

Funding TECHNOLOGY

Lessons from America

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Foreword

Funding Technology is a lively contribution to the debate in the UK on the conversion of the science base into commercial success. It is clear that momentum in the US has gathered pace in recent years and that dynamic growth in knowledge-based industries is no longer confined to a few regions such as northern California or Boston.

The UK has come a long way since the time when I set up Acorn Computers but momentum and a sense of urgency are still lacking. We have seen progress in individual areas, including a willingness in some leading universities to encourage (and benefit from) technology transfer. We now require the separate components of the knowledge economy – especially risk capital and entrepreneurship – to come together in a "golden chain", as the authors of this report describe it.

For momentum to gather and for the numerous key players in the knowledge economy to come together over here, as in the US, all those concerned must recognise the value of networking, both formal and informal. *The Cambridge Network*, which I helped to establish in 1998, is one successful example of a formal network in action, but similar ventures elsewhere are required to bring to life the numerous public and private initiatives launched over recent

years. UK regions are too small to compete individually on the world stage and must co-operate to compete. Cambridge might aim to become, say, Palo Alto, but on its own will never be of a size to take on Silicon Valley.

Finally, the authors of this report make clear that although the US – in its scale and vibrancy – still has much to teach the old world, the UK is doing several things right. The Cambridge MIT Institute is a welcome initiative involving universities, government and the private sector. Business incubation in the UK, for both biotech and software businesses, has come on apace since the mid-1990s. And the British may finally be learning that "it's cool to be an entrepreneur," as one of the companies interviewed for this report put it.

But we should not forget that countries in mainland Europe and elsewhere are learning technology entrepreneurship fast and this report provides a guide to the many steps which remain to be taken by the UK.

Hermann Hauser
Cambridge
March 2000



Preface

"I went to my bank first and met a very nice chap, very friendly. It turned out he was normally doing things like lending money to people to set up newspaper shops. He did not really feel qualified to comment on my adaptive non-linear pattern recognition technology. But he did give me a good piece of advice, which I carry with me even now, which is that people will always buy confectionery."

Mike Lynch, CEO and founder of Autonomy, the UK's largest internet software business, quoted in *The Observer*, 5 December 1999

This report is based on a series of some 50 interviews conducted towards the end of 1999 in the Boston area, North Carolina, California and the Pacific North West of the United States.

The authors of this report, all of whom are involved in the development of technology-based small firms (TBSFs) in the UK, have long been concerned that Mike Lynch's experience is representative of the great majority of UK TBSFs: not only do few if any bespoke financing products exist to enable such firms to prosper as they do in the US, but also few in the financial community understand the special needs of such potentially rewarding companies.

Despite a noticeable change in thinking initiated by the 1996 Bank of England report on *The Financing of Technology-Based Small Firms* and an increased availability of venture capital, the existing UK financial services sector is in many respects more appropriate for Napoleon's nation of shopkeepers than it is for the new economy of the twenty-first century.

This matters, as during our interviews we were frequently reminded that German, Israeli or Far Eastern banks and government agencies had already covered the same ground as us and are implementing the lessons. The UK requires a sense of urgency.

Innovative financial markets have been a key component of the extraordinary economic growth which the US has seen for nearly a decade. This report sets out specific recommendations for legal, technical or commercial changes which the authors believe will help the UK in catching up with the US experience and – eventually – setting in motion a similar virtuous circle of wealth creation as on the other side of the Atlantic.

The authors are grateful to the many US executives who gave up sometimes considerable amounts of their time to explain how the virtuous circle works from the inside. HM Consuls (Commercial) in Boston, San Francisco and Seattle were most helpful in enabling us to meet key individuals in technology finance in the US. We are also grateful to the numerous individuals in the UK who have assisted us in clarifying current legislative and regulatory issues. Any remaining errors are the sole responsibility of the authors.

Finally, although all the authors are actively involved in the TBSF sector in the UK, the opinions expressed in this report are those of the authors alone and do not necessarily reflect those of the organisations for which they work.

**St Patrick's Day
17 March 2000**





Summary and Recommendations

*"Most of us make our money from thin air: we produce nothing that can be weighed, touched or easily measured. Our output is not stockpiled at harbours, stored in warehouses or shipped in railway cars. Most of us earn our livings providing service, judgement, information and analysis, whether in a telephone call centre, a lawyer's office, a government department or a scientific laboratory. We are all in the thin-air business."*¹

1.1 This paper summarises the findings of a research team² investigating recent developments in the funding of technology-based firms in the US. Some 50 interviews were conducted over a period of 18 days in the Boston area, North Carolina, California and around Seattle³. The authors are grateful to the numerous executives interviewed, whose readiness to give up valuable time was instructive in itself: collaboration is as much part of the "new economy" as is competition, and in the wired world success accrues to those with the best networks, technical or professional.

1.2 The importance of the high-tech sectors for overall economic growth is now widely accepted. A recent report from the US Senate summarises this explicitly as follows:

"America's robust economic expansion is being led by the high-technology sector, which is currently generating over one third of real economic growth. High-tech industries now account for about 8.2% of US gross domestic product, up from 4.5% in 1980 [...] US leadership in the high-tech sector highlights the gap between America's fast-growing and dynamic economy and the slow-growth economies of Europe and Japan during the 1990s [...] In 1998, the per capita GDPs of the European Union and Japan were just 70 and 79%, respectively of the US figure. These income gaps show no sign of narrowing any time soon."⁴

1.3 Not only is the volume of funds raised for venture capital investment in the US some five

times the European total, but a far higher proportion of equity investment is directed in the US towards high technology sectors. The venture capital industry in the US raised funds at an annualised rate of £25bn in 1999, nearly twice the 1998 level. Two thirds of funds were placed in the IT sector (73% of which went to internet proposals)⁵. Please see Box A for further details⁶.

1.4 Technology start-ups and growth businesses in the US benefit from a virtuous circle, whose key components are:

- a growing cadre of serial entrepreneurs willing to invest their time, money and experience in new businesses
- a wealth of knowledgeable venture capital funds at all investment stages
- a permissive environment for institutions to invest in venture funds
- a supportive capital gains tax regime
- generous and intelligent use of share options
- a critical mass of business angels with extensive resources, a technology background and entrepreneurial experience
- added value from specialist banks
- financial innovation, including widespread use of instruments such as venture leasing
- liquid capital markets
- numerous research-led universities with sophisticated technology licensing offices
- incubation as an integrated range of activities and actors providing effective nurturing of new business ideas (from screening to initial public offering or IPO) beyond the traditional incubator provision of "heat, light and dialtone"

1 Leadbeater C (1999) page vii

2 Biographical details are set out in Appendix 2

3 A full list of individuals and firms interviewed is set out in Appendix 1

4 US Senate (1999) page 2

5 *Financial Times* 25 January, 2000

6 Detailed statistical information can be found at <http://www.nvca.org> , <http://www.bvca.co.uk> and <http://www.ventureone.com>



Summary and Recommendations

- and limited management support
 - a culture that celebrates and rewards risk-takers and does not punish those who suffer 'honest' failure
 - an acceptance by leading universities of entrepreneurship as a viable career path for their students (reflected in teaching and training programmes) and a subject deserving of widespread study (as reflected in every area of research)
 - readily available, quality office space on flexible terms
 - pervasive involvement of corporations in venturing
 - active transfer of technology from the public to the private sector.
- 1.5 Since the US has benefited from a virtuous circle rather than from one single event or policy initiative we do not believe that there is a "silver bullet" for UK TBSFs, instead the key components form a "golden chain". This paper analyses the interrelation of the key links in the chain and makes recommendations on regulatory reforms and commercial innovations required to accelerate the pace of growth of the new economy in the UK. The main recommendations include:
- clarifying the rules governing pension fund investment in venture capital
 - leadership in pension fund VC investment from public sector funds
 - simplification of the UK capital gains tax regime
 - simplification of the UK rules governing employee share options
 - enhancing the quality and availability of entrepreneurship education
 - recognition by fast-growth entrepreneurs of the need to give up equity
 - developing specialist banking units focused exclusively on technology
 - reviewing university ownership and management of intellectual property
 - taking a more positive approach to business involvement by university faculty
 - increasing the awareness of analysts in large financial institutions with an understanding of the dynamics of high-growth technology businesses
 - flexibility on the part of professional advisers prepared to take options as part of remuneration
 - a light regulatory regime for sophisticated private investors and angel groups
 - corporate venturing leadership from public research and technology organisations
 - clarifying and unifying government policy towards knowledge industries.

BOX A
UK versus US High Technology Venture Capital Investment
 The information in this section is extracted from BVCA 1998 Report on Investment Activity (p.32)

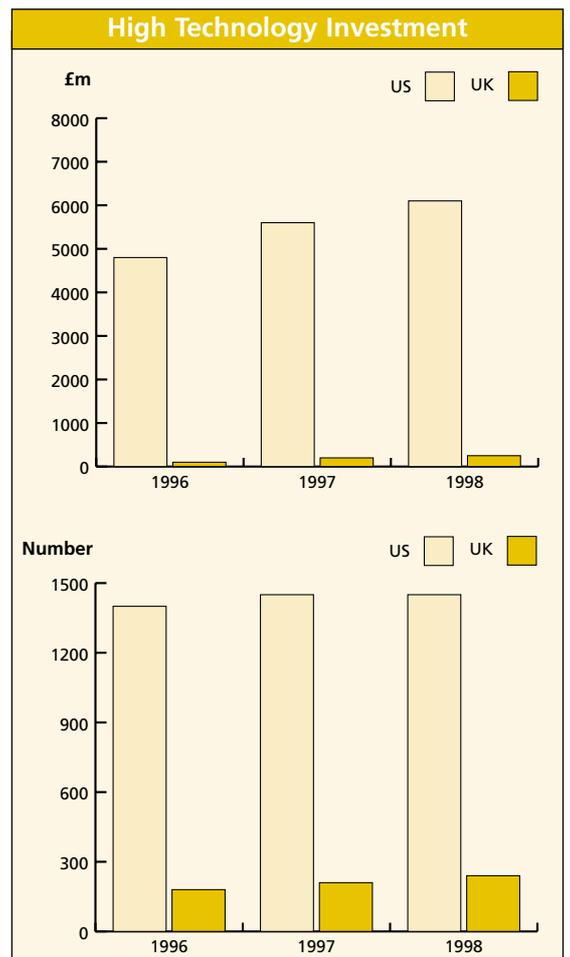
Year	High Technology Investment				GDP Penetration % (x100)			
	Amount US (£m)	US No.	Amount UK (£m)	UK No.	US GDP £bn	%	UK GDP £bn	%
1996	4,844	1,391	150	150	4,889	0.10	742	0.02
1997	5,673	1,518	283	214	4,886	0.12	801	0.04
1998	6,291	1,506	336	295	5,134	0.12	838	0.04

Sources

GDP figures were provided by the CBI from comparable OECD figures.
 Annual average exchange rates provided by the Bank of England (1998: £1=\$1.6574; 1997: £1=\$1.66; 1996: £1=\$1.5617)
 US venture capital figures: Venture One in the US
 UK venture capital figures: BVCA Reports on Investment Activity.

Notes

- 1 US and UK figures include "communications", "computer related", "electronics", "biotechnology" and "medical/health related", excluding non-technology/other.
- 2 UK includes early stage and expansion technology investment and therefore, allowing for any differences in methodology, is as comparable with US data as possible.
- 3 Leveraged buy-outs (similar to UK MBOs and MBIs) are not included in US VentureOne figures as they are not considered to be "venture capital". It is for this reason that MBO/Is are not included in the UK technology figure for the purposes of this comparison.



Venture Capital & the New Economy

"Different kinds of people are becoming rich these days. For the first time in my life, the engineers are the guys who are making all the money in America. Ten software engineers are leaving a big company, setting up in a garage, developing new communications products and selling their company after two years for \$500 million ... In the old days, it was always the providers of finance and the old senior managers who got rich."

Lord Simpson of Dunkeld, Chief Executive of Marconi, quoted in The Times, 18 December 1999.

INTRODUCTION

- 2.1 The new industries – whether based around the internet or biosciences – require significant external finance, and the majority of funding comes not from the banks but from venture capitalists (the VCs) and other providers of risk money, such as business angels and corporate venturing. This contrasts with established business sectors in the UK, for which bank finance is the largest single source of external funding, although it has declined from over 60% (1987) to under 50% (1997).⁷
- 2.2 Both the number of VCs, many of them relatively recently formed, and the amounts which they are able to raise, are breathtaking.⁸ We interviewed several fund managers who have recently raised, or are raising, funds of \$500m – or even over \$1bn. In some instances, a fund of \$1bn raised in 1999 had already been invested or committed, and the fund manager is raising a new fund to be able to carry on investing in 2000. In addition, most US entrepreneurs understand the need to part with equity to grow the business. In contrast with the UK, the most frequent question is not "whether" but "how much".
- 2.3 Such is the interest in VC that fund managers are able to select investors, and give preference to "smart" investors with industry value-added. However, it is essential to distinguish the following from each other: private equity; venture capital; and internet investment. Different characteristics apply to each market, and in the internet space (unlike the technology sector proper) it is more likely to be the marketing

entrepreneurs than the technologists who figure most prominently. (Please refer to paragraphs 2.15 – 2.17)

- 2.4 To summarise by using two phrases quoted to us by US investors, in recent years internet stocks have been seen as the "low hanging fruit" as a dot.com can be floated within two years of start-up and without recording a profit, whereas biotech businesses may need seven years or more of careful nurturing before it is clear whether any marketable product will be generated. However, investors are also beginning to recognise that "even turkeys can fly in a tornado" and that current market conditions may be unsustainably turbulent.

SCALE OF US VENTURE CAPITAL

- 2.5 The overall scale of the venture industry in the US can be gauged from the following summary:

"US venture capital investment has surged in the past three years from \$7.4bn in 1995 to \$25.3bn in 1998, according to National Venture Capital Association (NVCA)⁹ data. Figures for the first half of 1999 show that venture capital investment has soared 72% over the first half of 1998. In 1998, 61% of venture capital investment went to information technology firms, 19% to medical and biotech firms, and the remaining 20% to non-technology firms [...]

"According to NVCA figures, the United States raised five times more venture capital than Europe in 1998. US venture capital investment, or commitments, of \$25bn compared to just \$5bn for Europe. NVCA figures for a broader measure of private equity, which includes venture capital and buy-out capital, totalled

7 ESRC Centre for Business Research, Cambridge: *Enterprise Britain 1994-1997 (1998)* and *The Changing State of British Enterprise (1996)*

8 For an overview of "the new economy", please see section 11 below

9 <http://www.nvca.org>; see also <http://www.ipo.com> and <http://ventureOne.com>

- \$80bn for the US in 1998, which was four times larger than the figure for Europe of just \$20bn."¹⁰
- 2.6 Both commercial and regulatory reasons lie behind the success of the VCs in attracting investors. US investors have seen that venture capital can frequently produce returns significantly higher than would be possible from a portfolio confined to more traditional instruments such as fixed income securities or even quoted shares. We were told several times that a 40%+ internal rate of return (IRR) on a manager's current fund is the minimum prerequisite for raising subsequent funds, and that many VCs are achieving internal rates of return of 300%+.
- 2.7 Such is the interest in and understanding of equity investment and the almost "household" status of some VCs in broad swathes of US society at large that free events listings magazines in Boston will provide a guide to IPOs (initial public offerings, or flotation on a Stock Exchange) as well as to film or theatre events.

The well-established Silicon Valley firm of Kleiner Perkins Caulfield & Byers (KP) is considered so successful that rooting for it is like rooting for the Yankees. KP is personified by John Doerr, author of the phrase "largest legal creation of wealth in the history of the planet" to describe VC investment. Using 1997 figures KP-backed companies were worth \$125 billion, had turnover of \$61 billion and employed 162,000 people.¹¹

PENSION FUND REGULATIONS

- 2.8 In the light of these returns, professional money managers such as pension funds can see the commercial rationale for putting a meaningful proportion of their assets into VC. However, the pension funds would not have been able to invest in the first place if US regulations over the past 20 years had not enabled and encouraged them to do so.
- 2.9 The key regulations governing availability of funds for investment in venture capital from pension funds are the amended rules stemming from the Employment Retirement Income Security Act (ERISA). Originally enacted in 1974 to cover a broad range of pension funding issues, ERISA was amended in 1979 and 1980 in ways favourable to investment in venture capital (the "prudent man" and "safe harbor" changes).
- 2.10 From 1979 US pension funds were no longer steered away from investing in venture funds on account of their fiduciary duty to avoid investments deemed inherently risky (the "prudent man" rule). Up until that point many VCs also appear to have been reluctant to consider pension funds as appropriate investors as it was possible that the same fiduciary constraints would apply to the VC as to the pension fund manager. VCs were required to register with the Securities and Exchange Commission and were bound by the associated investment advisor regulations.
- 2.11 The supply of venture capital from venture funds was therefore greatly improved by allowing pension funds to invest up to 15% of their assets in riskier investments ("other assets"), clarifying the fiduciary position of VCs and removing the SEC registration requirements. Further changes in 1980 (the "safe harbor" rule) also made it clear that investment in venture capital was prima facie a suitable use of pension fund money. As a result of these changes, pension funds rapidly became the largest single source of VC funding in the US.¹²
- 2.12 It can be argued that by contrast with the US position, UK pensions legislation inadvertently makes pension fund involvement with venture capital difficult. The Pensions Act 1995, which will be fully in force by 2002, introduced the Minimum Funding Requirement (MFR), such that assets must closely match liabilities if a fund were liquidated immediately. It appears that as a result a greater proportion of UK pension fund monies are being diverted to government bonds. At the same time, the shift from defined benefit

10 US Senate (1999) pages 22 – 23. However, compare also British Venture Capital Association press release 30 April 1999. "UK Venture Capital industry invests almost £5bn in 1998 – record amounts invested in start-ups, early stage and high technology companies"; see <http://www.bvca.co.uk/Publications/VCAActive.html>. For a reconciliation of funds raised and funds invested over the business cycle see Bank of England (2000) Chart 4.2

11 The increasing availability of venture capital continued into the last quarter of 1999, when \$14.69bn was invested in entrepreneurial companies, bringing the annual total to £35.6bn. See <http://www.pwcmoneytree.com>

12 Details of ERISA legislation are complex and elusive. However, both the Department of Labor and the House Committee on Ways and Means publish useful information: see <http://www.dol.gov> and <http://www.house.gov/jct>

pensions to defined contribution pensions is also likely to see a reduction of capital flows to VC funds as individuals with the freedom to choose asset allocations are unlikely to have experience of the VC sector.¹³

market in 1998/99 (venture capital and private equity) was about £5bn. The total size of the combined markets in the US was about \$80bn, with the venture capital element alone accounting for \$25bn.

