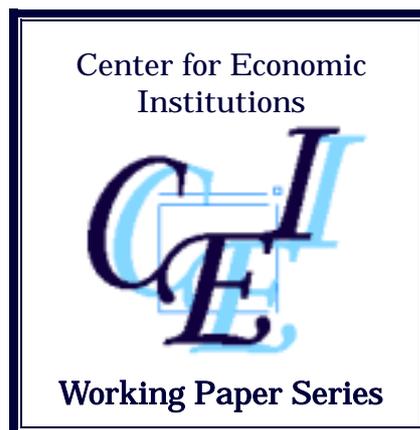


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***The Financing and Governance of New
Technologies***

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The Financing and Governance of New Technologies¹

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Abstract

This paper examines the financial sector preconditions for the successful development of high technology sectors. It argues that there is a close relation between types of activities undertaken in different countries and their institutional structures. A distinguishing characteristic of the financing of new technology firms is their evolving pattern of control by different investor groups. While stock markets are an important component of the development of the most successful firms, they are not the most common. Regulation is a significant influence on institutional structure. For the most part, Europe has opted for high levels of investor protection and low levels of diversity, while the U.S. has placed more emphasis on entry and competition in the financial sector. While most attention to date has focused on the regulation and fragility of banking systems in Japan and the Far East, careful consideration needs to be given to alternative forms of regulating other parts of the financial system as well.

Key words: high technology finance, corporate governance, financial systems, financial regulation

JEL classification: G2, G3, O3

1. Introduction

What are the financial sector preconditions for the successful development of a high technology sector? The conventional answer is straightforward: an active venture capital industry combined with a liquid domestic stock market. The development of venture capital firms and stock markets is regarded as a priority for the growth of high tech industries. Is this correct? How do high tech firms finance themselves and what role do stock markets play in their development?

There is accumulating evidence of a relationship between financial development and economic growth. Several studies report a relation between the size of financial systems at the start of a period and subsequent economic growth. Controlling for other considerations, financial development appears to contribute to growth. A range of measures of financial development are relevant - the volume of monetary assets, the size of banking systems and the size of stock markets.

To the extent that it is possible to establish the channel by which financial development contributes to growth, it appears to be through the external financing of firms. Comparing the growth of different industries across countries or different companies suggests that there is an inter-relationship between their growth rates, the extent to which they are dependent on external finance and the development of financial systems in which they are operating. In other words, financial development confers particular advantages on industries and companies that are especially dependent on external finance.

These results are consistent with the view that a primary function of financial institutions is to improve allocation of funds within an economy. Corporate, industrial and economic growth are assisted by institutions that direct financing to activities that are most dependent on external finance. The studies therefore provide empirical confirmation at an aggregate or industry level of the theoretical underpinning of financial institutions.

However, the question that these studies leave unanswered is which institutions are particularly well suited to performing these functions. Do all institutions serve companies equally well or are some institutions particularly well-suited to the financing of high technology?

The second set of issues concerns the policies that can be used to influence the development of institutions. Over the last few years a literature has emerged emphasizing the important role that legal and regulatory structures play in influencing institutional development. This literature has emphasized protection of investors as being a crucial determinant of the development of financial systems. Since, as noted above, the development of financial systems is in turn related to the external financing of firms, this points to a key role for investor protection in promoting the external financing and growth of firms. The policy message that appears to emerge from these studies is clear: improve investor, in particular minority investor, protection, and financial development, investment and growth will follow.

This raises the question of what precisely is the relation between legal systems, regulation and the structure of financial institutions. Is there, as the above literature suggests, a straightforward relation between regulation and the development of institutions? In particular, are certain regulatory rules suited to the financing of high technology activities?

Section 2 of this paper reviews evidence on comparative financial systems. Section 3 discusses ownership and control. Section 4 describes emerging theories that point to a comparative advantage of different financial and governance systems in promoting particular types of activities. The paper then turns to an illustration of this in the context of high technology industries. Section 5 discusses the pre-initial public offering (IPO) stage in part 1, and post-IPOs in part 2. Section 6 considers policy implications and lessons for Japan and Far Eastern economies. Section 7 concludes the article.

2. Comparative financial systems

There has been extensive comparison of the performance of different financial systems.² These analyses have focused on the contrast between bank oriented and market oriented systems. Most of the studies compare a small number of countries, focusing in particular on the UK and US on the one hand, and Germany and Japan on the other.³

The criteria by which systems are categorized include corporate financing, bank ownership of corporate equity and the exercise of corporate control by banks. Bank oriented systems are thought to display high levels of bank finance, equity holding by banks, long-term relations, close monitoring and active corporate governance by banks.

