....	Czech Republic
China Asset Mgt. Ltd.....	Hong Kong	Hong Kong (China)
China Enterprise Investment Mgt. Ltd.....	Hong Kong	Hong Kong (China)
Citicorp China Investment Mgt. Ltd.	Hong Kong	Hong Kong (China)
Prudential Asia.....	Hong Kong	Hong Kong (China)
Donaldson Lufkin & Jenrette Asia Ltd.	Hong Kong	Hong Kong (China)
HSBC Private Equity Management Ltd.....	Hong Kong	Hong Kong (China)
North-East Hungarian Regional Development Co.....	Budapest.....	Hungary
IBS Budapest	Budapest.....	Hungary
Antra Kft.	Budapest.....	Hungary
Indocean Venture Advisors Pvt. Ltd.....	Bombay	India
Pathfinder Investment Compnay Pvt. Ltd.....	Pune.....	India
IFB Venture Capital Finance Ltd.....	Calcutta	India
TDICI Ltd.	Mumbai	India
Indus Venture Management Limited	Bombay	India
Risk Capital & Technology Finance Corporation Ltd.	New Delhi	India
PT Mitrasarana Venture - Indonesia Growth Fund I	Jakarta	Indonesia
Halim Investment Finance Corporation	Seoul	Republic of Korea
Korea Technology Advancement Corporation (K-TAC)	Seoul.....	Republic of Korea
Korea Development Investment Corporation (K-DIC)	Seoul.....	Republic of Korea
Transpac Malaysia	KL	Malaysia
H&Q Philippines.....	Manila	Philippines
Asian Finance & Investment Corporation Ltd.....	Manila	Philippines
Walden AB Ayala Management Co. Inc.	Manila	Philippines
Keppel IVI Investments, Inc. (S'pore.)	Manila	Philippines
All Asia Capital Managers, Inc.....	Manila	Philippines
International UNP Holdings Ltd.....	Warsaw.....	Poland
Pioneer Investment Poland Sp.z.o.o.	Warsaw.....	Poland
Lubelsko Chelmska Fundacja Rozwoju (PBEP)	Lublin Region.....	Poland
Caresbac Polska	Warsaw.....	Poland
Sector Capital.....	Moscow	Russia
KM Management Pte. Ltd.....	Singapore.....	Singapore
ASC Group	Singapore.....	Singapore
Suez Asia Holdings Pte. Ltd.	Singapore.....	Singapore
SEAVI.....	Singapore.....	Singapore
ORIX Investment and Mgt. Pte. Ltd.....	Singapore.....	Singapore
Slovak American Enterprise Fund	Bratislava.....	Slovakia
Ayojana Fund Management (Pvt.) Ltd.	Colombo.....	Sri Lanka
Lanka Ventures Ltd.	Colombo.....	Sri Lanka
CF Venture Management Co. Ltd.....	Colombo.....	Sri Lanka
Asia Capital Limited	Colombo.....	Sri Lanka
H&Q Asia Pacific	Taipei.....	Taiwan (China)
Finansa Thai.....	Bangkok	Thailand
Prudential Asia.....	Bangkok	Thailand
AIA Direct Investment.....	Bangkok	Thailand
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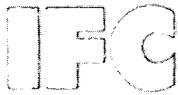
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