2.13 As a result, US pension funds invest an average of 5% of their assets in venture capital compared with 0.53% for UK pension funds.¹⁴

2.17 As a result, not only does the US have significantly more VC than the UK – thanks to more permissive ERISA regulations and the historic returns of the VCs themselves – it also channels a far higher proportion into the new technology sectors.

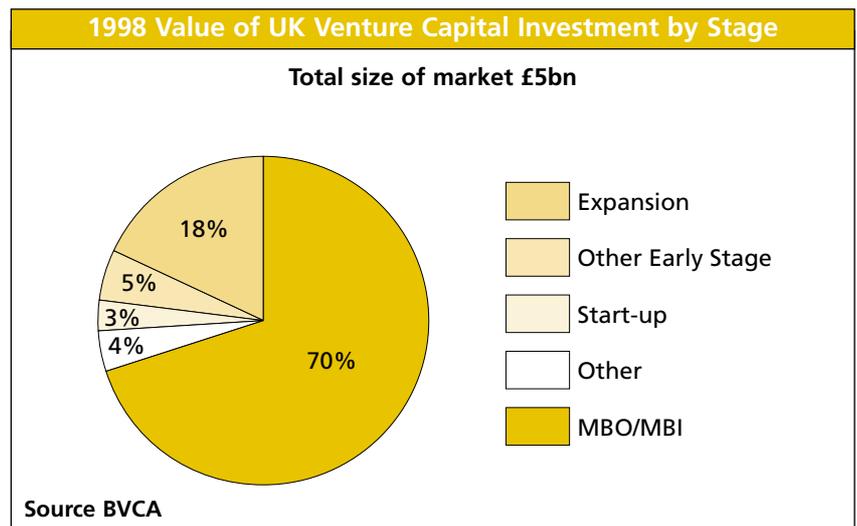
2.14 Pension funds in the UK are not restricted by law in the amount of a portfolio which can be invested in venture capital. The minimum funding requirement and the associated valuation based on winding up the fund assumes that funds are held in a standard form. The FRED 20 standard also has an impact as any fund surplus or deficit is shown on the company balance sheet. Volatile assets may therefore not be considered favourably by trustees.

2.18 However, a significant proportion of new US venture capital activity is focused on internet related investment, especially e-commerce. Among the largest new entrants to the US venture capital industry are Softbank,¹⁶ Internet Capital Group,¹⁷ and CMGI,¹⁸ all of whom invest exclusively in internet businesses, new media and e-commerce. Between them they account for \$5bn or more of new venture capital raised in the US since 1996. In contrast, established technology investors such as Kleiner Perkins,¹⁹ Menlo Ventures,²⁰ Mayfield Fund,²¹ and Sequoia Capital,²² which between them have backed AOL, Netscape, Yahoo, and Hotmail have maintained a balanced portfolio approach, continuing to invest in healthcare, biotechnology and non-internet 'hard' technologies. That said, Mayfield recently announced that its latest fund, Mayfield X, will be concentrating on the internet and new media.

2.15 Trustees may be tempted to place 5% of assets (itself a high proportion by historical standards) in venture capital but if the fund is small, the costs associated with managing it will be high. However, often the costs do not balance the exposure to volatility and so no venture capital investments are made. In addition, the relatively long term perspective of VC investment will deter some investors. There are exceptions such as Unilever which is increasing the amount invested in VC from 5% to 7%. Some industry specialists believe that as UK pension funds already cover a significantly large proportion of their assets in (quoted) equities than their US counterparts, they have a more risky structure with limited scope to invest further in more volatile assets.¹⁵

US FOCUS ON EARLY-STAGE

2.16 In addition, much of what is generically known as "venture capital" in the UK is really private equity. In the UK, nearly 90% of funds raised to invest in unquoted equities are invested in later stage deals, often in mature companies. Most UK transactions involve management buy-outs or buy-ins ("MBOs or MBIs"), whereas the US focus is on early-stage companies, especially in the technology field. The total size of the UK



13 Bank of England (2000), paragraphs 4.53 and 4.54

14 BVCA, *Why you should invest in Venture Capital (1999)*

15 The BVCA 1998 Performance Measurement Survey, prepared in conjunction with the WM C Company, does nevertheless indicate that net aggregate returns for venture capital funds for more recent investments have been around 30%

16 www.sbv.com

17 www.internetcapital.com

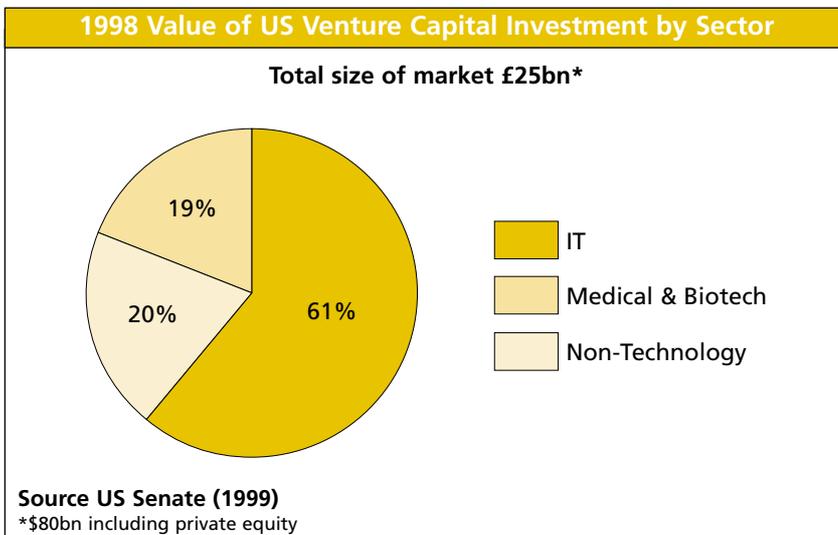
18 www.cmgi.com

19 www.kpcb.com

20 www.menloventures.com

21 www.mayfield.com

22 www.sequoiacap.com



CAPITAL MARKETS

- 2.19 A further factor affecting the success of smaller technology companies in the US has been the transformation in their ability to obtain liquidity and funding through a public quotation or IPO. IPOs in 1999 raised a total of £69.2bn (the previous peak was 1996: \$49.9bn; and the total since 1989 \$350.8bn). The IPO market has in turn led to increased funding for the VCs. The technology share of US stock markets is now some 33%, up from 10% a decade ago. The UK equivalent is 4.9%.²³
- 2.20 In the UK, the IPO market, especially for smaller quoted companies, has not been as buoyant. However, the Alternative Investment Market (AIM) – intended broadly for smaller and younger companies – provided a market for 347 companies as at 31 December 1999, for which an aggregate of £3.1bn had been raised (of which £741m was for IT/software stocks).²⁴
- 2.21 In addition, whilst we were in the US the London Stock Exchange launched techMARK, a "market within a market" (nearly 200 companies from relevant sectors of the main market are included on a dual listing basis) to

help promote existing quoted technology stocks and attract new ones. Less onerous requirements apply for new companies, with the usual need to provide a three-year trading record being waived. However, new entrants will need to attain a minimum market capitalisation of £50m and have at least £20m of shares in public hands at the outset.

- 2.22 NASDAQ announced at the same time that it intends to set up NASDAQ Europe during the course of 2000. NASDAQ has been the pre-eminent market for technology stocks in the US over the past decade. Many newly floated companies are not yet profitable.

SUMMARY

- US venture capital is much more widely available than in the UK.
- The ERISA rules encourage pension funds to invest in venture capital, although it may be as much a lack of familiarity and issues of economy of scale which inhibit UK institutions from participating in VC funds.
- UK MFR and defined contribution regulations may also be limiting pension fund interest in VC. All such regulatory issues require further study.
- A far higher proportion of equity in the US is invested in early-stage and technology stocks.
- VCs have generally seen high rates of return in recent years in the US.
- VCs concentrate on "smart" investors with value added skills in the US.
- VCs raise large funds in the US with a view to making several rounds of investment in the best companies without "selling the upside".
- The success of dot.com stocks puts pressure on investment in other promising areas such as biotech, although biotech may be experiencing a revival.
- VCs have a ready exit route through active capital markets.
- US entrepreneurs understand the need to part with equity.

²³ *Financial Times* 25 January, 2000

²⁴ See AIM Market Statistics December 1999; <http://www.londonstockexchange.com>

Case Study – INCEPTA CAPITAL – "SMART" VENTURE INVESTMENT

Incepta²⁵ in Seattle is itself a start-up (like many VCs in developing clusters in the US), with 1999-2000 its first year of operation. It is at the crossroads between venture capital, corporate venturing and business incubation.

Conventional incubators offer "heat, light and dial tone", but Incepta claims to offer more, developing ideas and incubating them in-house as well as providing late seed capital and A, B and C round investment. Its speciality is facilities-based telecoms and its close partnership with Bechtel provides considerable leverage.

As at November 1999, Bechtel Enterprises was the sole investor in Incepta and guarantees its expenses. Incepta has \$1.1bn to invest over 5 years and is a pledge fund. The President and CEO is John DeFeo, who was previously with GE and One2One.

Incepta expects to have two further investors in the near future for 30% of the fund but Bechtel will remain the preferred supplier of services and two out of 24 Incepta staff come from Bechtel.

Incepta has a very well defined screening process ("the Book") for evaluating opportunities and uses this codified experience to cut the wasted time and effort typical when attempting to filter business ideas. The process is scaleable and repeatable, and is "team" as opposed to "partner" centric. Two thirds of proposals are technology not customer led.

Incepta intends to open a London office in 2000.

Incepta claims to spend a greater proportion of its time with a company after investment than most VCs: "For a typical VC, their view of fixing something is to fire the CEO." John DeFeo sees this different approach to time committed to investees as a competitive advantage as there is a weight of money looking for an investment home and a VC needs to have an additional skill-set to be selected into the deal.

Why is Bechtel the founder investor? It sees Incepta as a means of entering the telecoms infrastructure business in an integrator role and of obtaining a share of the equity value created – a corporate venturing approach to managing profitability.

The best deals come from investment banks and other VCs – but Incepta's website has a pro forma application form linked into "the Book".

Although John DeFeo does not see much direct technology transfer from universities, he works as a mentor at the University of Seattle and on entrepreneurship with the University of Washington – the success of the new economy has led to those in their 20s and 30s having a mindset that is open to the possibility of entrepreneurship: "They see the world differently, they don't know what can't be done and often they just do it."



Venture Capital & the New Economy

Specialist Banks

"Who is going to go into a bank and get a loan in the future? Why not just click onto the internet and have all the rates in the world and you can pick whichever you want?"

Lord Simpson of Dunkeld, Chief Executive of Marconi, quoted in *The Times*, 18 December 1999

INTRODUCTION

3.1 It is generally accepted, especially in the UK, that banks find TBSFs difficult to finance as traditional loan instruments do not match risk with reward. If an average loan margin is 3%, allowing for costs, a bank could not risk more than one customer in 50 defaulting before incurring serious losses. In the technology-sector – with new products being developed for new markets by inexperienced management teams – it is particularly difficult to tell at the outset which might be the "one customer in 50" requiring particular attention.

3.2 This does not mean, however, that there is no role for banks to play currently or that that role could not be expanded:

"Banks are not normally an appropriate source of risk capital for small technology-based firms at early-stages ... They do, however, have an important role to play in providing working capital and assisting such firms to obtain packages of appropriate finance, as well as providing other banking services."²⁶

This section analyses how some specialist US banks have expanded their conventional role as providers of debt finance and put together packages of finance, with numerous lessons for the UK.

PACKAGED FINANCE

3.3 There are some notable exceptions in the US to the general observation that banks do not become directly involved in the funding of technology-based firms. However, we found not only that the same three or four banks²⁷ were repeatedly mentioned as sources of funds for TBSFs, no matter which geographical location we visited, but also that such banks would only

provide facilities where specific preconditions were met. Such pre-conditions include:

- significant investment by a leading VC (who can be relied upon to carry out due diligence on the technology and the management team, and to make changes to the management as is often necessary);
 - high proportion of equity funding in relation to debt, perhaps as high as 6 or even 10 to 1;
 - debt funding is likely to be in the form of "venture leasing". Put simply, the bank is supporting the purchase of specific assets, over which it will have a charge, and will take a warrant or equity kicker to give it a share in the upside; see Case Study: GATX Capital – Venture Leasing. Banks in such circumstances are maximising their reward rather than minimising their risk;
 - banks are likely to take a charge over intellectual property and to work collaboratively with the VCs – the VCs recognise that they will be working with the same bankers on a raft of transactions and that they have a moral duty to ensure that so far as possible the bank does not suffer unduly when an investment fails; and
 - such "pro-active" funding is only made possible because growth companies will go through a number of different funding rounds – from pre-seed through to A, B and C venture funding on the way to a flotation or trade sale. The lending bank can see an "exit" at each stage – the next round of (equity) finance – and has a realistic chance of being able to exercise its warrants at a profit.
- 3.4 Above all, the small number of banks active in this market are able to succeed because their individual loan officers build extensive networks of professional contacts in the technology sector. Constant informal "due diligence" is being undertaken through

²⁶ Bank of England (1996), page 16

²⁷ See for instance Silicon Valley Bank (<http://www.svb.com>), Imperial Bank (<http://www.imperialbank.com>), Fleet Boston (<http://fleetbankbostonmerger.com>) and Lighthouse Capital (<http://www.lighthousecap.com>), an asset finance house

telephone contacts, site visits, seminars, dialogue with universities and so forth. Much time is spent out of the office and the culture is not introverted, as it might be in a mainstream financial institution. External recruitment is also encouraged.

- 3.5 Although few loan officers even in the specialist banks will themselves have a technology background, they develop an acute sense of how many researchers are working on a particular new type of software or medical application, which entrepreneurs are most likely to make it commercially viable and which VCs are likely to add most value. Investment in US technology sectors tends to be "smart" rather than passive.
- 3.6 Although continuing to provide a "second opinion", sector heads of credit will be much closer to the borrowing customer than would be the case with UK banks. Provided a head of credit believes the underlying proposal is commercially sound, the role of credit is to help ensure that the transaction is completed, rather than subject the proposal to pro-forma lending ratios.
- 3.7 One of the principal motives in lending to (initially non-cash generative) technology businesses is to build relationships and keep a borrower's business once it has grown to a size to be cherry-picked by a "national" bank. The specialist banks appear to have a good track record in customer retention and are able to provide a wide range of services such as trade finance and wealth management.

BANKS AND EQUITY FINANCE

- 3.8 More mainstream banks also recognise that technology sectors cannot be ignored and are best tackled through specialist operations. For instance, Chase Manhattan recently purchased the well-established specialist Los Angeles based investment bank, Hambrecht & Quist. Fleet Boston purchased Robertson Stephens. Montgomery Securities is now part of Bank of America and Alex Brown part of Deutsche Bank. Interestingly, the acquisition of specialist banks by mainstream players in the US has spurred the creation of new specialist merchant banks, such as Thomas Weisel Partners, formed

in January 1999. Such new banks claim to rely more heavily on "human capital" than "financial capital". In January 2000, the Californian Public Employees Retirement System (Calpers) bought 10% of Thomas Weisel Partners for \$100m.

- 3.9 Banks have also been investors in VC funds, often on an arm's length basis to reflect the substantial differences between equity investment and debt lending (see Case Study – BankAmerica Ventures). Such ring-fencing also prohibits banks from moving in and out of the venture capital market in response to adverse market conditions affecting other areas of their disparate business and suddenly requiring significant capital to be "repatriated" for reasons unconnected with the VC's performance, a problem in the 1980s according to some interviewees. Ring fencing is also essential where external monies are managed.
- 3.10 Investing in venture capital can also be profitable for banks and other major corporates. For instance, 44% of Chase Manhattan's fourth quarter 1999 earnings came from Chase Capital Partners (corporate lending contributed only 8%). Microsoft in the same period grew by 30%, of which two thirds were attributable to increased investment income. Venture capital by North American banks may also be seen as a form of corporate venturing. In January 2000 Toronto-Dominion Bank's discount brokerage and merchant banking arms together created a \$100m fund to invest in companies that will create Web technology the bank will use.
- 3.11 US Banks are also using their experience to take advantage of technology finance opportunities occurring overseas, including in the UK. For example, Chase Capital Partners has established a new \$100 million VC operation to be called Chase Episode.²⁸ This fund is a joint venture with a former vice president of Amazon.com's European division. It plans to offer funding and advice to seed and early-stage companies, particularly UK start-ups focused on business-to-business e-commerce. While UK start-ups will welcome such overseas investment, UK institutions may consider that worthwhile opportunities are being lost.