In practice, the distinction between bank and market oriented systems is fragile.⁴ While bank lending to corporations has been high in Japan in comparison to the UK and US, it has not in Germany. Bank holdings of corporate equity are modest in most countries. While banks are thought to have been actively involved in corporate activity and in particular restructurings in Japan, they have not in Germany. In addition, although early studies of Japan pointed to the advantages of close bank-firm relations in Japan, more recent ones have noted their defects in displaying excessive conservatism in corporate lending and inhibiting restructuring.⁵

The influence of financial systems on measures of corporate governance is also unclear. Close relations between financial institutions and companies might have been thought to influence incentives and disciplining of management. Systems with close relations have better information flows and thus a firmer basis on which to reward and discipline management. But they might lack the powerful incentive and disciplining devices of stock markets. In fact, to the extent that there is evidence on

² For surveys, see Carlin and Mayer (2000) and Levine (1997)

³ See, for example, Edwards and Fischer (1994).

⁴ See, for example, Mayer (1988) and Rajan and Zingales (1995).

⁵ See, for example, Kang and Stulz (2000) and Weinstein and Yafeh (1998)

this, it does not point to a clear difference in either incentive arrangements or disciplining across financial systems.⁶

3. Ownership and control

The standard bank-market orientation distinction is neither particularly robust nor insightful. In contrast, there are striking differences in the ownership and control of companies that do bear close scrutiny.⁷ This is normally discussed in terms of comparisons of concentration of ownership in the UK and US on the one hand, and Continental Europe and the Far East on the other. For example, in France and Germany, in more than 80% of the largest 170 listed companies, there is a single shareholder owning more than 25% of shares and in more than 50% of these companies, there is a single majority shareholder. In contrast in the UK, in only 16% of the largest 170 listed companies is there a single shareholder owning more than 25% of shares and in only 6% is there a single majority shareholder. Concentration of ownership is appreciably higher on the Continent of Europe than in the UK. High levels of ownership concentration have also been reported for the Far East and South America and ownership is as dispersed in the US as in the UK.

Not only does the level of ownership differ appreciably between the UK and US and most of the rest of the world but so too does the nature of that ownership. In the UK and US, the shares of listed companies are primarily held by institutions, such as pension funds, life insurance firms and mutual funds, and individual investors. Ownership is dispersed in the sense that no one institution or individual holds a large stake in a single company. This is described as an “outsider system”.⁸

On the Continent and in the Far East, the large share blocks are primarily held by families (or family holding companies) and other firms. Inter-corporate holdings of large blocks of shares are commonplace, frequently in the form of pyramids of shareholdings, cross-shareholdings or complex webs. As noted above, in most

⁶ See Kaplan (1994).

⁷ See Barca and Becht (2001) and La Porta, Lopez-de-Silanes and Shleifer (1999).

⁸ See Franks and Mayer (1995).

countries, bank holdings of shares are modest and holdings by the government vary appreciably across countries. This is described as an “insider system”.

4. Comparative institutional advantage

A theoretical literature is emerging suggesting a relation between the institutional structure of countries and the *types* of activities that are undertaken in those countries. There are several strands of theory pointing in this direction. These can be classified under the headings of information, renegotiation and corporate governance. In the information theories (see, for example, Allen (1993) and Allen and Gale (1999)) new technologies, where there are legitimate grounds for diverse expectations, benefit from securities markets. More traditional investments, which are prone to asymmetries of information between borrower and lender benefit from the economies of monitoring that banks can provide. In the renegotiation theories (see, for example, Dewatripont and Maskin (1995)), fragmented banking systems are associated with short-term investments and concentrated banking systems with long-term investments. Similarly, dispersed ownership systems are associated with high-risk R&D investments and concentrated ownership systems with lower risk, more imitative investments. In the corporate governance theories (see, for example, Burkhardt, Gromb and Panunzi (1997)), concentrated ownership is required to provide active governance of firms by investors but might result in excessive interference. Some activities benefit from the active monitoring of management; others are disadvantaged and require dispersed ownership to discourage investor intervention.