FINANCIAL INNOVATION IN THE UK

3.12 The 1998 Competitiveness White Paper²⁹ contained the following undertakings:

- "More help will be provided using the Small Firms Loan Guarantee Scheme for businesses without the collateral or track record that banks normally require.
- "The finance industry will be helped to develop innovative financing ideas to assist growth businesses."

3.13 Considerable opportunities exist in the UK currently for financial innovation, although the US system cannot be expected to be fully replicated as:

- Banks such as Silicon Valley Bank have grown up in an environment where banking is decentralised – because of regulations imposed in the 1930s (and now being dismantled) universal and "national" banks have been a limited feature of the US scene for over two generations.
- By contrast, SME banking in the UK is concentrated in the hands of the major clearers (four of whom between them account for over 80% of the market).
- The UK does not (yet) have the seamless web of finance from angel investment through to IPO, which enables US specialist banks to take calculated risks on the chances of banking customers in technology sectors raising subsequent rounds of finance.
- The US culture of equity investment and option granting allows banks to take warrants as a matter of course – no such tradition exists in the UK.
- Venture leasing represents an innovative opportunity for the UK, and a small number of US players has already moved into the UK market. There is a broad analogy with the loss

of control of UK merchant banking to overseas players in the 1980s and 1990s.

3.14 From the point of view of UK banks, developing new expertise in the TBSF sector also represents an opportunity to develop new business to compensate for the threat of losing existing market segments to internet-based players. Internet businesses will require service providers to operate on a Web-based platform.

3.15 In some respects, the UK services sector lags behind the major US manufacturers. In February 2000, each of Ford Motor Company's 350,000 employees worldwide was offered a personal computer, colour printer and internet access at home.

SUMMARY

- A small number of specialist US banks have made a significant difference to the ability of fast growth technology stocks to raise funds.
- Such banks generally recognise that they must maximise reward as there is limited scope for minimising risk – an innovative concept for most banks.
- Common instruments include equity or venture leasing, which includes warrants.
- The window of opportunity for UK banks is shrinking as US players move to Europe.
- Although the UK does not have the same density of VC activity as the US – which provides comfort to the banks – there is considerable scope for financial innovation on a pilot basis.
- We recommend that government and UK banks should work together on financial innovation as a matter of priority, seeking guidance from the US as appropriate.

29 DTI (1998), paragraph 2.24

Case Study – BANKAMERICA VENTURES – BANKS AND VENTURE CAPITAL

Several leading US banks recognise that they do not have the expertise to become involved directly in financing the new technology sectors but are still able to benefit commercially by setting up venture funds. Such funds may be "captive" at least initially (that is, they are wholly funded by the sponsoring bank) but in some instances later find third party investors to leverage the already significant investment by the sponsoring bank.

However, a key competitive advantage for such bank-associated funds is that they are managed on an arm's length basis at all times: even captive funds are not seen as an adjunct to bank lending or the sale of other bank products, or as a PR exercise, as might be the case in the UK. The executives running the captive funds are in no different a position from managers of independent funds: they have a carried interest in the fund itself and are not answerable to the management of the sponsoring bank, except to the extent that they would be answerable to investors in a wholly independent fund.

BankAmerica Ventures (BAV) is a department of BankAmerica (BA),³⁰ currently managing \$200m of the bank's own capital. In 2000 BAV will be reorganised into a limited partnership (LP) in which the bank will be a limited partner and the present senior managers (called "partners") will be general partners. There are usually seven or eight partners in BAV, with two or three associates in a support role. The associates are selected as having the potential to become partners and their performance determines whether that happens or not. From time to time an analyst is also employed to undertake desk research, normally a graduate on the way to business school.

The new LP will remain wholly BA funded, although the manager is organising a side fund in which entrepreneurs who bring them good deal flow can invest. This will be the first time that BAV

has managed third party money. BAV is very close to the bank, advising it on its "fund of funds" exposure to private equity funds. This is about \$2bn in total of which \$400m is in VC and the rest in LBO funds.

BA closed its previous VC operation in the 1980s, but acquired an extensive VC business with the Security Pacific (SecPac) merger in 1993. The SecPac personnel have been replaced over time. BAV did not initially invest in early stage businesses, but start-ups currently account for 25% of investments. BA has traditionally been strong in aerospace and IT and the BAV portfolio is technology-based.

Until 1999, half its investments were in healthcare (bioscience, diagnostics and medical services) and the rest in IT. In 1999, the balance shifted towards IT, reflecting the higher exit valuations achievable in IT stocks. The portfolio includes dot.com but concentrates on deals where there will be long-term value in the investment, irrespective of stock market sentiment. BAV's partners sit on the boards of all their investees, with up to eight directorships each, and see themselves as adding value as investors. A first round funding might be some \$500,000 to \$750,000, with follow-on investments leading to a potential total exposure of \$10m.

The bank is realistic about the special needs of a VC operation and has a carried interest and market salary structure in place, which will be superseded by the new LP structure. All the partners will share equally in the 20% carry. BA is not a good source of deal flow and, to avoid distraction and loss of goodwill with the bank lending officers, BAV has deliberately sought a low profile in the group. However, now that its investment profile is better understood internally, the partners are prepared to raise BAV's profile within the bank. Investees are likely to continue to bank with the specialists (such as Silicon Valley or Imperial Bank) until the company has gone through an IPO.

30 www.bankamerica.com; see also www.norwestvp.com and www.chase.com/global.ccp for further examples of autonomous bank VC operations

Universities & Technology Transfer

"Why take world class professors and turn them into mediocre businessmen?"

Discussion at CalTech Office of Technology Transfer.

"It's cool to be an entrepreneur"

ARCH Venture Partners

INTRODUCTION

4.1 The importance of universities as integral elements of clusters generally has been increasingly recognised in recent years. For instance, the recent report by the biotechnology cluster team led by Lord Sainsbury³¹ identified a strong science base as the first on its list of ten critical factors for cluster development, and leading research universities help to provide such a base. The full list of success factors identified was as follows:

- Strong science base
- Entrepreneurial culture
- Growing company base
- Ability to attract key staff
- Premises and infrastructure
- Availability of finance
- Business support services and large companies in related industries
- Skilled workforce
- Effective networking
- Supportive policy environment

4.2 We were fortunate in being able to visit several prominent institutions, including the Massachusetts Institute of Technology (MIT), Tufts University, the University of North Carolina at Chapel Hill, the California Institute of Technology (CalTech), Stanford University and the University of Washington. CalTech itself provides a good example of how world-class research need not be antithetical to commercial concerns. Our interviews showed us how the factors identified by Lord Sainsbury's team can be extended to innovation more generally, and that specific lessons can be applied to the UK.

TECHNOLOGY LICENSING

4.3 The following overall picture emerges of the role of universities. Universities generally are

alive to the commercial potential of licensing technology developed in their research laboratories and in addition to those we interviewed we were frequently referred to Columbia, Stanford and Carnegie Mellon as examples of best practice. Although the resources available to the Office of Technology Licensing ("OTL" or similar body – titles vary between universities) differ in the number of staff available and the funding provided, most benefit from a level of resource that a UK university would envy.

4.4 In addition, most leading universities have an intellectual property rights (IPR) policy which is clear and unambiguous. Faculty members are obliged by their employment contract to recognise that the IPR in the projects on which they work is vested in the University and in most universities there is a duty on faculty members to inform the OTL of developments which may have commercial potential.

4.5 Only in a minority of instances would the OTL actively trawl departments for inventions for fear of being swamped. A leading US OTL confirmed to us: "we're not doing all we could be doing as there is a fear of 'opening the floodgates.'"

4.6 If contractual obligations are the stick, the carrot for the faculty member is additional funding. For instance, if the university policy is that the commercial benefits of technology licensing will be shared one third to each of the school, department and individual (after deduction of OTL expenses, including patent protection) the individual's research team stands to gain considerably through the licensing arrangements. Some individuals, who have benefited personally, may also contribute some or all of their licensing earnings back to the

31 DTI (1999)

department (and in some universities, matched funding arrangements exist).

- 4.7 The Committee of Vice-Chancellors and Principals in its authoritative and pioneering 1999 report, *Technology Transfer – the US Experience*, grouped its findings under six headings: clarity, confidence, commitment, commercialism, community and challenges. Under this last heading of "Challenges – how to move forward", it included sections on the responsibilities of university managers, government and other funders.³² To this we would add the responsibility of both new and existing UK businesses to improve their knowledge and understanding of developments within individual UK universities. The level of formal and informal two-way dialogue between US universities and corporations goes considerably beyond what we usually see in the UK in all but a minority of cases. UK universities are improving their commercial awareness and recognition of this development by industry will accelerate the trend.

SPIN-OUTS

- 4.8 The message often published, that US institutions have a much higher level of spin-outs than the UK, can be misleading. Often the figures quoted refer not only to university spin-outs (i.e. where university IP is used as the base of a new business) but also university start-ups (i.e. companies created by graduates of the university).
- 4.9 Many OTLs are ambivalent about their role in supporting SME spin-outs as opposed to licensing technology to fund the university's research activities. At Stanford, for instance, there is little formal support for SME spin-outs but the connections between individual OTL executives and investment executives in local venture capital firms enable substantial informal connections to be made.
- 4.10 Stanford, like Washington University, also has an enlightened policy on allowing faculty members to continue to work at the university whilst also taking on a role with a spin-out company. At Stanford the policy is to encourage faculty members to take regular sabbaticals,

whilst at Washington dual appointments are possible, although faculty members would be precluded from taking an executive role (such as CEO or CFO) in a spin-out.

BUSINESS SCHOOLS

- 4.11 The interaction with the business school will also vary from institution to institution. A vogue for entrepreneurship means that work by technologists with SMEs is actively encouraged at some universities (such as MIT and Washington), whereas at others the focus of the business school is on major international corporates (Stanford). Further details on entrepreneurship are set out in section 9.
- 4.12 College endowment funds are also significant players in the development of new technologies through their major investment in VCs. Universities are hubs for entrepreneurship, through formal programmes, and funding, and as sources of significant numbers of technically trained and business minded individuals. One university endowment fund to which we spoke claimed to be so well funded that it can have difficulties distributing the 5% of its annual income required by law to maintain endowment status.
- 4.13 In summary, the role of the university within technology clusters is, generally speaking, not to generate significant numbers of spin-outs itself but to contribute to an environment in which new technologies are being developed. Such technologies are often to be commercialised by others through licensing. Universities also provide a cadre of trained graduates (qualified in business, technology – or both) and contribute towards business incubation.

CHANGING ROLE OF UNIVERSITIES

- 4.14 The role of universities in the commercialisation of science has changed subtly in the past 15 years. Nothing that we saw would contradict the analysis of Miller and Cote,³³ who identified four points defining the inputs necessary for cluster formation, but new approaches are now being adopted towards the commercialisation of research:

32 CVCP (1999), paragraphs 2.8 to 2.17

33 Miller R & Cote M (1985)

- Universities are a critical factor in cluster building but "not all universities and research centers can be at the vanguard of science. Only a limited number attract the highest qualified scientists and graduate students who can explore these avenues."
- An important difference exists between generic research (which mostly takes place in universities) and applied research (conducted in private companies or in universities under contract). "At some point in its development, a generic technology becomes fertile with marketable applications and spawns numerous new enterprises. Technological entrepreneurs are adept at harvesting technologies ripe for the market place..."
- "Most scientists are not entrepreneurs [but] many entrepreneurs have established their businesses near these institutions ... Research institutions tend to be passive suppliers, and entrepreneurs active developers of high technology."
- "Applied research that takes place in non-profit organisations ... is usually not market driven and seldom gets translated into products or ideas that lead to the formation of new ideas."³⁴

4.15 Whilst it remains true that only a limited number of universities or other research institutions can be at "the vanguard of science", encouraging faculty members to become involved with spin-out companies helps researchers identify when generic research might be capable of becoming commercially marketable. It also ensures that researchers are personally familiar with the entrepreneurs who are likely to drive the commercialisation forward. This in turn ensures that a higher proportion of potentially valuable research ideas can make the precarious transition from generic to applied science. Therefore networking is the key.

FACULTY INCENTIVES

4.16 It should also be noted that leading US institutions are able to pay salaries to faculty members which, if not on a par with industry, are at least competitive. Differentials between universities, departments and individuals are widely accepted. This is not the case in the UK, where academic salaries are generally below those obtainable internationally and differentials between institutions are narrow. A recent report

Case Study – UNIVERSITIES AND VENTURE CAPITAL – ARCH

Several established venture funds concentrate on the commercialisation of university research. One such fund is ARCH. ARCH was set up as a technology transfer operation by the University of Chicago in 1985 with a focus on 'dig and develop' i.e. going out into the labs, identifying projects with potential and negotiating their commercialisation. It metamorphosed into a VC fund and has invested a total of \$330m over its life – it is currently managing a \$180m fund. ARCH has offices in Chicago, New York, Austin, Albuquerque and Seattle.

ARCH is a true seed investor: its first round investment is typically \$200k and ex-bench top. It remains 'hands-on' to the development of its investees. The portfolio is half life sciences and half IT, with a particular preference for projects at the interface of the two: for instance, R2 Technology, which produces image analysis software for radiologists. ARCH deliberately set out to have a fund which is large enough to allow it to follow through on its investments in subsequent funding rounds and

prevent excessive dilution.

It likes to keep the inventors in academia, with ownership and a technical role in the business but does not like them trying to become general managers. ARCH does not have a formal asset allocation model and, like many other US VCs we met, has a number of dot.com investments. ARCH has largely institutional limited partners, pension funds and university endowments in particular.

ARCH sees the US market as particularly buoyant - "it's cool to be an entrepreneur" - and that one generation's success feeds the next either through serial entrepreneurs or through active angels. In contrast, the UK is considered handicapped by the number of early stage technology businesses moving to the US to maximise the opportunity for success, because it limits the number of serial entrepreneurs or business angels available with the right skills to support new start-ups. That said, ARCH (like many other successful US VCs) is interested in setting up a UK presence.^{34a}

by the Royal Society noted that a higher proportion of its fellows than ever before are now based in the US. The Royal Society pointed out that UK universities operate in a global market and are losing the battle to recruit, retain and support the brightest stars.³⁵

4.17 Most university employment contracts in the US are for the academic year only. This positively encourages faculty members to become involved in external activities such as entrepreneurship. A recent survey by the Association of University Teachers in the UK showed that only 7% of the 2000 academics polled spent five hours a week on activities linked to the local economy. Factors holding back greater involvement include:

34 All quotations in this paragraph are from Miller R & Cote M (1985)

34a <http://www-arch.uchicago.edu>

35 <http://www.Royalsoc.ac.uk>. Report dated 27 January 2000

- The difficulty of reconciling commercial confidentiality with the academic tradition of publishing research findings;
- A conflict between a university's need to conduct research which will attract high ratings under the Research Assessment Exercise on the one hand and commercial or applied research (which is unlikely to be highly rated) on the other; and
- A lack of rewards for academic staff involved in the business community, especially as staff are already burdened with teaching, research and administration.^{35a}

BAYH-DOLE ACT

4.18 Legislative changes have also helped with technology transfer and, by extension, university funding.

"But opportunities for university-based entrepreneurship took off in 1980. In that year, the Bayh-Dole Act assigned intellectual property rights from federally-funded research grants to the universities performing the research. The Bayh-Dole Act not only allowed but compelled universities to move their research and intellectual property to the marketplace. Alvin L Kwiram, UW [University of

University of Washington Related Start-ups by Decade	
1960s	1
1970s	4
1980s	30
1990s	85

Washington] Vice Provost for Research, asserts that this development 'is stimulating one of the most profound transformations of the culture of the research university that we have seen in recent decades.'³⁶

SUMMARY

- Universities are key components of clusters, and in the US are increasingly alive to the opportunities of technology licensing and spin-outs.
- The activities of the Office of Technology Licensing (or similar body) in US universities are not seen as antithetical to research and teaching. Rather, the additional funding generated can be used to further the universities' intellectual activities.
- Many universities accept that they have a "community" role to play and are heavily networked into VCs, professional advisers and angel clubs.
- The technology licensing offices generally have budget sufficient to allow them to carry out their work of protecting and promoting intellectual property effectively.
- Quality of staff and financial resources (often generated from royalties as part of a virtuous circle) appear to be the key factors. Good OTL staff are poached by rival universities.
- Financial rewards within universities ensure that no exodus of talent is likely. Such rewards recognise differentials based on individual "marketability".
- Faculty members are, in addition, encouraged to take part in entrepreneurial companies through sabbaticals and similar opportunities, though such participation will usually fall short of a full-time executive position.

35a <http://www.aut.org.uk>. *University and business links – the gap between vision and reality*. Report dated 7 March 2000. On the positive side, "More than 85% of academics were in favour of making their services available to businesses, and around two thirds of academics felt their teaching had benefited through links with business."

36 *Northwest Science & Technology*, Spring 1999 p.12

Case Study – CALTECH – START-UPS AND TECHNOLOGY TRANSFER³⁷

CalTech (the California Institute of Technology³⁸) was founded in 1891 and is one of the most successful teaching and research universities in the US. Its undergraduate population numbers some 900 only, with approximately 1100 graduate students also, all of whom have the opportunity to work with eminent faculty members at the leading edge of science. Professorial faculty members number some 280 and research faculty 130. Twenty-eight Nobel Prizes and four Crawford Prizes have been awarded to faculty members and alumni, including the Nobel Prize for Chemistry awarded to Professor Ahmed Zewail in 1999³⁹.