All of the above observations and theories therefore suggest a relation between financial systems and the ownership and control of companies and the types of activities that they undertake. As Carlin and Mayer (2001) argue, they suggest that there is an association between the institutional structure of a country and the activities undertaken in that country. They provide a first empirical assessment of this thesis. They examine the relation between growth and investment in 27 industries in 11 OECD countries over the period 1970 to 1995 with the interaction of the institutional structure of the countries and the characteristics of the industries. They find a close relation between growth and investment of different industries in different countries and the interaction of the structure of countries’ financial institutions with

the dependence of industries on a variety of financial and other inputs. The relation is particularly significant in the case of R&D. Investment in R&D is closely related to the dependence of industries on equity finance and highly skilled labour and is large in countries with good information disclosure, as measured by accounting standards. The relation between R&D and a high level of skills is pronounced, pointing to the significance of human capital in R&D activities.

The case of high tech and the financing of new economy illustrates how this relation between financial systems, governance arrangements, legal systems and investment and growth might operate. Germany has a large banking system, a two-tier board structure and a civil law code. The USA has a large stock market, a unitary board and a common law system. The rankings of industries by the intensity of patent registrations for Germany (relative to a twelve-country average) are almost inversely related to those for the USA. Information technology, semi-conductors and biotechnology, for example, are in the top six (of 30) industries by patent registrations for the USA and in the bottom four for Germany. Germany's patent specialization is highest in civil engineering and transport equipment, which are in the bottom three industries for the USA.⁹

The question that this raises is whether the difference in patent activity in the two countries is related to institutional differences between Germany and the USA. Does the concentration of patent activity in "science based" industries reflect the advantage of, for example, funding these activities through stock markets and does the more production oriented patenting activity in Germany relate to its highly concentrated ownership and large banking system? The question that this raises is whether there is an association between these differences in technological activity and the structure of countries' financial institutions. A detailed consideration of the way in which high tech firms are financed and governed provides some evidence on this.

⁹ Patent specialization indices for 30 industries are calculated from patents registered at the European Patent Office. The correlation between the German and US indices is -0.78 (Cusack and Soskice, 2000).

5. The financing of high technology industries

5.1 The pre-IPO stage

The development of high tech firms involves several phases (see Figure 1). The first is the seed stage when a concept has still to be proven and developed. The second is the start-up phase when products are developed and initial marketing takes place. The firm may be a year old or younger at this stage. The third is the early stage development when the firm is expanding and producing but may well remain unprofitable; it is often less than five years old at this stage. During the fourth stage of expansion it might go public after six months or a year.

The initial development almost invariably comes from savings and relatives. Initial external equity financing does not generally come from venture capital firms but from business angels. In the US it is estimated that the venture capital industry invested around \$5 billion in 1998 in 1,000 early stage firms. In comparison, business angels (wealthy or reasonably wealthy private investors) are estimated to invest \$15 billion annually in 60,000 early stage firms. In the UK, it is estimated that about 5% of small firms receive business angel support as against 1% receiving venture capital finance (quoted in Osnabrugge (1998)).

What accounts for the different contribution of business angels and venture capitalists to start-up financing? One of my former doctoral students, Mark van Osnabrugge, undertook a detailed comparison of the way in which venture capitalists and business angels operate. He compared the initial screening, due diligence, investment criteria, contracts, monitoring and exit routes employed by the different types of investor.

The results were striking. Venture capitalists are highly rule based using careful screening of applicants and due diligence. Business angels place more emphasis on ex post involvement in investments to reduce risks, such as their ability to contribute to the management of the business. Venture capitalists therefore act like institutions following principal-agent relations of limiting risks through monitoring. Indeed, since in the UK they are frequently subsidiaries of institutions, such as pension funds,

that is not surprising. Business angels are more actively involved in the subsequent management of activities, exerting more direct control.

From the outset, venture capitalists are focused on exit, business angels much less so. Venture capitalists in general look for rates of return of between 30-40%, business angels in the UK between 20 and 30%. Initial public offerings are the preferred route of exit for investors, since they yield the highest return, but they are not the most common. It is estimated that fewer than one in a thousand new ventures have an IPO. However, entrepreneurs are much more optimistic than this record would warrant. One study estimated that 70% of new technology firms believed that a public stock offering was “highly likely” or “probable”. Trade sales are the most common exit route of business angels, accounting for over 40% of exits, followed by sales of shares to other shareholders and sales to third parties. IPO’s account for just over 10% of business angel exits.

In the US, around 25% of venture capital funds are invested in early stage firms. In the UK, start-up and early stage investments also accounted for around a quarter of venture capital investments in 1984 but this has fallen to a figure of around 4% at present. MBOs and MBIs have substituted for start-up financing increasing from 20% to 70% of UK funds’ investment.