The aerospace industry in the surrounding area recognises the key role played by CalTech in the development of the industry. For instance, the adjacent Jet Propulsion Laboratory was originally funded by the Department of Defense but is now funded by NASA, which provides CalTech with considerable research income to manage its R&D activities in this area. The exceptional calibre of CalTech's teaching and research now goes hand in hand with an enlightened approach to technology exploitation. Technical excellence and commercial success are not seen as strange bedfellows, but as inherently complementary.

CalTech began to take equity in new companies some five years ago, and takes some ten stakes a year, divided between start-ups and early stage companies, with a current portfolio of about 40 (five of which have a public quotation). Half are in healthcare (biotech, DNA diagnostics and biosensors). Fifteen are located near CalTech in Pasadena.

The benefits to CalTech in receiving equity are as follows:

- CalTech grants a reduced royalty rate on sales of licensed products, which affects VCs and angels as high royalty rates lead to lower corporate valuations at the time of merger or IPO. Founder's stock (some of which CalTech may receive) has little valuation and is diluted over time – it may receive 5% of the initial valuation of the company after a Series A financing)
- CalTech defers for a reasonable period patent expenses, issue fees, maintenance fees and other costs to enable Series A funding to focus on product development, making CalTech a partner in the enterprise.

Licensing technology to a start-up also has several advantages for CalTech. Usually a faculty member will be involved with the start-up not to make money personally but to enable cutting edge technology to be brought to the market place. If it is successful, wider public benefits of job-creation, national well being (especially in biomedical instances) and success to investors will follow – notably to faculty members and the entrepreneur.

The main difference between licensing to a start-up and to an established company is that with a start-up there is no risk of the exploitation of the licence being lost through loss of its champion, or competing products in the established firm.

CalTech's patent policy grants inventors a 25% share of royalties received from a licence. If a faculty member opts to donate that share to his/her department, CalTech will match it. Equity is treated in the same way, even if the inventor receives equity from the start-up independently of CalTech.

The number of equity stakes taken by CalTech is probably the highest in the US. The senior members of the university have come to recognise the need to promote an entrepreneurial culture, a key step in which was to create the Office of Technology Transfer (OTT), reporting directly to the Provost's office. In its turn, the OTT identified key faculty and investigators, and demonstrated to them that it could provide support and guidance. As a result of building trust and understanding between faculty and the OTT, the number of reported inventions has doubled.

In addition, the Bayh-Dole Act of 1980 improved the position of non-profit institutions such as universities:

- It allowed universities to elect to retain title to inventions made with government support, and
- It also established a preference for small businesses, including start-ups. If the smaller company (fewer than 500 employees) has the expertise and resources to bring the technology to market, it will receive preference. Provided the SME is suitably funded, members of the university are ideally placed to bring the technology to market.

OTT require the entrepreneur to write a business plan or summary before a spinout is created. The Entrepreneurship course, which requires submission of a business plan to receive credit, is one of the most popular on campus.

Where OTT is negotiating an option, it seeks to support the faculty member who has developed the technology over many years in the laboratory. The commercial criteria are that the technology should have numerous applications or address large markets. The usual option period is 12 months, and the consideration modest. The faculty member can exercise the option on raising start-up funds (minimum \$500,000).

The advantage to CalTech in such circumstances of an option over a licence are that it is quick and yet still allows the faculty member to raise funds. If the entrepreneur is not successful in so doing, the technology is only tied up for a limited period. The OTT can also provide introductions to VCs, IP firms and other advisers, as well as mentoring. The OTT provides patent support.

The entrepreneurial programme at CalTech is a long term approach. In addition to its direct equity interest, it hopes for philanthropic support from alumni who have been successful through the programme. It expects that over a ten-year period, \$75m will have been added to its endowment to further teaching and research, thanks to its entrepreneurial approach.

37 We are most grateful to Larry Gilbert, Richard Wolf and Christopher Moulding of the CalTech Office of Technology Transfer for information and assistance supplied in the preparation of this section

38 <http://www.caltech.edu>

39 CalTech was also ranked in first place in the 2000 US News College rankings, though with typical modesty this was said by the OTT to be "because they couldn't decide between Harvard and MIT so they chose us."



Universities and Technology Transfer

Vocal Choirs of Angels

"There used to be a joke doing the rounds. If you started a business in Hong Kong, your family would help you run it. If you started it in California, your friends would buy equity. If you did it in the UK, people would tell you that you couldn't succeed and then scratch your car when you did."

Mike Lynch, CEO and founder of Autonomy, the UK's largest Internet software business, quoted in The Observer, 5 December 1999

INTRODUCTION

- 5.1 A notable trend in the past 18 to 24 months in the US has been for new VC funds to invest in significantly larger deals than was the case in the mid-1990s. The usual economies of scale apply. New venture funds have become larger than those raised in the early 1990s, and as each fund manager only has a relatively small number of experienced, qualified investment executives, it is far more economical for larger funds to concentrate on deals above \$5m, often above \$10m. (The UK also has seen a notable increase in average deal size).
- 5.2 The gap is being filled by the growing army of business angels, although many fast growth businesses do not have the time to deal with a multiplicity of angels, and there is still a role for zero stage VC investment at \$500,000 to \$1.5m⁴⁰.
- 5.3 The growth in number of angels (and the resources available to each angel) is part of the virtuous circle of the "new economy" in the US. Taking Seattle as an example, there are estimated to be over 50 centi-millionaires in the region (and 6000 millionaires) largely as a result of the very high proportion of Microsoft employees who have benefited from a generous share option policy over recent years. In addition, it is estimated that dozens of new millionaires are created in Silicon Valley every week. Many of the new breed of angels are prepared to spend a considerable period of time in informal due diligence, evaluating the companies in which they intend to invest with the benefit of their professional expertise.

ANGEL & VC COMPLEMENTARITY

- 5.4 The differing approaches of formal and informal investors mean that there is plenty of scope for angels to co-operate with the VCs. Not only do angels often fill the gap below which VCs are generally no longer prepared to invest, but their seed stage funding will also count as due diligence in the eyes of VCs where the individual angels are known to the VC as experts in the field.
- 5.5 However, in both northern California and Seattle we were informed that although the angels and the formal VCs do now co-operate in a way which would not have happened in 1997/98 – when they fought each other for deals – many VCs still consider the contribution of the angels to be a mixed blessing. Although knowledgeable angels can be both a source of due diligence and a pipeline for larger, second stage investments, less sophisticated angels are seen as overpaying at the seed capital round, making realistic valuations difficult for follow-on investment.

FORMAL ANGEL FUNDS

- 5.6 Often angel finance is provided through a formal fund, in a way which would be difficult in the UK owing to the restrictions of the financial services legislation.
- 5.7 Well-off and sophisticated private investors in the US have found a variety of ways to act in concert to gain economies of scale and to diversify risk across a portfolio. Organisations such as Alexander Hutton (see case study),

⁴⁰ See for instance <http://www.ZeroStage.com> and <http://www.phoenixvc.com>

Common Angels, garage.com⁴¹ and the Washington Alliance of Angels⁴² demonstrate the diversity of how these angel organisations evolve in response to current local need and circumstances. Alexander Hutton has moved from being an angel "choir master" to a formal fund raised on the strength of the success of angel investments such as F5 Labs. Limited partnerships are more accommodating in terms of numbers of investors (up to 99 in the US, only 20 in the UK) and "professional investor" status more readily accredited.

- 5.8 None of these organisations could operate in the UK without FSA regulation, with all of the consequential costs, capital and formal qualification requirements. We therefore recommend that the existing UK restrictions on concerted and managed aggregation of active angels' investment activities be re-examined. This may facilitate the creation of responsive self-managing funds as in the US, where sophisticated investors are concerned. The Financial Services and Markets Bill, currently before Parliament, is expected to provide an exemption for business angels to Section 57 of the Financial Services Act 1986, which restricts the ability of entrepreneurs to solicit investment from non-professional investors. The definition of "business angel" will be a key element of the revised legislation, and the US wealth tests (e.g. \$1m net worth or \$200,000 income for the last two years – Alexander Hutton's definition of "accredited investors") will be a useful starting point.

ANGEL SUCCESS FACTORS

- 5.9 As successful entrepreneurs with a desire to repeat their previous success by bringing VCs, advisors and new businesses together, angels are a significant factor in the networking essential to make clusters work. For them to be fully effective, a regional focus is a distinct advantage:

"Make no mistake: Silicon Valley is what it is because of its smallness. The fact that everybody knows everybody else is essential. This can't be reproduced nationwide. Sure, more people are

coming here all the time, but those who have been here for a while have bigger Rolodexes. They have the advantage."⁴³

- 5.10 Although angel finance is undoubtedly on the increase in the UK, it is as yet nowhere near the levels of activity seen in the US:

"BVCA figures suggest that there is enormous growth in the informal venture capital market. It is estimated that there are now 18,000 business angels across the UK investing upwards of £500 million per year in over 3,500 companies. This averages out at approximately £50,000 invested per business angel with larger amounts going to individual companies through business angel syndicates and packaged finance."⁴⁴

- 5.11 Mason C & Harrison R in a November 1999 study concluded that supply-side initiatives on their own are insufficient to produce increased investment activity in the informal venture capital market because most angels are opportunity constrained.

"The clear implication of this study for government is that they can increase the supply of informal venture capital by providing tax incentives to business angels. This will encourage business angels to increase the proportion of their investment portfolio that they allocate to investments in unlisted companies and may also be expected to encourage other high net worth self-made individuals to become business angels. However, in view of the factors that prevent business angels from investing as often as they would like, tax incentives will not be effective in increasing the amount of risk capital that is invested in entrepreneurial businesses unless they are accompanied by micro-scale measures to address the barriers to investment. These micro-scale measures can be addressed by NBAN and other business angel networks".⁴⁵

SUMMARY

- Angel finance is widely available in the US, partly as a result of the success of recent technology companies, whose generous share option arrangements have created many thousands of new millionaires.

41 <http://www.garage.com>

42 <http://www.archventure.com/affiliations.html>

43 Bronson P (1999) pages 247 - 248

44 Harding R (1999) page 31

45 Mason C & Harrison R (1999) p.9. NBAN is the National Business Angels Network

- Such new investors often have technical skills to contribute to a potential investment, whether at the due diligence stage or as part of the ongoing management.
- Angels now (since perhaps early 1999) fill the gap up to \$5m early stage investment as VCs make larger investments to benefit from economies of scale in line with larger fund sizes.
- Although there is now generally good co-operation between angels and VCs, angels are still often seen as prepared to overpay for "zero stage" deals, complicating valuations for later stages of investment.
- Angels are able to form funds, and in some regions are now doing so in preference to making a series of independent investments.
- US securities and investment legislation permits LLPs to have up to 99 members and recognises "professional investor" status more readily than does the UK.
- Most angel investment is regional. It is another example of how the fastest-growing areas are extensively networked, with regular formal and informal co-operation among angels, universities, VCs and professional advisers.
- Tax incentives are key drivers for business angels, but these should be introduced along with micro measures to facilitate investment.

Case Study – ALEXANDER HUTTON, LLC⁴⁶

Kent Johnson, the President of Alexander Hutton, was previously the CEO of a high-tech business and an accountant with Arthur Andersen. He formed Alexander Hutton in about 1994 to raise capital for emerging technology businesses. Originally, Johnson had a "virtual" fund, relying on the interest of the 50,000 or more accredited investors in the Puget Sound area of the Pacific North West.

In the early years, some \$63m was raised in private placements for 17 companies, which generated an IRR of 200% mainly with 2 big hits: F5 Networks and Infospace (merged with CMGI). (An IRR of 40% is the minimum requirement in the current market to be able to generate a follow-on fund.)

Alexander Hutton is paid by the investee company, not by the investors. The possible conflict of interest is not seen as a real problem, and in addition to performance related fees, warrants are generally taken by Alexander Hutton, together with director's stock options. The accumulation of what were in effect contingency fees made it possible for Alexander Hutton to raise small amounts of capital for a number of promising new technology businesses without charging them full professional costs up-front.

Overheads were low at Alexander Hutton itself, and in addition to arranging the investor presentations Johnson would train CEOs in presentation skills and – in many instances – initiate management changes in the investee companies. Some five to seven private placements

were possible a year operating in this way. The last such was in May 1999. In effect, Johnson is now moving from being an angel "choir master" to running a more conventional fund, comparable to a Venture Capital Trust in the UK (an angel fund properly so called would be a collective where the angels organise management between them).

"Things changed in January [1999] here in the North West," Johnson said. "We put out term sheets but got none back." The exponential growth of internet stocks has created a great number of wealthy business angels prepared to invest \$250,000 or more at a time. To accommodate the changing market, Alexander Hutton decided to set up its own fund instead of organising a series of small, individual private placements. The fund will be helped by the participation of two or three venture incubators. In the US it is possible to have 99 investors in a limited partnership (LLP), after which the fund would need to become a "mutual". The new Alexander Hutton fund will have class A investors (with a minimum stake of \$1m) and class B investors (\$200,000), with the capital being called in stages.

Kent Johnson made two general observations about moving from a virtual fund to an established fund. First, under UK regulations the new fund would not be able to take operating income. Secondly, existing (US) tax laws will not let Alexander Hutton take director's options as before.

46 www.alexanderhutton.com



Vocal Choirs of Angels

The Changing Face of Business Incubation

"The in-house management consultant incubators such as bainlab and Accelerator@McKinsey have attracted some scepticism, because, reluctant as they are to admit it, much of their motivation lies in the need to try to halt the haemorrhaging of their best people to dot.com start-ups [...] Further confusion lies in the blurring between incubators and venture capitalists. The well-funded incubators look rather like venture capitalists in disguise, while venture capitalists are backing people at ever earlier stages."

The Financial Times, 16 December 1999

INTRODUCTION

6.1 The term "business incubation" is used to describe a wide variety of processes that help to reduce the failure rate of early-stage companies and speed their growth. Business incubation is typically used to encompass not only the provision of physical premises and basic resources ("heat, light and dial-tone") but also an instructive and supportive environment for entrepreneurs at start-up and during the early stages of businesses.

6.2 In the past decade, the important role of business incubation in promoting fast-growth start-ups, especially in the technology sectors, has come to be widely recognised in the US and UK.⁴⁷ One US venture capitalist reported to us that "incubators were a feature of a kinder, gentler world" but, having fallen out of favour for a short while as being "counter-Darwinian"⁴⁸, incubation is now being re-invented in a variety of guises: business acceleration, business generation and monitoring and aftercare for VC investors.

6.3 The late 1990s saw the emergence in the US of organisations that represent new forms of business incubation and that bring together previously disparate functions relating to all stages of the business development process, from opportunity recognition through start-up to growth and on to flotation. The development of these new forms of incubation has been driven by the desire to multiply the number of successful, fast-growth, high technology businesses that have been a key part in the revitalisation of the US economy.

BUSINESS INCUBATION IN THE US

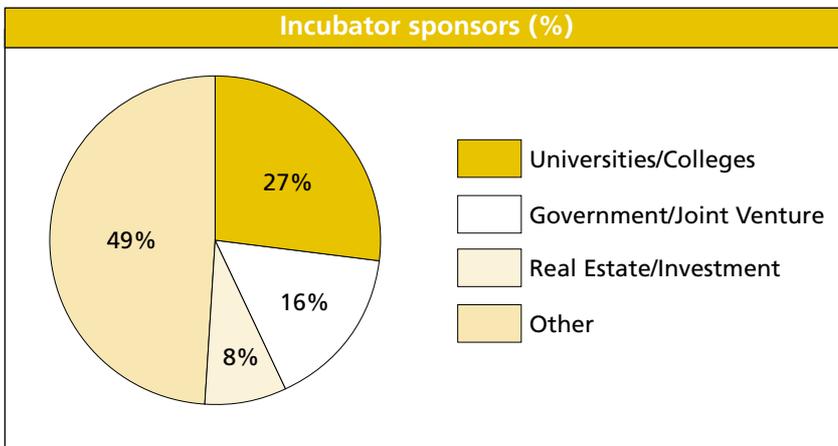
6.4 Business incubation in the US can trace its roots back to the founding of the Batavia Industrial Center in New York in the late 1950s. Business incubators began to grow in popularity in the 1970s driven by a number of initiatives aimed at revitalising the then-ailing economy.⁴⁹ Key among these initiatives was a move by the National Science Foundation (NSF) to foster innovation and entrepreneurship at major universities. By 1980, there were 12 incubators in the US; now there are over 580.⁵⁰

47 This is reflected in the growth of incubation networks such as UK Business Incubation (<http://www.UKBI.co.uk>) sponsored by the DTI, HSBC, the Prudential, the Securities Institute, Aston University and Aston Science Park; and, in the US, the National Business Incubation Association (<http://www.nbia.org>)

48 See Ross Russell G (1998)

49 See Panitz B (1998)

50 Of the total number of incubators over half of these are sponsored by government and non-profit organisations, and are primarily for economic development; 27% are affiliated with universities and colleges; 16% are joint efforts among government, non-profit agencies and/or private developers; 8% are run by investment groups or by real estate development partnerships. Further information can be found at <http://www.nbia.org>



- 6.5 The formation of Techfarm⁵¹ in Silicon Valley in 1993 with entrepreneur Gordon Campbell (founder of SEEQ, Chips and Technologies and 3Dfx Interactive) typified a new development in business incubation. Techfarm brought a successful serial entrepreneur into a position where he was most effectively able to lever his skills and resources to build new business in a particular market sector, in this case, information technology.
- 6.6 The growth of the internet and boom in e-commerce has in turn led to growth of incubation systems that focuses specifically on e-commerce, with Idealab!⁵² held up as the exemplar in this field. These developments in business incubation, coupled with the booming economy resting on the rapid growth of high technology-related businesses, have led to business incubation evolving along a number of intersecting pathways.