An important reason for the greater success of US venture capital in funding start-up businesses is the structure of the US industry. Venture capital comprises two parties (see figure 2) – the limited partners which are the institutional and individual investors and the general partners which are the venture capital firms investing in individual companies and entrepreneurs. The general partners manage portfolios of companies and are frequently successful entrepreneurs themselves who want to manage larger portfolios of investments. They therefore provide intermediate technical expertise between the investing institutions on the one hand and the entrepreneurs on the other. Venture capital industries in other countries, including the UK, frequently lack the pool of entrepreneurial scientists on which to draw to provide this intermediary function.

The picture that emerges is that the financing of new high tech firms is highly reliant on own funds, families and friends. Once these are exhausted, external equity initially comes from private investors who are actively involved in the management of the investment. Venture capitalists come in at a later stage, acting at more arms-length than business angels and seeking higher returns over short periods. A small fraction of the most successful firms are floated on stock markets; most are sold as trade sales and sales to other investors. Much venture capital finance in particular in the UK is not associated with funding new investments but management buy-outs.

To understand high tech finance, it is therefore important to appreciate it as being intimately connected to the control of firms (figure 3). The transition from personal to business angel to venture capital to stock market finance involves a gradual broadening of the investor base. This moves rapidly from the entrepreneur to single outside investors who are active managers, to financial institutions who use intermediary venture capital firms to screen and manage their investments, to stock markets with largely passive investors.

The financing of Amazon.com illustrates this (see figure 4). The firm was initially funded out of Jeff Bezos' own savings and some borrowings. The family then invested a quarter of a million dollars. Two business angels then came in followed by a larger business angel syndicate. There was a further small family investment followed by a substantial venture capital injection of \$8 million. A year later the firm went public with an IPO of \$49 million.

5.2 The post IPO stage

What happens after the IPO? Another former doctoral student of mine, Marc Goergen, has undertaken an interesting comparison of the changing pattern of control of UK and German firms after they have gone public. Goergen notes that historically the average age of a firm coming to the German stock market has been 50 years. In the UK it is around 12 and in the US around 6 years. German firms have typically been about twice as large as UK firms on coming to the stock market. At the time of the IPO in general there is either no change in control in Germany with the original investors retaining control or control is transferred as a block to a new investor. Even

six years after the IPO, families hold majority stakes in nearly 50% of German firms. In the UK families control a majority of votes in only 11% of firms; most are either taken over or become widely held.

This difference even persists in the Neuer Markt firms. As Vittols (2000) documents, the typical Neuer Markt firm adheres to what is described as the “Herr im Hause” (“Master of the House”) model where the founder/ CEO has a controlling stake in the firm and dominates the company board. The innovation strategy is the incremental development of existing products in contrast to that of a venture capital dominated “Silicon Valley” firm, which seeks the development of a block buster product.

Similarly, in Japan the average age of companies coming to the stock market is significantly greater than in the US. Sako (2001) reports, for the population of Japanese IPOs in 2000, that the average age of firms coming to the Mothers Market is 8 years, 15 years on Nasdaq Japan and 27 years on JASDAQ. The sectoral composition of Japanese IPOs is also quite different from US IPOs. Internet and IT sectors dominate Mothers and Nasdaq Japan while a large majority of JASDAQ IPOs were in the retail sector.

This further emphasizes the important control differences not only between old and new economy firms but also between different types of new economy firms. There is a much more rapidly changing control structure in new than old economy firms. Dominant control structures in old economy firms are concentrated and slowly evolving. Dominant control structures of new economy firms shift rapidly between entrepreneurs and different investor groups as the production process and financing needs of firms change.

Examining what happens once firms are established on the stock market further reinforces this observation. Work that I have been doing with Marc Goergen has compared the characteristics of companies listed on the UK stock market with equivalent sized firms that are privately owned. Consistent with the above observations on the importance of stock markets for high tech firms, listed firms are concentrated in R&D intensive sectors of the economy. Listed firms obviously raise much more equity finance but this is not used to fund internal investment. Instead,

what clearly distinguishes listed from unlisted firms is the extent to which they engage in acquisitions. Access to stock markets primarily provides firms with the opportunity to expand through acquisition. Stock market listings and dispersed share ownership are important not only in making firms subject to the discipline of the takeover market but in providing them with the opportunity of expanding through acquisitions themselves. Again it is the potential for rapidly evolving patterns of control that mark out the new economy firms.