NEW FORMS OF BUSINESS INCUBATION IN THE US

- 6.7 There are a number of key features common to many of the new forms of business incubation that have emerged recently in the US and which are now beginning to take hold in the UK.
- **Entrepreneur-led.** At the head of many of these new business incubation organisations is a serial entrepreneur. For such individuals, establishing an organisation for incubating new business represents the development of a mechanism that puts serial entrepreneurs in a position where they can most effectively leverage their skills, i.e. the vision to spot

opportunities, marshal resources and push from concept to operational business.

- **Internal fund.** To provide the seed and growth funding for the incubatees, many of the new incubating organisations will have their own fund, or establish strong links with a particular fund. These funds are typically drawn from either (a) the founder's own capital; (b) a related venture capital fund (providing a way for the fund to target at a very early stage business opportunities with the best chance of success); (c) a corporate partner (seeking to stimulate new businesses in their industry); or (d) a combination of all three.
- **Corporate partner.** Corporate involvement in an incubator represents a particular set of activities within the more broadly defined area of corporate venturing. By establishing their own incubator, or working closely with an outside incubator, large corporations can nurture new businesses that they feel will in some way support their own activities. These activities also encompasses the role now being played by some of the management consultancy firms that are seeking to get a foothold in the high technology start-up sector by providing services for equity in lieu of fees for such companies.⁵³
- **Specific focus.** A number of the new incubator organisations are focusing on nurturing businesses in particular sectors. The boom in e-commerce and e-business areas is driving a growing number of "e-incubators". These encompass both those providing "bricks and mortar" facilities as well as those providing only "virtual" or on-line support. Incubators are also being formed that focus on nurturing businesses in the life sciences, telecommunications, and information technology hardware and software industries.
- There are examples of most of the types given in the UK also. In fact we have the interesting example of TTP, Scientific Generics, PA Consulting and CCL in Cambridge who, although their bread and butter is technology consultancy, also act as technology incubators and have been successful in this field.
- Putting a serial entrepreneur in charge of an incubator can be highly effective, but there can also be conflicts of interest. It may not necessarily be a good thing because entrepreneurs are not necessarily good 'nuts and bolts' people which is the essence of running an incubator.

51 <http://www.techfarm.com>

52 <http://www.idealab.com>

53 The 'Accelerator' programme from McKinsey & Co is an example of one such scheme

Case Study – RECENT INCUBATORS				
Data drawn from company websites and press releases	Idealab! www.idealab.com	NewcoGen www.newcogen.com	Techfarm www.techfarm.com	Incepta www.inceptalc.com
Entrepreneur	Bill Gross	Noubar Afeyan	Gordon Campell	John DeFeo
Entrepreneur's past companies include	Knowledge Adventure, IdeaMarket, CitySearch, eToys	PerSeptive Biosystems	SEEQ, Chips & Technologies & 3Dfx Interactive	One-2-One
Internal fund	Idealab Capital Partners	Combined with corporate partners	TechFarm Capital LP	Through corporate partners
Corporate partner(s)	-	PE Corporation	-	Bechtel Enterprises, Betchel Telecom, et al.
Specific focus	Internet businesses	Bioscience and IT	IT	Telecoms.

6.8 The Case Study – Recent Incubators gives five examples of organisations that reflect, in differing ways, the key features of these new developments in business incubation.

SUMMARY

- The process and mechanism for incubating new businesses in the US is evolving rapidly in response to market demands, although incubators based on the ‘traditional’ model continue to prosper.
- The booming economic conditions in the US, driven to a large extent by the growth of high technology businesses, has resulted in large amounts of capital being available to invest in new businesses. These economic conditions have also stimulated the desire to invest in new technology-related businesses, but at the same time amplified the difficulty in identifying the opportunities with the best potential for substantial return on investment. Incubation is seen as providing a way in which this capital can be efficiently applied to support the growth of new technology-based businesses.
- Putting a serial entrepreneur at the head of an organisation that incubates technology-based businesses can be a highly effective way of applying the serial entrepreneur’s specific skills where they can be most effective.
- New forms of business incubation may provide a way for corporate venturers to improve the likelihood of success of their investments.
- As deal size grows, many venture capital funds find that it is no longer efficient for them to be operating at the start-up end of the market. However, by linking with a business incubator, run by a successful serial entrepreneur, the venture capital fund is able to ensure that it retains a foothold in the start-up end of the market, and is positioned at the front of the line in further funding rounds for the most successful of these businesses.
- While the mix of activities that are now being seen in the US under the label of ‘business incubation’ may be considered novel, all the components have been around for some time. It will be interesting to see how these developments will be adapted for use in the UK.



The Changing Face of Business Incubation

Lawyers and Other Professional Advisers

"In Silicon Valley, equity stakes are a highly profitable way of life for advisers. 'It's clear the way to wealth and fortune is not providing service but making successful equity investments,' says Mike Hall, a partner in the Silicon Valley office of law firm Latham & Watkins. 'A lot of service providers in the Valley simply won't take on a client relationship without the opportunity to take an equity stake.'"

The Financial Times 15 December 1999

INTRODUCTION

7.1 Another significant contributory factor in enabling TBSFs to progress along the success curve has been the emergence of a cadre of professional advisers able to understand the needs of smaller companies with limited resources and to develop mechanisms for deferring remuneration. The law firms have taken the lead here, and are seen by many entrepreneurs as essential to accessing other resources, especially funding from prominent VCs.

7.2 TBSFs in the UK often report that the corporate advice of the type they require is usually only available from major "City" firms but such firms, who are used to dealing with established corporate clients, do not understand the different outlook of a TBSF, and the TBSF is rarely in a position to pay "City" rates. In addition, we were frequently reminded of the key role to be played by PR consultants and head-hunters.

RISK SHARING

7.3 The UK situation contrasts with the US position: "We answer as many business questions as legal questions, especially for intellectual property, and we are a kind of management consultancy".⁵⁴ Despite the imbalance of supply and demand, attorneys from Wall Street firms cannot successfully practice in Silicon Valley "because they have the wrong culture and do not even know that they do have the wrong culture."

7.4 A small number of US law firms have in-house venture funds. The aim is to share risks fully with the client. The rationale is that since the firm shares in the downside and does not chase for fees as a creditor "it is nice if we can share in the upside. We leave it to the client to determine the percentage." A percentage of the equity taken will be reserved for the partners working on the deal, with the majority of the investment being made by the law firm's in-house fund, which subscribes cash for common stock. In form, the firm may start two new funds a year to accommodate new partners joining and leaving, but in substance it is one rolling fund with as many as 1,000 investments.

7.5 Law firms are able to acquire equity in this way because for some time it has been a seller's market for legal services in the US, with many firms having to turn down potentially good clients. Legal fees to the stage of first funding might be \$20,000 to \$30,000 if everything proceeds smoothly, and \$50,000 to \$100,000 if things do not: "We write off \$30,000 [fees] all the time, the one percent [equity stake] compensates us for the risk."

FEES VS EQUITY?

7.6 Most firms prefer the discipline of the client paying cash and do not provide services for equity in lieu of fees. That said, attorneys may often negotiate on licensing deals (for instance, for universities) without involving the client directly and without being paid. Some firms insist on receiving equity as a condition of taking on a client. Others operate more flexibly.

54 All quotations in this section are from major US law firms interviewed by the authors in November 1999



7.7 Professional firms operating in the Silicon Valley environment and in other clusters are an integral part of a new business model based on collaboration as much as competition:

"Leaders of businesses, government, and institutions all have a stake – and a role to play – in the new economics of competition. Clusters reveal the mutual dependence and collective responsibility of all these entities for creating the conditions for productive competition. This task will require fresh thinking on the part of leaders and the willingness to abandon the traditional categories that drive our thinking about who does what in the economy. The lines between public and private investment blur. Companies, no less than governments and universities, have a stake in education. Universities have a stake in the competitiveness of local businesses. By revealing the process by which wealth is actually created in an economy, clusters open new public-private avenues for competitive action."⁵⁵

SUMMARY

- Many professional advisers will take remuneration in the form of equity.
- Some treat receiving equity as a pre-condition for taking on a client. Others adopt a more discretionary approach.
- Law firms are seen by many entrepreneurs as the gateway to other essential services, including access to leading venture capital investors.
- Many firms operate a "rolling investment fund", with hundreds of small stakes in early stage clients.
- Public relations and head-hunting firms are also considered key players in ensuring the success of TBSFs, especially in Silicon Valley.
- Professional firms, like universities, are key components of networking and clustering.

Case Study – LAW FIRMS MOVING BEYOND LEGAL ADVICE

VENTURE LAW GROUP⁵⁶

Venture Law Group (VLG) was set up in 1993 by a small group of lawyers from the major law firms in Silicon Valley (Wilson, Sonsini, Goodrich & Rosati; Brobeck, Phleger & Harrison; and Morrison & Foerster). Currently more than 70 lawyers work at VLG, "which specializes in representing deal-intensive technology companies, both public and private, and the venture capital funds and investment banking firms that finance them."⁵⁷

VLG's headquarters are on Sand Hill Road in Menlo

Park, California, a district which has the highest concentration of venture funds anywhere in the world (currently more than 50 funds are estimated to be in Menlo Park) and VLG also has an office at Carillon Point in Kirkland, Washington.

VLG's business has evolved such that it can be seen as a combination of law firm, investment bank and venture fund. In exchange for equity in clients, it provides strategic as well as legal advice, but they do not trade fees for stock – stock is taken in addition to normal compensation.

55 Porter M (1998) page 90

56 www.vlg.com

57 See VLG website for further details

Case Study – GATX CAPITAL – VENTURE LEASING

GATX Venture Finance Partners⁵⁸ is a San Francisco based specialist provider of venture finance. The venture finance industry in the US has been in existence since the late 1980s and it is estimated that \$1.5bn of funding was provided in 1998, with a significant increase in 1999. There are six major venture finance providers in the US and several additional boutiques. Venture finance has helped hundreds of development stage technology companies to grow, and is used by 70% of US start-ups.

GATX Venture Finance – which opened its UK operation in early 2000 – provides not just conventional equipment-backed loans or leases but also "venture loans". The key differentiator with venture loans is that

- they are not secured by specific equipment
- they are loans for working capital requirements and
- they are loans based upon the "enterprise value" and secured by intellectual property.

Unlike equipment-backed financing, venture loans "spend like equity" (for instance on payroll and marketing) but have a more reduced cost of capital – especially for the founders and early investors, who are likely to have been severely diluted by the time of the Series C or D round of investment. It is riskier than equipment finance as there is no physical collateral: GATX is taking a view on the

value of a TBSF (which may not yet have revenues).

The financial return on venture finance comes from a combination of the fixed debt service or lease payment and an upside provided by taking warrants in the client company. Venture leasing would normally only be appropriate where experienced, professional VC investors are already involved, providing active input into the management of the company and the ability to make subsequent rounds of investment.

Considerable emphasis will be put on the calibre of the management team and the inherent value of the technology (venture leasing will therefore have limited application in dot.com).

Venture finance is non-intrusive as it relies mainly on the VCs to carry out due diligence. When companies encounter difficulties, the management and the VCs are left to solve the problem. Board representation is unusual and GATX claims to be able to work with any existing creditors.

Entrepreneurs often have up to 12 months to draw down facilities, which are typically of 36 months' duration.

However, reduced dilution does have a price; the company must make contractual (monthly) payments and venture finance is likely to suit only those companies expecting significant increases in valuation from one equity investment round to the next.

58 <http://www.gatx.com>



Lawyers and Other Professional Advisers

Corporate Venturing

"It is ironic that as 1999 drew to a close, British Airways, a company which Freeserve has overtaken in size of market capitalisation, announced it is stripping out its Internet sales into a separate company; one more example of a traditional company hoping to add value with a dot.com added to its name."

The Observer, 2 January 2000

"... it was lack of imagination in blue-chip boardrooms, not lack of cash, that was holding the UK back."

The Scotsman, 25 January 2000

INTRODUCTION

8.1 Corporate venturing is prevalent in the US. Many established companies realise that new technologies will have a profound impact on their core business and that such new technologies have a good chance of being developed within a start-up or early-stage company. Taking a stake in a range of smaller companies is a way for the established industry players to hedge their bets. The underlying rationale is that innovative smaller companies require additional resources to make an impact on world markets, and large corporations benefit from the creative streak in new businesses. It should also be noted that the distinction between corporate venturing and "intelligent" venture capital is difficult to determine in the US.

VENTURING OR VENTURE CAPITAL?

8.2 Outright ownership of the SME is not necessary as a strategic stake has the potential to provide

- Early sight of technology which might have an impact on the established player's business, and
- VC levels of return on investment.

As such, venturing is similar to venture capital investment, and those funds built on "smart" investors are in many ways more akin to clubs of corporate venturers than to financial investors mainly interested in the performance of the investment rather than the performance or potential of the underlying technology.

8.3 The "venture capital" approach to corporate venturing is one of the major distinguishing factors between the US and UK approaches. Corporate venturing is not as well-established in the UK, and the common UK approach is still probably the one-to-one or ad hoc investment approach, as defined recently by the CBI:

"a formal, direct relationship, usually between a larger and an independent smaller company, in which both contribute financial, management or technical resources, sharing risks and rewards equally for mutual growth."⁵⁹

8.4 Such is the accepted significance of corporate venturing in the US that an annual handbook lists 160 detailed corporate profiles of corporations undertaking venturing (see The Corporate Venturing Directory & Yearbook, Asset Alternatives Inc., Wellesley, MA). This report also demonstrates the close affinity of corporate venturing and venture capital. Many of the items featured could appear under either heading, and co-investors are frequently VC funds.⁶⁰ The amounts set aside by major corporates for this type of investment are as significant as the returns. Oracle, for instance, has set aside \$100m to its venturing programme. Apple generated \$1.3bn from its Akamai investment.⁶¹ Some similar moves are beginning to be seen in the UK, for instance through the Reuters Hothouse Fund or the £5m investment made by British Energy in Home

59 CBI (1999)

60 See <http://www.corporateventuring.com>

61 Another household name in Silicon Valley is so aggressive and indiscriminate in its investment approach that it was described to us as leaving its calling card "on every hydrant in town"



Case Study – CORPORATE VENTURES

Chevron is one example of a major corporate taking stakes for both strategic and financial reasons. In early 1999, it established a \$60m fund to be run as a stand-alone entity by two Chevron employees. This first fund has a nominal life of 10 years, with all the funds expected to be committed in three years at the outside, following which a further fund will be established. The fund is invested as to 30% in other VCs and 70% directly in SME investments.

Chevron's target sectors are:

- Biotechnology (modified enzyme or gene-modified pathways for chemical synthesis)
- Materials (micro materials and machines for sensors, chemical species, large scale materials for construction in severe and weight-sensitive environments)
- Information technology (business-to-business, knowledge management and collaborative working, management and decision support, communications and connectivity).

Chevron expects to invest in 12 or so companies, bringing total average investment in each company to \$3.5m. Syndication with mainstream VCs is common and Chevron is largely dependent on VCs to deliver quality deal flow – most self-referred proposals are of poor quality.

Being located in Silicon Valley was a clear advantage for Chevron's corporate venturing activities. The VCs in which they have invested are small enough to give attention to Chevron despite the relatively low investment (\$5m) in each fund.

Chevron invests more than just money. It can provide a show case for the technology in which it has invested and will often put in place an in-house parallel development project to take up the technology in Chevron's core business – something a mainstream VC would not be able to do. The investment committee includes the Vice President for Technology and the Vice President for Mergers and Acquisitions.

Directory.com, an on-line guide to more than 75,000 homes for sale.

IMPACT ON STOCK VALUATION

- 8.5 Perhaps unlike their UK counterparts, US stock analysts are held by major corporates undertaking venturing to see corporate venturing as a major plus factor in rating the corporate stock.
- 8.6 However, industry insiders recognise that different corporates have entered the venturing market with different levels of skill. Some venturing operations are considered to be overstaffed or inflexible (the corporate to succeed must accept some of the entrepreneurial approach of the investee – something many larger companies find culturally alien).

ACQUISITION OF VENTURE PARTNERS

- 8.7 Involving external fund managers is one way of circumventing this difficulty. However, without the involvement of some senior internal management resource in a venturing fund, the route for taking up the technology in the main business will not be effective and the necessary network of contacts will not be in place.
- 8.8 Many corporate venturers do not go into investments with a right of first refusal to outright acquisition of investments at a later stage as this would be unattractive for the entrepreneurs and the other investors. They may, however, anticipate acquiring some of the investments at market valuations.

CURRENT UK POSITION

- 8.9 In the November 1999 Pre-Budget Report the Chancellor of the Exchequer announced that tax incentives would be provided for UK companies undertaking corporate venturing:
- Up-front corporation tax relief at 20% on investments in small higher risk trading companies; and
 - Deferral relief where companies sell shares and reinvest the gain in corporate venturing.⁶²

SUMMARY

- Corporate venturing is prevalent in the US.
- It provides major companies with an insight into emerging technologies as well as possible financial return.
- Corporate venturing is generally a positive factor from the point of view of quoted stock analysts. This is a point for UK analysts to reconsider.
- Some types of corporate venturing are barely distinguishable from "smart" VC investment save that venturing unlike smart investment is likely to be undertaken on a solo rather than a club basis.
- Corporate venturers need to strike the right balance between sufficient autonomy to provide the environment in which investments can flourish and operating with full independence, which cuts out the in-house networks for technical exploitation.
- Several successful venturers operate in close association with VCs, who provide deal flow, whether or not the corporate has itself invested in the VC.
- We are not aware of special tax rules making venturing peculiarly attractive in the US.

62 Pre-Budget Report (1999)

Entrepreneurship

*"Just about anybody in this position would have taken a deep breath and remembered what they teach you in business school – think it through, check for flaws in the logic, make a list of pros and cons, run your decision past your board of directors, sleep on it. But Nico Nierenberg knew that another five minutes might as well be Monday. His mind went down every path, and then I saw that click in his mind that I'd seen the day we met: he'd decided to decide."*⁶³

INTRODUCTION

9.1 Although it is clear that many factors support the success of technology-based firms – from the availability of venture capital and the prevalence of clusters through to innovation in financial markets – little of this would have an impact were it not for the individuals who run the tens of thousands of hopeful start-ups: the entrepreneurs. While there is considerable controversy over how best to promote entrepreneurialism, the description of the entrepreneur's role quoted by the US Senate Joint Economic Committee Staff Report sets out the role of the entrepreneur:

"The entrepreneur shifts economic resources out of an area of lower and into an area of higher productivity and greater yield."⁶⁴

TEACHING ENTREPRENEURSHIP

9.2 Entrepreneurship is an area beset by "nature/nurture" controversies. Can entrepreneurialism really be taught? A recent study contrasted the growth in entrepreneurship as a topic in major US business schools with an inability to fill posts or grapple with the subject at an academic level:

"The number of entrepreneurship chairs has grown from 28 in 1980 to more than 200, but dozens remain empty, because business schools cannot easily find candidates with the academic credentials they consider necessary to fill them. As of September 1998, New York University's business school had four endowed chairs in entrepreneurship, of which two were unfilled. The school's dean, George Daly,

told Bonner that he saw 'entrepreneurship as a word in search of a meaning in the academic sense.'⁶⁵

9.3 However, we found that entrepreneurship courses were popular at all the universities we visited (see Annex "A" for information on courses at MIT). Whilst it may be true that no academic course can teach the "alchemy" which divides a business administrator from a true leader thriving on the creativity and uncertainty of the small business environment, many such courses provide participants with a solid foundation in such vital areas as

- business planning
- presenting a business case
- teamwork through working together on specific projects
- understanding accounts
- knowing which sources of finance to approach.

Helping to create "rookie" entrepreneurs is key; we were told by several different interviewees that in Silicon Valley there are currently 350 CEO posts vacant, with a corresponding number of CFOs and CTOs being sought.

RISKS AND REWARDS

9.4 If the initial entrepreneurship impetus in the early 1990s was "negative" – mainly the result of major corporates shedding jobs – in the past year or two it has become overwhelmingly positive, with graduates of leading US business schools electing to work in start-up or early stage companies in preference to the more traditional employers such as consultants and investment banks. As a result, "the share of total US employment represented by Fortune

63 Bronson P (1999) page 69

64 US Senate (1999) page 14, quoting Jean-Baptiste Say, the 19th century French economist

65 Bhide A (1999) page 7. See also pages 13 to 14 for a full review of the "uncertainty-bearing role" of the entrepreneur



500 firms has fallen from 20% in 1970 to just 8.5% by 1996."

- 9.5 Several US VCs also commented to us that the pace for change has been such in recent years that there is now what one called a "reversal of arrogance". Now it is the entrepreneurs who are able to chose from amongst the clamouring VCs eager to invest.
- 9.6 One factor constantly brought to our attention in the US is the balance of risk and reward in favour of the entrepreneur. On the reward side, it is possible to start a company with seed capital, go through two or three further rounds of finance and then an IPO in as little as two years. This has created hundreds of millionaires – sometimes billionaires – since as a general rule not just the founders but most permanent employees will benefit from generous stock options. Such individuals often become serial entrepreneurs, with capital and experience. For them, founding a new business is a means to an economic end.
- 9.7 This has two implications for policy in the UK:
 - Current employee share option legislation needs

to be reviewed to ensure that it encourages smaller, high growth potential companies to grant options, especially with a benign capital gains tax regime. Current thinking in the UK suggests that the risk of providing unjustified gains to a minority of "fat cats" outweighs the advantages of providing justified gains to a great number of dynamic small firm owners and managers;

- UK companies must come to recognise that just as venture capital is required for accelerated growth in the vast majority of cases, so parting with equity to a wider employee base will be necessary to attract and retain key staff, especially where initial salaries are not comparable with what might be obtained in an established corporation.
- 9.8 Early stage technology start-ups in the US are able to attract experienced managers by offering share option schemes as a significant part of the remuneration package. These option schemes vest within two or three years. Usually there is no link between performance and the vesting of the options. In the UK restrictions on the percentage of quoted companies' shares which may be in option schemes and the tax regime

Case Study – SHARE OPTIONS

Generous stock options – and generous taxation rules governing stock options – have enabled start-up and early stage technology businesses in the US to recruit experienced managers away from established corporations, even though the start-up cannot compete in terms of salary or other elements of the employment package.

At the outset, employees are likely to be given the right to purchase a parcel of shares at the market price (for instance, the same price as the VC investors are paying). The right to purchase the shares vests in stages over the following four or five years, although the options themselves can be exercised over a ten year period. Two features distinguish US from UK corporate policy on options. First, options tend to be widely distributed in the US and not simply reserved for a favoured few "key" employees. Secondly, employees leaving the corporation for positive reasons (the so-called "good leavers") are generally allowed to take

vested options with them.

As for taxation, the UK rules on exercising options often mean that options are not as strong an incentive as they are in the US. For UK schemes not falling within the Inland Revenue "approved regime", the difference between the exercise price and current market value is treated as income on exercise of the options and taxed accordingly, rather than as a capital gain. National insurance will also be levied if the shares are easily convertible into cash, and quoted technology companies will be unable to predict future tax liabilities dependent on share price performance and the volume of employee options exercised.

Inland Revenue approved schemes only allow for options with a maximum value of £30,000 to be granted and in any event options cannot vest in under three years if the tax benefit is to be received.

66 US Senate (1999) page 4

67 For a discussion of the Pre-Budget Report (1999) suggested changes in this area see Section 10 below

associated with personal gains from options are complex and unattractive compared with the US position. US VCs see this as a barrier to entering the UK market, although the UK restrictions are only guidelines and are frequently by-passed in consultation with professional investors.⁶⁸

ATTITUDES TO FAILURE

9.9 On the risk side, we found that there is generally less stigma attached to failure in the US than in the UK. One long-established and successful West Coast venture capital investor told us:

"Failure is not a black mark. I love people who have had their brains kicked better than someone who just succeeded [by luck]."

9.10 Interestingly, such attitudes to failure, although widespread, were not universal in the US. Even discounting obvious factors such as fraud, most of our interlocutors in North Carolina expressed wariness about entrepreneurs with a business failure behind them, and believed that such wariness would be widely shared in the region.

9.11 In September 1999 the UK government published *A Review of Company Rescue and Business Reconstruction Mechanisms*. While making no specific proposals, this paper did invite submissions on whether the UK approach is too debtor-friendly. It is expected that a further consultation paper will be published in the Spring to take account of submissions received. The Insolvency Service has proposed legislation requiring a company to be given notice before an administrative receiver could be appointed by a secured lender. The proposed legislation would also enable small companies to apply to the court for a moratorium when negotiating voluntary arrangements with creditors.

9.12 Lastly, the sheer dynamism of some regional US economies is in itself a factor mitigating the risk involved in setting up or working for a high

WHAT MIT STUDENTS SAY ABOUT RISK-TAKING

- "All [MIT alumni interviewed who had gone on to found companies] agreed that MIT had encouraged them to become risk takers."
 - "[Risk taking] is a combination of several different factors. I knew that I was not going to work for big companies when I was about to leave MIT. I would rather take the risk of failure than the risk of becoming nobody. There must
 - be many alumni who felt the same way I did. MIT offers great mentors and more opportunities for students to test the water in establishing their own businesses."
 - MIT instils the entrepreneurial spirit in its graduates: "You know lots of people (students and professors) start their own companies."
- See MIT: The Impact of Innovation, BankBoston Mark 1997*

potential SME. The technology-based economy around Seattle took off in earnest in the mid-1990s once entrepreneurs were convinced that leaving Silicon Valley or Boston to work there would not mean they would be stranded without a job if the proposed venture failed to prosper. Availability of capital, a network of professional advisers and quality of life on their own were not sufficient.

EMPLOYMENT

9.13 Legislative restrictions on technology workers have also been eased, with Congress nearly doubling the number of specialist ("H1B") guest worker visas in 1999 from 60,000 to 115,000. Several of the internet entrepreneurs and VC managers to whom we spoke, notably in Silicon Valley, came from overseas:⁶⁹

"There are so many Indian computer programmers in Silicon Valley that cricket is one of the fastest growing sports in the region"⁷⁰

9.14 It is notable also that under the current administration the President and Vice President have frequently been visible in Silicon Valley (and John Doerr of the leading California based VC, Kleiner Perkins Caulfield & Byers was repeatedly rumoured to be a potential running mate for Al Gore for the presidency).

68 For a different view of stock options as an incentive, see Carr Bettis, John M Bizjak and Michael L Lemmon, *Insider Trading in Derivative Securities*, Arizona State University Working Paper 1999. Executives of young companies are resorting to Zero cost collars with increasing frequency. Such investments – the simultaneous purchase of put and call options – limit the downside of equities, which, given the volatility of internet stocks, is a useful strategy. See also Bygrave & Timmons, *Venture Capital at the Crossroads*, Harvard Business School Press 1992

69 The Punjab, Bangalore, Israel, Canada, the UK and Switzerland

70 Leadbeater C (1999) p.141



SUMMARY

- Although star quality can no more be taught to entrepreneurs than it can be taught to any other business school group, entrepreneurship programmes at US universities have made a welcome contribution towards raising the general standard of business competence, especially among those whose primary interest may be in science and technology.
- The UK government's initiative in establishing the Cambridge MIT Institute (see Case Study – The Cambridge MIT Institute) is a welcome move towards establishing entrepreneurship skills in one of the UK's leading research universities. Excellence in both research and entrepreneurship should no longer be seen as antithetical, as the MIT and CalTech experiences demonstrate.
- Entrepreneurship in the US may have grown out of corporate downsizing but is now an activity rivalling consulting and investment banking in attracting the best students and the highest rewards.
- A key function underpinning the high level of entrepreneurial activity among students, faculty and alumni is networking. A common feature of US universities is the prevalence of networking between the business and academic communities, often driven by alumni.
- One of the critical factors in US success has been the number of repeat or serial entrepreneurs: a private company is not "the family silver" but a means to an economic end.
- A more generous approach to employee share options is still required both within the fiscal framework and within the culture of small firms. The proposed Enterprise Management Incentive Scheme is welcomed.
- The UK government's review of insolvency is also welcomed.

Government

*"Public policy cannot create Silicon Valleys around the world. Yet many of the constraints which will hold back Silicon Valley will only be removed through public policy. Innovation in public policy will be essential to match the rate of innovation in the economy. Property taxes are so low that there is not enough money to fund a decent basic-education system. Zoning restrictions will not allow the construction of high-rise apartments. Housing is so scarce that new immigrants to Silicon Valley often have to drive for two hours to get to work. Traffic congestion is endemic and as a result the physical environment is degrading. The place is ugly, overcrowded and overheating."*⁷¹

INTRODUCTION

10.1 Apart from providing an environment of macro-economic stability, the role of government in the US in encouraging the new economy is generally seen as not to interfere rather than to take micro-economic measures which may favour investment in the sector:

"No top down or strategic plan was responsible for the success of US high-tech industries such as semiconductors, software and biotechnology. Rather, decentralised decision-making in technology and capital markets has allowed a multiplicity of good ideas to be tested and developed. Diverse angel and venture capital funding sources, and efficient public equity markets, have allowed entrepreneurs to quickly grow business start-ups into multibillion dollar enterprises [...]"

"The challenge for US policymakers is to keep the United States one step ahead by reducing barriers to entry in product markets, encouraging further financial market innovation, and removing barriers to entrepreneurship."⁷²

10.2 Although the role of government was seen by most of those we interviewed to be mainly to create a benign environment through a stable economy and low taxation, it was also recognised that government can have a role in meeting market weaknesses (of which there are more in the UK than in the US). In addition, in several interviews we were told that low taxation policies in the US have probably gone

about as far as they can if government (local or national) is to continue to provide essential infrastructure such as transport and education.

TAXATION

10.3 Government can influence enterprise, for instance through taxation, which does have an important role to play in discouraging VC and angel investment, as well as incentives such as equity options. The Williams Committee in November 1998 noted that:

"On Capital Gains Tax (CGT), the UK has much to learn from US experience. After a toughening up of their CGT regime was followed by plummeting venture capital in high technology companies, the US re-thought their tax regime. Between 1979 and 1982 the CGT rate was cut from 35% to 20%. After 1981 stock options were taxable only when the relevant shares were sold, rather than exercised. The market responded. [...] The US has continued to develop its CGT regime to encourage entrepreneurial investment. Recent developments include a taper for long-term investors and flexible rollover arrangements to promote long-term investment in general rather than locking investors into a particular business."⁷³

10.4 The Williams Committee welcomed the changes in CGT set out in the Finance Act 1998. However, for many the UK regime is still too restrictive. The British Venture Capital Association⁷⁴ Budget Submission 2000/2001 (*Be Bolder*) lists the main conclusions of a

71 Leadbeater C (1999) pages 143 to 144

72 US Senate (1999) page 30

73 Williams (1998) p.3

74 <http://www.bvca.co.uk>

review undertaken on its behalf of CGT in the UK, the US and the rest of Europe, of which the US segment is available. Key conclusions include⁷⁵:

- The close association of tight monetary policy and tax cuts in ending the long run of US stagflation
- Since 1978 the maximum rate of CGT for individuals in the US has been reduced from 49% to 20% on assets held for a year or more, with an effective rate of 14% for taxpayers selling stock in companies with assets of \$50m or under held for five years
- US Treasury Department studies, supported by academic research, indicate that CGT reductions have increased entrepreneurial activity and the demand for venture capital, with no evidence of increased tax avoidance or an adverse yield on income tax.

- 10.5 Against this consensus view that taxation, especially CGT, is a critical factor should be considered the evidence summarised by the Bank of England as follows:

"There were, however, a number of other influences at the time for example the [...] introduction of the Prudent Man Rule (1979) and the Safe Harbor Regulation (1980) [...] It is difficult to assess which of these changes had the greatest impact and, therefore, to prove the causal link between venture capital investment and CGT rates. Indeed, regression analysis on this issue of Bygrave and Timmons was unable to demonstrate a statistically significant correlation."⁷⁶

- 10.6 Although the impact on institutional investors (pension funds are tax exempt) may be marginal, CGT will have a material impact on business angels and entrepreneurs:

"Indeed research by Mason and Harrison found that two thirds of those business angels surveyed cited CGT as impacting on their investment decision; it ranked higher than any other variable."⁷⁷

PRE-BUDGET REPORT

- 10.7 Since 1998, CGT has been reduced to 10% for higher-rate tax payers for long-term investments, although the personal threshold is only £7,100. In November 1999 the Chancellor announced the intention to increase incentives for entrepreneurial investment by shortening the CGT taper for business assets from 10 years to five years. However, several entrepreneurs to whom we spoke suggested that a five-year taper for companies in the internet space is still too long as in that market even three years is enough for most companies either to prove themselves or go out of business. The arguments are finely balanced as tax in the US tapers 14% over five years. Please see Case Study – The Enterprise Management Incentive Scheme.

THE SBIC PROGRAMME⁷⁸

- 10.8 Although generally speaking the US was not seen to have market weaknesses in supporting SMEs in general and TBSFs in particular, one notable form of government intervention – the Small Business Investment Companies (SBIC) programme – was frequently mentioned. The SBIC programme is operated by the US Small Business Administration (SBA) to make equity capital and long term debt available to SMEs. SBICs themselves are private investment firms financing SMEs equity, loans and "kickers" – convertible debt and warrants. The SBICs are licensed by the SBA and make their own investment decisions. SBICs have provided more than \$13bn in long-term debt and equity capital to over 80,000 small US companies.⁷⁹

- 10.9 SBICs must have capital in place before a licence can be granted and can use the SBA to supplement their funds. The SBA will arrange and guarantee debenture issues on the open market to fund SBICs and can also issue "participating securities", and the SBA can itself purchase the securities of SBICs in good standing. With public issues of securities, the SBA guarantees principal and fixed coupon payments. The SBA is in the position of a credit

75 "Be Bolder", page 3

76 Bank of England (2000) paragraph 4.105. Bygrave & Timmons *Venture Capital at the Crossroads*, Harvard Business School Press 1992

77 Bank of England (2000) paragraph 4.106. The research referred to is: Colin Mason and Richard Harrison *Public Policy and the Development of the Informal Venture Capital Market: UK Experience and Lessons for Europe*, Editor K Cowling, Industrial Policy in Europe (1999)

78 In the UK, government-sponsored schemes to foster regional venture capital are evolving into a variation on SBICs

79 See <http://www.nasbic.org/success/index>

Case Study – THE ENTERPRISE MANAGEMENT INCENTIVE SCHEME⁸⁰**Introduction**

The EMI scheme is intended to assist smaller high-risk companies (particularly those in the IT sector) to recruit and retain employees of high calibre, in the face of the strong competition for the services of such people from larger concerns and companies in other jurisdictions. In broad terms, it aims to do this by providing a number of significant tax reliefs for no more than 10 key employees in companies with gross assets of no more than £15 million who each receive options over no more than £100,000 worth of shares.