6. Financial institutions and venture capital financing

We return to the question of the relation of the structure of financial systems to corporate activities in the context of the financing of entrepreneurial firms. To date, very little is known about this. Black and Gilson (1998) have argued that stock markets are a pre-requisite to the successful development of a venture capital market and that IPOs provide an important exit route for venture capital funds. But even this assertion is open to question as a comparison of venture capital in Israel and the UK illustrates. Even though the IPO market has not been active in Israel in recent years, there is widespread investment in firms in their early stages. Instead of using the Tel Aviv market, most high-tech companies go public in the US on NASDAQ (Blass and Yafeh, 2001). In the UK, where the stock exchange is much larger and more liquid than the Tel Aviv stock exchange, investments in early stages of technological developments are comparatively rare. In addition, according to the venture capital associations, IPOs are nearly as important as an “exit” mechanism in bank-dominated Germany as they have been in the UK in recent years – 7.5 percent of all venture capital backed companies in Germany as against 9 percent in the UK.¹⁰

Mayer, Schoors and Yafeh (2001) have undertaken one of the first analyses of the relation between institutional structure and venture capital finance. They examine venture capital industries in four countries: Germany, Japan, Israel and the UK. Their analysis differs from much of the preceding literature in (a) providing an international comparison of countries outside the US and (b) examining the funds themselves rather than the venture capital firms. The question that the paper poses is, to what extent can

¹⁰ EVCA (2000) and BVK (2000).

differences in venture capital activities (in particular, stages of finance and sector focus) be associated with the venture capital firms sources of finance. Do venture capital firms that are funded through banks invest in firms at different stages of their development from those that are funded by private individuals? Do pension and insurance fund backed venture capital firms have a different sector focus from corporate backed funds?

To answer these questions, Mayer, Schoors and Yafeh collect data on venture capital firms and their sources of finance from venture capital associations. The results were striking. Firstly, they report substantial differences across countries in terms of the stage of finance of venture capital firms. In some countries, notably Israel, funds are much more focused on early stage investments than in others, in particular Japan. There is a remarkably close similarity in stage of finance between Germany and the UK despite the differences in their financial systems noted above.

Secondly, there are significant differences in venture capital firms' sector focus. While biotechnology and life sciences receive a substantial level of attention in all four countries, a much larger fraction of venture capital firms in Israel and Japan invest in information technology, software and electronics than in Germany and the UK, where the manufacturing sector receives more attention.

Thirdly, the paper reports substantial variations in the sources of finance of venture capital firms. Banks are a major source of external finance in all countries, particularly in Germany and Japan.¹¹ Pension funds are much more significant in the UK than in the other three countries. Corporations are a more important source of finance of venture capital firms in Israel than elsewhere.

Fourthly, the paper reports that there are significant relations between sources of finance of venture capital firms and their investment activities within countries. In particular, banks and pension funds backed venture capital firms invest in later stage,

¹¹ More generally, Sako (2001) notes the relationship between VC firms and old economy firms in Japan arguing that "in the future the most successful Japanese incubators will not be affiliated with free-wheeling venture capital funds. Instead, they are likely to be backed by the most forward-looking members of Japan's old mainstream economy: trading companies and banks, manufacturers and consumer companies" (p. 12).

while venture capital firms relying on private individual investors favour earlier stage activities. Industry and privately backed funds are focused towards IT, software and electronics and away from manufacturing sectors, while the reverse holds for pension funds.

Fifthly, the paper records significant differences in the relation between financing and investment stage in different countries. While bank backed venture capital firms in Israel and the UK invest in later stage activities relative to other sources of finance, bank backed funds in Germany and Japan are no different from other venture capital funds. Later stage investing by pension funds is a feature of the UK but not of Israel, the only other country where pension funds are a significant source of venture capital finance.

Institutional differences are therefore associated with significant differences in venture capital activities within countries. But the paper also reports that institutional differences only account for a small proportion of the differences in venture capital activities across countries. This suggests that a majority of international differences are attributable either to demand for funds (i.e supply of entrepreneurs) rather than supply of financial institutions or to the availability of alternative sources of entrepreneurial finance, for example, business angels referred to above. The implication is that while there may be a matching of institutions with types of entrepreneurial activities within countries, international differences in entrepreneurial activity are primarily driven by other considerations.

7. Policy implications and lessons for the Far East

With the collapse of the internet bubble and retrenchment of VC firms in the US and Europe, it might be thought that a discussion of the financing of new technology is largely redundant. But what we are currently experiencing is, of course, precisely what a theory of a relation between institutional structure and corporate activity would predict. Some financial systems are suited to the initial phases of technological innovation that we are currently witnessing and others are suited to the subsequent implementation stages which we are about to observe. Not only are there cross-sectional variations in the relative performance of different systems at a particular

point in time but there are also variations in performance of different systems over time.