Principal elements of the EMI scheme**Form of incentive under the EMI scheme**

The form of incentive which participants will receive under the EMI scheme is a share option. However, the terms of EMI options are to be significantly more flexible than those under existing Inland Revenue-approved option schemes:

- there is to be no minimum period for which the option must be held before exercise to obtain the tax benefits (although these benefits will not be so significant if the shares are immediately sold)
- options must be exercised within 10 years of grant if the tax benefits are to be available
- there is to be no minimum exercise price (although there are tax consequences arising on exercise if the options are granted at a discount to market value - see further below)
- shares subject to EMI options must be fully paid up ordinary shares, but the other restrictions applying to shares which may be subject to the existing Inland Revenue-approved regimes do not apply (so, for example, shares under the EMI scheme may have limited or no voting rights). Accordingly, the shares may be subject to restrictions on their transferability or subject to forfeiture (although the tax regime applying generally to such shares would apply equally)

Limits on the EMI scheme

- No more than 10 employees in any company (or group) may hold EMI options at any one time
- The maximum value of shares (calculated as at the date of grant) over which any employee may hold EMI options is £100,000

Eligible employing companies

Only small trading companies (or holding companies of small trading groups) with a qualifying trade will be eligible to grant options under the EMI scheme. The eligibility test is similar to that under the Enterprise Investment Scheme (EIS) and Venture Capital Trust (VCT) tax regimes (but with some significant differences). Quoted as well as unquoted companies will be eligible provided the gross assets test is satisfied (quoted companies were ineligible under the original Budget proposals)

Eligible participants

Participants in the EMI scheme must either be full-time employees (devoting more than 25 hours per week to the company or group) or part-time employees who devote at least 75% of their working time to the company or group. Employees who control, directly or indirectly, more than 30% of the ordinary share capital of the company are ineligible to participate. Subject to these conditions (and the maximum number of 10), participation is at the absolute discretion of the company.

Establishment and operation of the EMI scheme

To reduce compliance costs, the EMI scheme is not to be subject to the somewhat cumbersome prior approval procedure which applies to other Inland Revenue approved schemes. The company makes annual returns to the Inland Revenue in relation to EMI options outstanding

Tax reliefs available under the EMI scheme

The tax benefits available to EMI options are broadly two-fold, relating to the income tax (and NIC) treatment applying on the grant and exercise of the EMI option and the capital gains tax treatment applying to the shares acquired on exercise of the EMI option:

- No income tax or NIC is payable on the grant of an EMI option
- No income tax or NIC is payable on the exercise of an EMI option for which the exercise price is no less than the market value of the shares at the date of grant of the EMI option
- Income tax is payable on the exercise of an EMI option which is granted at a discount, but only to the extent of the discount. This income tax is collected under PAYE, and a corresponding NIC charge arises, if the shares acquired are readily convertible into cash
- If the conditions for EMI treatment (save that relating to the size of the employing company) cease to be satisfied, then a valuation is carried out at the date of such cessation and any subsequent increase in value will not benefit from the above reliefs on exercise
- Shares acquired under EMI schemes are treated as being "business assets" and as being acquired at the date the option was granted for the purposes of capital gains tax taper relief. Taken together with the proposals made in the Pre-Budget Report on 9 November 1999 to enhance taper relief for business assets, this will mean that, provided that shares acquired under the EMI scheme are not sold within 5 years of grant of the EMI option, the gain in value of those shares from the date of grant to their eventual disposal will in normal circumstances be taxed at the rate of 10% (the rate reducing from the normal 40% by 6% for each complete year after grant)
- The CGT benefits referred to above are withdrawn (in whole or in part) if the EMI conditions cease to be satisfied at any time before disposal of the shares concerned
- Companies granting EMI options will obtain an automatic corporation tax deduction for the costs incurred in establishing and operating the arrangements

insurer, and the Federal Government pays the premium:

"The SBIC programme was formed by the Small Business Administration (SBA) in 1958 to help small businesses and entrepreneurs secure financing. SBICs are typically formed by a group of people

experienced in venture capital financing who have at least \$5 million in capital they want to invest. They pool their money together, and apply to the SBA for an SBIC license. There are very few restrictions on the ownership of SBICs. Many commercial banks also own SBICs. Current laws allow banks to invest up

⁸⁰ We are grateful to Graham Muir of Nabarro Nathanson for permission to reproduce an abridged version of his November 1999 paper on EMI.

Funding Technology went to press before the 21 March 2000 Budget

to 5% of their capital and surplus in an SBIC. Banks are interested in SBICs because they allow them to invest in higher risk business ventures than possible under federal banking regulations. For every dollar an SBIC invests in a company, the SBA matches that investment (up to 300%). With that money, the SBIC forms SBA-guaranteed debentures that are sold to investors.⁸¹

10.10 With debenture schemes, SBICs must start to pay both interest and principal six months after issue regardless of profitability. With participating securities SBICs do not have to pay the fixed rate coupon unless they are profitable, and if they are not, the SBA pays the coupon. The SBA will then be entitled to a priority percentage of profits when the SBIC is profitable. Participating securities are therefore expected to make SBICs more suitable for early stage technology investments.

10.11 Specialised SBICs – SSBICs – invest only in businesses owned by economically or specially disadvantaged groups. Special incentives will be available, such as interest rates subsidies on issues of debentures. Some smaller, early-stage VC funds began life as SBICs and, having proved themselves, were able to raise conventional funds.

UK POLICY

10.12 In addition to several existing measures falling outside the scope of this report (such as SMART Awards and the Small Firms Loan Guarantee Scheme)⁸² the UK government has launched a number of initiatives aimed to help the supply of finance to TBSFs. These recognise the relatively poor supply of early stage venture capital to the sector and include:

- The University Challenge Fund (UCF). Launched in 1998, the UCF is intended to facilitate the transfer of university research into commercial exploitation. The government and two major charities (the Wellcome Trust and the Gatsby Charitable Foundation) are providing an amount now totalling £65m for seed funds within universities successful in bidding for resources.
- The UK High Technology Fund, launched in November 1999, is intended to be a £125m fund of funds to invest in VCs specialising in early-

stage technology investments. In addition to £20m committed from government, this fund is intended to raise a further £105m from other investors. It is intended that the fund should demonstrate to institutional investors that commercial returns can be obtained from early-stage technology investment.

- DTI sponsorship for UKBI, the Centre for Business Incubation Policy in the UK, aimed at promoting knowledge of and best practice in business incubators. UKBI is also sponsored by HSBC, the Prudential, Aston University and Aston Science Park.
- The Higher Education Reach-out to Business and the Community (HEROBaC) Fund is a special fund (of £83 million to be allocated over the period 1999 – 2004) to increase the capability of universities to respond to the needs of businesses and of the wider community where this will lead to wealth creation. The new fund is intended to initiate a third stream of funding, complementing the Higher Education Funding Council for England (HEFCE)'s existing grants for teaching and research, to reward and encourage universities to enhance their interaction with business. The fund will provide a platform of core funding to help universities to put into practice organisational and structural arrangements to develop and implement their strategic aims in this area.⁸³

10.13 As for improving the supply of skilled entrepreneurs, eight centres of enterprise, receiving £25m in aggregate, have been set up under the Science Enterprise Challenge announced in the March 1998 Budget. Their objective is generate a greater number of trained TBSF managers through cross-disciplinary training within universities.

10.14 In addition to the eight centres of enterprise, the establishment of the Cambridge MIT Institute was announced in the November 1999 Pre-Budget Report. A total of £68m is being made available by government over five years, and it is intended that a further £16m should be found from private sources. Please see Case Study – The Cambridge MIT Institute for further details.

10.15 UK government initiatives to redress the market failure of limited early-stage venture capital for

81 <http://www.datamerge.com/news/archives/sbic>

82 For further details see *A Guide to Help for Small Businesses* Department of Trade and Industry April 1999. DTI/Pub 4058/60k/4/99/NP. URN 98/942. <http://www.dti.gov.uk>

83 Data from the Higher Education Funding Council for England – <http://www.hefce.ac.uk>

Case Study – THE CAMBRIDGE MIT INSTITUTE(CMI)⁸⁵

In November 1999, a partnership between the University of Cambridge and the Massachusetts Institute of Technology was announced.

The two universities will create the Cambridge-MIT Institute (CMI) that will support collaboration in four areas: undergraduate education; a programme of integrated research; professional practice programmes in innovation and entrepreneurship; and the creation of a National Competitiveness Network.

CMI is to be funded by a combination of UK government and private sector funding. The UK government will commit up to £68m to CMI over five years against contracts for specific programmes of activity. The private sector in the UK will contribute a further £16m. The Cambridge office of the CMI is based at the Judge Institute of Management Studies, and is under the directorship of Dr David Livesey.

At the University of Cambridge, the CMI will be working closely with the newly formed Cambridge Entrepreneurship Centre (CEC).⁸⁶

Undergraduate education

An undergraduate student exchange program is a central objective of CMI. The two institutions are planning to initiate a series of common courses (typically to be taken by third-year students who will spend their entire third year at the host university) taught simultaneously at both locations as part of the degree programmes of the two universities. These courses will focus on students of engineering, science, technology, and management (including innovative interdisciplinary programmes). The course will use distance learning technologies and Web-based instructional materials. MIT programs for distance education with the University of Cambridge will be based, in part, on experience gained in MIT's distance learning alliance with the National

University of Singapore and the Nanyang Technical University. These innovations should permit up to 50 undergraduates a year from each university to join this exchange programme.

Integrated research

The CMI will co-ordinate an integrated research program that will focus on how technology improves productivity, how technology-based enterprises grow out of academia, and how technology enterprises develop into world-class organisations. CMI will also link into research in fields that have potential to influence substantially the future evolution of technology. Potential areas of collaboration include physics, biology, neuroscience, information technology, financial engineering, nanotechnology, bioengineering, microfabrication, and materials science. CMI will also support faculty exchanges through a programme of Cambridge-MIT Fellows.

Professional practice programmes in innovation and entrepreneurship

Through CMI, the University of Cambridge and MIT intend to develop and extend their existing programmes of education for business, in such areas as logistics, product development, manufacturing, and the management of technology. In addition, the partner universities will identify other opportunities for collaboration on graduate education in fields beyond management and engineering.

A national competitiveness network

CMI will establish a national knowledge network with linkages to the Enterprise Centres⁸⁷ and to industry. Its aim is to disseminate educational and research results produced by CMI and other universities, co-ordinate the development of joint research projects to be undertaken by participating universities, and hold an annual business-government-university summit focusing on the competitiveness and productivity of UK industry.

TBSFs have generally been well-targeted, as have initiatives to facilitate the commercial exploitation of university research. The government has also taken a leading role in awareness and discussion, for instance with the 1998 competitiveness White Paper and the bio-incubators report. However, the following factors have obscured the government's strategic intent and made it difficult for entrepreneurs to access

appropriate government schemes:

- the number of initiatives;
- the relatively small amounts of cash awarded to each;
- the reliance on private sector matched funding; and
- the tendency on the part of government to conflate new and existing initiatives in press releases and policy documents.

85 <http://www.cmi.cam.ac.uk>. Information given here is drawn from the Cambridge University Reporter (<http://www.admin.cam.ac.uk/reporter>), University of Cambridge Press Office (<http://www.admin.cam.ac.uk/news/stories/1999112301.html>) and MIT News Office (<http://web.mit.edu/newsoffice/nr/1999/cambridge.html>)

86 Further information on the work of the Cambridge Entrepreneurship Centre can be found at <http://www.cec.cam.ac.uk>

87 Eight enterprise centres have received funding as part of the UK Government's Science Enterprise Challenge (SEC). For further information on the winners of the SEC see <http://www.dti.gov.uk/ost/ostbusiness/claysec.htm>

As a minimum, a clear and comprehensive restatement of government policy and a focus on TBSFs within the new Small Business Service are required, and initiatives for TBSFs should be clearly separated from more generic SME government proposals.⁸⁴

INDIRECT GOVERNMENT INTERVENTION

10.16 In addition to specific initiatives on taxation or aimed at market weakness, governments can materially affect the TBSF sector indirectly. For instance, much of the technical infrastructure in California existed ahead of its commercial exploitation because of the presence of the US Air Force in the San Francisco Bay area and the Jet Propulsion Laboratory in Southern California. As the USAF moved out, small, high-growth companies were able to move into the premises the Air Force left behind, and benefited from the continuing presence of a pool of trained personnel, well-funded universities and technical equipment suppliers.

10.17 Similarly, the US government is a major provider of finance to universities through the award of funding programmes, such as major medical research. Even where government has a bias towards low formal intervention, its influence cannot be discounted in a developed society, where 30% (the US) to 40% (the UK)

of gross domestic product is controlled by government and government remains directly or indirectly responsible for setting standards and awarding research contracts.

SUMMARY

- Most US commentators consider that the function of government is to provide a benign environment through a stable economy and taxation which rewards enterprise.
- However, market weaknesses are addressed through targeted projects such as the SBICs, which have in turn launched VC operations.
- Low state intervention or low taxation has also led in some areas to an erosion of public services, which may in turn challenge the robustness of the economic virtuous circle.
- UK government initiatives have been well-aimed but fragmented and under-resourced. A comprehensive re-statement of policy is required.
- The UK government has been effective in raising awareness of the implications of the knowledge-driven economy and the revolution in business being brought about by the internet.
- Further specific taxation reforms in the UK along the lines of the Enterprise Management Incentive Scheme should be targeted at share options for entrepreneurs.

⁸⁴ For a more detailed review of current UK Government policy, see House of Commons Select Committee on Science and Technology *Engineering and Physical Sciences Based Innovation*, Second Report, 9 February 2000. See also Third Report from the House of Lords, Science & Technology Committee, *The Innovation – Exploitation Barrier* 1997

The "New Economy"?

"To the true believer it is a New Paradigm, a modern industrial revolution that has lifted the US permanently on to a higher track of faster sustainable growth."⁸⁸

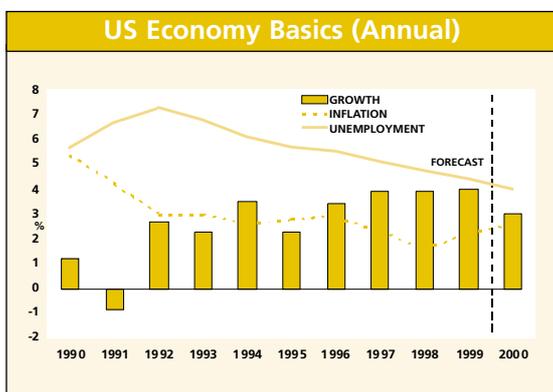
INTRODUCTION

11.1 Even to those who do not believe that the US economy is now subject to a new paradigm, it is evident that economic circumstances in the US have undergone a major shift in recent years, with some consequences which will have enduring results.

THE CASE FOR THE NEW ECONOMY

11.2 The view that the US economy has undergone a fundamental transformation is based on four key observations:

- First, the US came out of recession in Q1 1991 and has now had some nine years of growth – the longest period of uninterrupted growth since the 1950s and 1960s.
- Secondly, such growth has in recent years averaged some 4% a year, higher than the 2.75% to 3% that most economists believed to be the long-term sustainable rate of growth for the US.
- Thirdly, record growth has so far been achieved with consistently low rates of inflation – inflation has generally been below 3% and has not risen above 4.5% in the 1990s.
- Lastly, unemployment has remained consistently low and so far the US economy has not been subject to the wage inflation which has characterised other post-war periods of growth in output and employment.



11.3 Some commentators believe that the so-called "natural rate" of unemployment – the level at which inflation will be triggered – has therefore permanently shifted to a lower level. If the new paradigm claims are accepted, the US would be able to sustain higher average levels of growth over a longer period of time than has been the case for a generation or more, a virtuous circle of high employment and low inflation as well as growth.⁸⁹

THE IMPACT OF NEW TECHNOLOGY

11.4 New technologies are held to be at one and the same time:

- One of the *causes* of the shift in the US economy: it is growth in the technology sectors which has fuelled above average growth in the economy as a whole.
- The principal *subject* of its refocus as technology stocks:
 - are the greatest growth area for venture capital investment;
 - become major components of the stock markets, especially NASDAQ; and
 - create significant numbers of new individual millionaires through generous stock option plans for a majority of employees in new technology firms.
- One of the principal *mechanisms* of growth as:
 - a high proportion of the companies concerned are either developing the software required to run the "dot.com" economy or are themselves dot.com businesses (whether b2b "business-to-business" or b2c "business-to-consumer"); and
 - a great deal of the day-trading by private investors, which pushes up the price of technology stocks to levels unenvisioned two or three years ago, can only take place because of the technology of internet trading.

⁸⁸ *Financial Times* 20 December 1999; see also <http://www.ft.com/hippocampus/wamer.htm> for a full review of the subject

⁸⁹ Economic data kindly supplied by Business Economics at HSBC Bank plc

CULTURAL CHANGES

11.5 In addition to the technical changes affecting macro-economics, cultural changes are argued by advocates of the new economy to play a key role in the transformation of US business. John Doerr, a leading partner in Kleiner Perkins Caulfield & Byers,⁹⁰ one of the key venture capital firms in Silicon Valley, includes in his slide show on high-technology investment a table contrasting the "old economy" with the qualities inherent in the new economy (see table).

Kleiner Perkins – High Technology Investment		
OLD ECONOMY	vs	NEW ECONOMY
a skill		lifelong learning
labor vs mngmt		teams
bz vs. environment		growth
security		risk taking
monopolies		competition
plants		intelligence
standardization		customized choice
sues		invests
status quo		speed, change
standing still		moving ahead
top-down		distributed
wages		ownership, options

LIMITATIONS OF THE NEW ECONOMY

- 11.6 It is reasonable to accept that
- many changes (notably those associated with the internet, which are redefining supply chain networks and reconfiguring how both business-to-business and business-to-consumer companies must operate) brought about by new technology do amount to a permanent change in corporate business models without accepting that
 - other more fundamental changes in the economy (such as smoothing out business and growth cycles) have also occurred.