This is what has been repeatedly observed in the past. The most important periods of stock market expansion have coincided with major technological innovations when returns to investment were exceptionally high. In the UK, these were associated with financing of the canals at the end of the 18th century and investment in railways in the 19th century. But stock markets were less well suited to financing activities that offered more modest returns, most notably investment in manufacturing.

What are the policy implications of this and in particular, what are the lessons for Far Eastern economies? Inevitably, most attention has been focused on banking systems and banking crises. As table 1 records, Far Eastern economies remain highly dependent on bank lending: they still in general have substantially higher levels of bank lending and lower levels of corporate bond and stock market value as a proportion of GDP than the US. The Japanese banking crisis has been variously attributed to asset price declines, deregulation and deepening of capital markets, imbalances in deregulation between savings and corporate borrowing, moral hazard from deposit insurance, and a slow response to the crisis by the regulatory authorities (Corbett (2000), Hoshi and Kashyap (1999), Hutchison (1998) and Kanaya and Woo (2000)). A variety of prescriptions have been proposed for dealing with the crisis which suggest a marked contraction in the banking sector, mergers of banks, write-off of loans, improved governance of banks and greater transparency.

What has received much less discussion to date is the appropriate structure of financial regulation outside of banking. Is there, as the literature in the introduction suggests, a straightforward relation between regulation and the development of institutions? Becht and Mayer (2000) have recently argued in the context of an analysis of the ownership and control of European corporations that regulation affects the structure of financial and corporate systems. There is evidence that regulatory differences across European countries and between the UK and US bias institutional arrangements in particular directions.

The regulation of the high tech sector illustrates this well. While the UK and US are generally classified under similar common law systems, there are actually pronounced differences between the two countries in their approach to the regulation of non-bank financial institutions, such as pension funds and fund managers. One of the important contributors to the development of venture capital in the US was the relaxation of the “prudent man” rule on pension funds at the end of the 1970s. This stimulated a substantial expansion in investment in venture capital activities during the 1980s. US regulation emphasizes the importance of disclosure of information to investors, auditing of the behaviour of institutions and the imposition of penalties, in the event of failure being uncovered.

In the UK, investor protection has relied more heavily on public compensation schemes and the imposition of detailed conduct of business rules. For example, to protect pensioners from the types of losses that were incurred in pension fund scandals during the 1990s, rules were imposed that encouraged pension funds to invest heavily in government securities. These had the effect of discouraging investment in more risky investments such as venture capital funds.

US regulation therefore promotes private contracting, UK regulation relies more heavily on public contracting. Private contracting systems do not require institutions to amass capital before they are allowed to transact. They do not presume that there is a single best way of transacting business and they do not seek to impose common rules of conduct. Instead, they allow institutions and investors to choose how to organize their business and where to invest. If malpractice is uncovered then there is a significant probability that it will be uncovered through auditing and penalized through the courts.

A critical question that this comparison raises is the extent to which reliance should be placed on public versus private contracting to provide protection in non-bank financial institutions. The advantage of private over public contracting is that it does not prejudge what is acceptable. It allows for a greater degree of diversity of institutional form. It permits institutions to adapt more rapidly in the face of changing requirements of both investors and firms. It has therefore made it easier for

institutions to respond to the changing financing and control needs of high technology firms in the US than in the UK.

On the other hand, it relies on “caveat emptor” and in general provides investors with less protection than public contracting schemes. It places considerable emphasis on private agents, such as analysts, accountants and auditors, to collect and process information. It relies on the courts to enforce contracts. All of these are better developed in the US than elsewhere and it is questionable therefore whether the US model is the appropriate one for the Far East.

8. Conclusions

This paper has argued that there is a close relation between the types of activities undertaken in different countries and their institutional structures. Certain types of institutional arrangement, in particular information disclosure, appear to be related to growth of R&D activities. More generally, there is a relation between the structure of institutions and the types of high tech activities undertaken. The contrast between German and US patenting and the greater success of the general-limited partnership arrangements in the US than the captive funds in the UK in funding start-up activities are illustrative of this. So too is the relation between the source of funding of venture capital firms in different countries and the types of activities that they fund.

A distinguishing characteristic of the financing of new economy firms is its evolving pattern of control by different investor groups. Participation in successful firms moves rapidly from own investments, to families, individual investors, small groups of investors and to venture capitalists funded by financial institutions. While stock markets are an important component of the development of the most successful firms, they are not by any means the most common. Where initial public offerings occur, they involve rapid changes in control from original to new investors and dispersed ownership. Stock market finance is important in allowing control of and by high tech firms to alter.

Regulation is a significant influence on the ability of financial institutions to be able to respond to the changing needs of corporate borrowers. The form in which investor

protection is provided affects the degree of risk taking by financial institutions and the types of financing that they offer. This is well illustrated by differences between the public contracting systems of regulating investment management in Europe and private contracting in the US. Private contracting forms of regulation permit a greater degree of competition and variety of products in financial markets. However, they rely on caveat emptor, private firms to undertake monitoring and the courts to enforce contracts. Which form of regulation is most appropriate both for investors and companies in Japan and the Far East in the 21st century is something that will require careful consideration once the more immediate concerns about restructuring banking systems have subsided.

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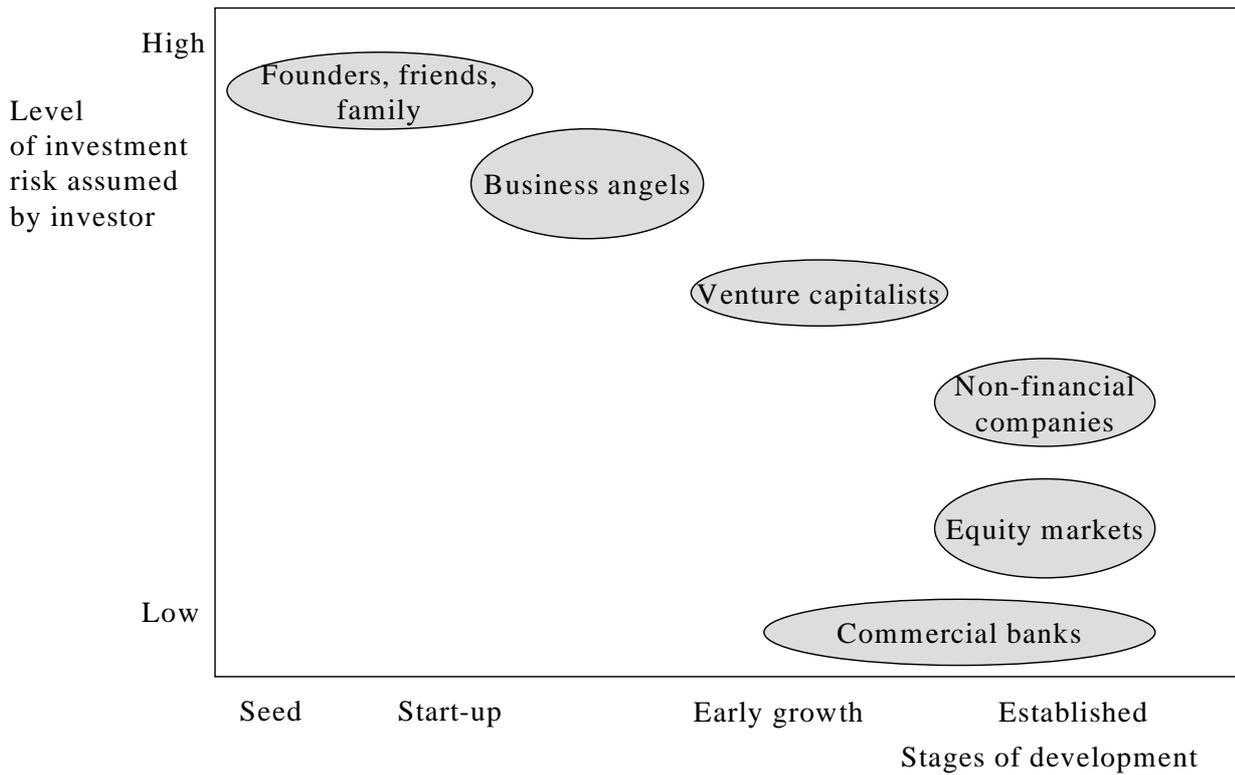
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Figure 1: The Development and Financing of Entrepreneurial Firms



Source: Van Osnabrugge and Robinson (2000)

Figure 2: The Structure of the US Venture Capital Industry

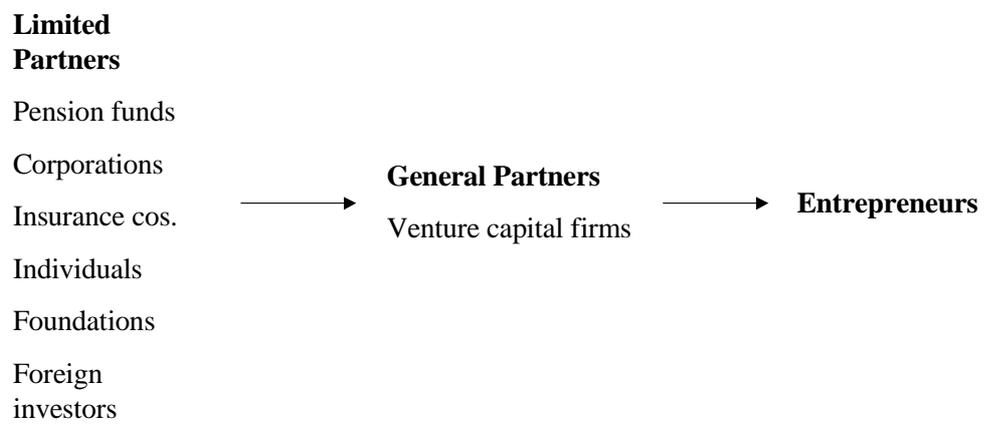


Figure 3: Stages of Entrepreneurial Finance

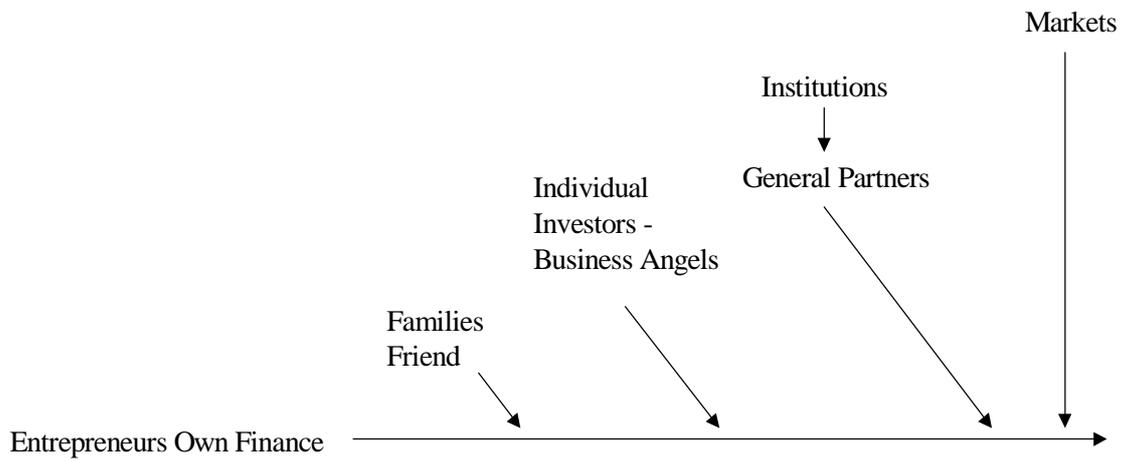


Figure 4: The Financing of Amazon.com (1994 - 1999)

Time Line	Price/ Share	Sources of Funds
1994 - July to Nov	\$.001	<i>Founder:</i> Jeff Bezos starts Amazon. Com with \$10,000, borrows \$44,000.
1995 - Febr to July	\$.1717	<i>Family:</i> Founder's father and mother invest \$245,500.
1995 - Aug to Dec	\$.1287-.3333	<i>Business Angels:</i> 2 angels invest \$54,408.
1995/6 - Dec to May	\$.3333	<i>Business Angels:</i> 20 angels invest \$937,000
1996 - May	\$.3333	<i>Family:</i> Founder's siblings invest \$20,000.
1996 - June	\$2.3417	<i>Venture Capitalists:</i> 2 venture capital funds invest \$8 million.
1997 - May	\$18	<i>IPO:</i> 3 million shares issued raising \$49.1 million
1997/8 - Dec to May	\$52.11	<i>Bond issue:</i> \$326 million bond issue. Source: Smith and Kiholm (2000)

Table 1. Bank Loans, Corporate Bonds and Stock Markets as a Percentage of GDP, End 2000

	Bank Loans	Corporate Bonds	Stock Market Value
Indonesia	20.9	1.7	20.0
Japan	109.3	12.9	70.9
Malaysia	91.6	41.3	124.9
The Philippines	39.6	N/A	77.6
South Korea	88.4	25.8	36.4
Thailand	86.1	10.2	26.2
USA	48.6	45.2	124.2

Source: IMF, International Financial Statistics, reproduced in Japanese Ministry of Finance, “Challenges of the Asian Economy and Financial Markets” (2001)