On this analysis, the US is fast evolving a "new economy" but not a "new paradigm".

- 11.7 Business models are being redefined even at the simplest level, leading to significant efficiency gains. For instance:
- front line sales staff are able to provide realistic data to customers on stocking levels and production levels; they can even influence

production schedules to meet day-to-day shifts in demand;

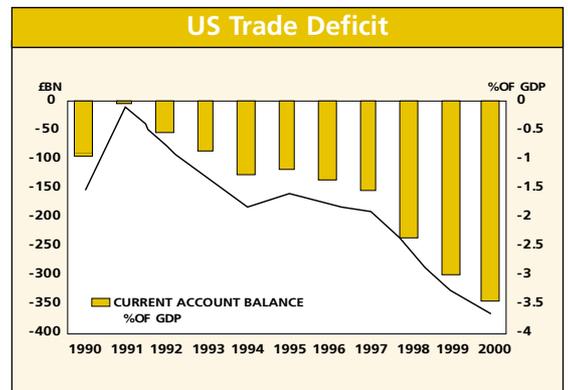
- revised supply chain networks will allow end users and original producers to truncate the supply and design lines between them. Even relatively small businesses can have direct access to suppliers such as advertisers; and
- internet companies, trading from a Website, are able to reach a far wider public – even an export market – at a far earlier stage than a conventional business can.

CLOUDS ON THE HORIZON?

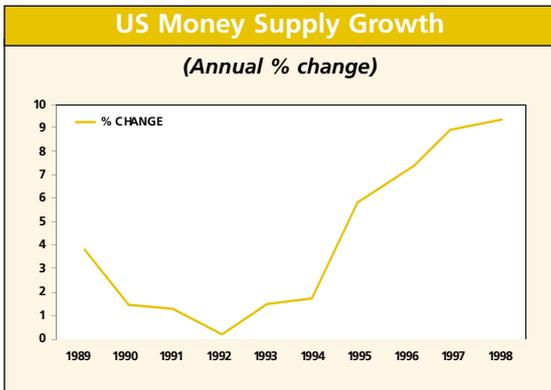
11.8 The two major issues facing the US economy over the next two years are likely to be the twin issues of the US trade deficit and the sustainability of stock market valuations. The US trade deficit in 1999 was some \$375bn (4% of GDP). The US has therefore been living on significant and increasing amounts of borrowed money since about 1991. Overseas investors have been buying US equities and bonds, and they have been prepared to do so partly because of a lack of other opportunities in the world economy:

- the Japanese economy has been stagnant for most of the 1990s;
- the "Asian tigers" went into a significant downturn in Q3 1997; and
- much of Europe has shown at best sluggish growth.

11.9 However, there are clear signs at the beginning of 2000 that the Japanese and European economies are again sustaining growth and are therefore likely to attract capital which in recent years has been invested in the US. At the same time, quoted US technology stocks are trading at levels which on conventional criteria (sales, earnings, cashflow) are unsustainable.



90 <http://www.kpcb.com>

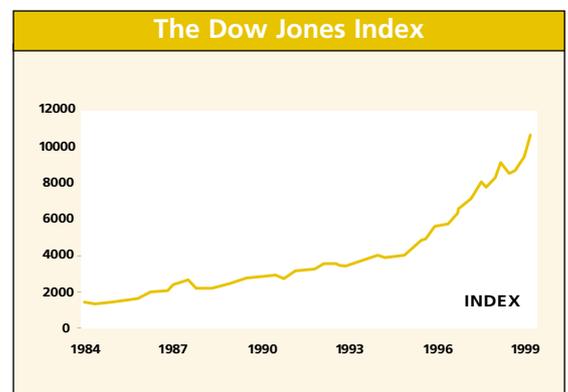
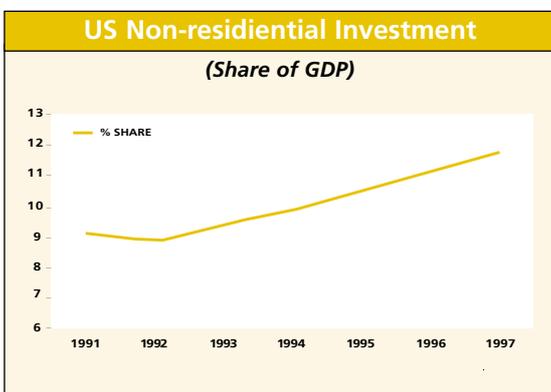


11.10 In addition, the investment logic behind dot.com proposals is usually that the company faces a "land grab" and must be the first or second in its sector in order to acquire viable market share. It is therefore inevitable that over the coming year or two many internet companies will undergo consolidation or outright failure as a major shake-out occurs.

11.11 More wary investors are then likely to concentrate on those proposals which offer a genuine competitive advantage based on internet technology (likely to be mainly in b2b) but a great number of day traders and others who have "bet the ranch" in recent years risk severe capital losses, leading to a significant curtailment of consumption and reduction in overall growth. The US economy as a whole has had a much lower savings ratio than the world average in recent years and has relied on external investment to fuel growth.

11.12 Whether the landing is "hard" or "soft" will depend to a major extent on the skill of the Federal Reserve in raising interest rates to dampen growth, make the US\$ more competitive and enable the US to increase exports and limit imports. Rate cuts in late 1998 were justifiable to preserve world financial markets from the fall-out from Long Term Capital Management's hedge fund debacle, and in turn provided a renewed spur to the US economy. Such circumstances are unlikely to be repeated in 2000.

11.13 But the unknown factor will still be the reaction of the US stock market. Sentiment cannot be predicted and a recent paper from HSBC Investment Bank plc⁹¹ showed that the internet does not itself – contrary to the popular view – create a perfect market. Consumers may not be able to find goods at the cheapest prices on the internet as they cannot find the cheapest sites. Brand recognition is still important and some 50% of US shopping sites visited over Christmas were the online arms of established brands. As a result, several leading internet stocks are trading well below their peaks (Yahoo! by 30%, Amazon.com by 40%). Since delivery of goods and services ordered over the internet has become a key issue, b2b rather than b2c stocks are seen as a more reliable investment.





The “New Economy”?



Annex "A" - Entrepreneurship Education at MIT

Entrepreneurship has been taught at MIT⁹² since 1961, but it was not until 1996 that a dedicated Entrepreneurship Centre was established.⁹³ The Center, a part of the MIT Sloan School of Management, is involved in the delivery of a raft of entrepreneurship programmes that range from an MBA programme with a New Product and Venture Development track, through to entrepreneurship courses that fall within the Independent Activities

Programme (IAP) available to students throughout MIT. The courses supported by the Entrepreneurship Center draw upon the experience of MIT's entrepreneurial alumni⁹⁴ and combine a variety of teaching methods including case studies, in-company placements and project work. Courses currently delivered at MIT to over 1,000 students from all disciplines include those summarised below.⁹⁵

New Enterprises

This core course, first taught in 1961, covers the process of identifying and quantifying opportunities, then conceptualising, planning, and starting a new enterprise. Topics include opportunity assessment, the entrepreneur, legal issues, entrepreneurial ethics, the business plan, the founding team, and seeking funds. Each student develops a detailed business plan for a start-up.

Entrepreneurship Without Borders

This course examines the opportunities and problems for entrepreneurs outside the US, particularly in emerging markets. Students understand the linkage between the business environment and new business creation, and learn the analytics of venture finance.

ProSeminar in Financing New Ventures

Successful entrepreneurs, business developers, and venture capitalists from different industries visit MIT to share their wisdom and lessons learned.

Entrepreneurship Lab

Engineering, Science, and Management students demonstrating entrepreneurial talent work as interns on projects 1-2 days a week with the top management of high-tech start-ups to gain hands-on experience in starting and running a new enterprise. All students must quantify the economic benefits and analyse all aspects of the selling proposition as part of their reports to their companies, their classmates, and the instructors.

ProSeminar in New Product & Venture Development

Visiting speakers explain the reasons why their new products were designed, built, marketed and launched successfully.

92 <http://entrepreneurship.mit.edu>

93 The Center was seed funded by the Kauffman Foundation's Centre for Entrepreneurial Leadership

94 A well-publicised report by the Economic Department of BankBoston in 1996 found that the 4,000 MIT-related companies that exist today employ 1.1 million people and have annual world sales of US\$232 billion. This report can be downloaded from <http://web.mit.edu/newsoffice/founders/>

95 Further information on these programmes can be found at <http://entrepreneurship.mit.edu>



Entrepreneurial Marketing The primary objective of this course is to teach students to perform rigorous, explicit, customer-based marketing analysis for new ventures. Students will begin with an analysis of customers or potential customers, use available data together with explicit and sensible additional assumptions about customer needs and behaviour, and proceed to design a marketing strategy that is logically and explicitly based on the analysis of customers.

Technology Entrepreneurship Students enrolled in technology entrepreneurship will design and build a prototype product in response to an identified market opportunity. They will then develop a plan for bringing the product to market, considering legal issues, the founding team, and fund-raising. Special emphasis will be placed upon the specific procedures and opportunities for licensing MIT technologies and leveraging MIT resources. Joint with the Department of Mechanical Engineering.

Preliminary Venture Analysis and Personal Entrepreneurial Strategy In this course, students develop their personal entrepreneurial career strategy and perform a preliminary venture analysis to determine if a business idea can be built into a high-potential business opportunity.

The Nets and Bolts of Business Plans This series is aimed at students interested in starting up and/or improving a new business. Students taking the courses for credit will submit a 2-3 page business plan executive summary that may be used as a basis for MIT \$50k Entrepreneurship Competition entries.

Starting and Building a High Tech Company First taught in 1981 by the MIT alumni of the MIT Enterprise Forum, this course addresses the issues faced by entrepreneurs who wish to build their venture from an idea into a fast-growing company. Guest lecturers, successful entrepreneurs, venture capitalists, and service providers, discuss their experiences. The final class will cover resources available to students starting companies from MIT. Course work includes readings and a 10 page written assignment.

In addition, the MIT Entrepreneurship Center supports a range of activities that underpin and feed the development of the entrepreneurial culture at MIT.

The Entrepreneurship Center is home to the '\$50k' and '\$1k' entrepreneurship competitions that have evolved over a period of ten years. These competitions have led to the formation of highly successful companies such as Akamai Technologies (www.akamai.com), Direct Hit Technologies (www.directhit.com) and Sensable Technologies (www.sensible.com). The success of the '\$50k' is such that it has now spawned many clones around the world.⁹⁶

Within the context of a pre-eminent research and teaching university, MIT has succeeded in developing a culture that encourages entrepreneurship and in providing an environment that allows it to thrive. This success relies not only

on the commitment of the university to support such activities and development of programmes to train and encourage entrepreneurs, but also the embedding of these programmes within a range of networking activities that bring together the academic and business communities. Similar approaches are being trialled in the UK with Venturefest (Oxford) and Cambridge Entrepreneurs. Activities that the Entrepreneurship Centre is involved in include:

- **The MIT Entrepreneurship Society ("E-Society")**

This is a society that:

- provides an entrepreneurial support network among MIT students and recent alumni/alumnae;
- promotes productive interaction with MIT faculty, staff, students, other alumni/alumnae, and MIT-related new ventures;
- seeks to establish a stream of funds and

96 Information on the network of business plan competitions can be found at <http://50k.mit.edu/about/global-bplan.html>



other intellectual and material contributions to ensure MIT's continued excellence in education and research.

Members of the E-Society pledge to contribute 3 to 35 percent of their share in any venture they participate in founding in the course of their career.

- **MIT Entrepreneurs Club (E-Club)**

An MIT-based entrepreneur support club with weekly meetings. Members include MIT students, faculty, alumni, and professionals from outside MIT.

- **MIT Sloan New Ventures Association**

A student-run organisation that hosts guest speakers on entrepreneurship and champions new venture efforts at the Sloan School and throughout MIT.

- **MIT Sloan Venture Capital and Principal Investing Club**

This student-run club promotes awareness of the venture capital industry, hosts venture capital speakers, and helps develop new venture teams for the MIT "\$50k" Entrepreneurship Competition.

- **MIT Enterprise Forum (Cambridge, MA)**

This chapter of the MIT Enterprise Forum⁹⁷ is a volunteer, non-profit organisation based at MIT whose mission is to promote and strengthen the process of starting and growing innovative and technology-oriented companies by providing services and programs that educate, inform, and support the entrepreneurial community. It is primarily targeted at alumni and the larger business community.

97 MIT Enterprise Forum Inc. has over twenty chapters worldwide. See <http://web.mit.edu/entforum> for further information



Annex A - Entrepreneurship Education at MIT



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References



Appendix 1 - Organisations & Individuals Interviewed

We are grateful to the following organisations and individuals for providing us with interviews and/or comments and written information in the preparation of this report.

Bank of America Ventures – *Jess Marzak, Robert Obuch*
 Chevron – *Cliff Detz*
 HM Consul (Commercial) – *Bernie Frieder*

BOSTON

Massachusetts Institute of Technology
 Entrepreneurship Center – *Ken Morse, Matt Utterback*
 Zero Stage Capital – *Paul Kelley*
 Molehill Ventures – *Brad Elmlad*
 Common Angels – *David Solomont*
 Softbank – *Charles Lax, Jesse Parker*
 garage.com – *Dan Roach*
 HM Consul (Commercial) – *Paul Klein*
 Brown, Rudnick, Freed & Gesmer – *David Gammell, Paul Hartnett Jnr, David Murphree, Gordon Penman*
 Tufts University Technology Transfer – *Frances Toneguzzo, Ojas Mehta*
 OneCore.com – *Barry Star, Chris Hill*
 NewcoGen – *Noubar Afeyan, Richard Farrahar, Robert Morgan, Dr Howard Austin*
 Morse, Barnes-Brown & Pendleton – *Jon Gworeck*

PACIFIC NORTH WEST

HM Consul (Commercial) – *Roberto Alvarez*
 Washington Software Alliance – *Kathy Wilcox, LeAnn Yoder*
 Ascent Partners – *Byron McCann*
 Fred Hutchinson Cancer Research Center
 Technology Transfer – *Catherine Hennings*
 Frazier & Company – *Bob Overell*
 Incepta – *John DeFeo, Tom Wolf*
 Vulcan Ventures – *Kevin Ober*
 Encompass Ventures – *Scot Land*
 Alexander Hutton Capital – *Kent Johnson*
 American Electronics Association – *Terry Bynington*
 University of Washington Technology Transfer – *Bob Miller*
 ARCH Venture Partners – *Alex Knight*
 Washington Technology Alliance & Alliance of Angels – *Susannah Malarkey*
 Phoenix Partners – *David Johnston*
 Washington Technology Center – *Lee Cheatham*
 Pacific Northwest National Laboratories – *Bill Grinstein*
 Washington Biotech & Biomedical Association – *Ruth Martens Scott*
 Olympic Venture Partners – *George Clute*
 Voyager Capital – *Erik Benson*
 Guide Ventures – *Russ Aldrich*
 Corixa – *Steve Gillis*

NORTH CAROLINA

University of North Carolina – *Howard Aldrich*
 Council for Entrepreneurial Development – *Monica Doss*
 Organon Technika – *Barbara Robison*
 First Flight (NC Technological Development Authority Inc) – *David Emmett*

CALIFORNIA

California Institute of Technology Licensing – *Lawrence Gilbert, Chris Moulding, Richard Wolf*
 Idea.lab – *Zibby Schwarzman*
John Dally
 Silicon Valley Bank – *Mark Cadieux, Adam Kaufman, Larry Lopez*
 Battery Ventures – *Bob Barrett, Ravi Mohan*
 Stanford University – *Hans Wiesendanger, Stuart Evans*
 Wilson Sonsini Goodrich & Rosati – *Ken Clark, Robert Brownell*
 Venture Law Group – *Craig Johnson*

UNITED KINGDOM

GATX – *Brent Lindberg, Anders Vestergaard*
 Brown, Rudnick, Freed & Gesmer – *Scott Burns*
 Bank of England – *Adrian Piper, Victoria Cleland*
 Department of Trade & Industry – *Rory Earley*
 Finance & Leasing Association – *Craig Pickering*
 Kingston University – *Robert Blackburn, David Stokes*
 Nabarro Nathanson – *Jenny Nott, Graham Muir, Richard Hierons*
 St John's Innovation Centre, Cambridge – *Dorcas Doolan*
 Greenfield Ventures – *Tim Taylor*



Appendix 1 - Organisations & Individuals Interviewed



Appendix 2 - Report Authors

David Gill is Head of Innovation & Growth Unit at HSBC Bank plc in London. The Unit develops products and services to support technology-based small firms, including the provision of equity finance and the growth of business incubation. For the past four years, he has had overall responsibility for the nine HSBC UK Enterprise Funds, regional venture capital funds investing in early-stage high-growth companies. He is a director of the National Business Angels Network and a member of the Enterprise Panel. In 1998, the Unit established the HSBC Chair of Innovation at Brunel University to assist in the exploitation of innovation. Educated at Cambridge, David qualified as a barrister before working in corporate finance for US and UK banks. His comparative analysis of UK and German SME banking appeared in 1994. He is an Industrial Fellow of Kingston University Business School.

Chris Martin is the CEO of Xenva Ltd, a firm specialising in bringing ideas, people and money together to seed and grow technology companies. As a part of the Xenva team, he also advises a number of large corporations, funds, universities and banks on early stage technology venturing. He is also an investor as one of the Xenva group of business angels. Before joining Xenva, Chris was CEO and founder of Paras Ltd., a firm of technology management consultants with offices in the UK, the Netherlands, South Africa and the US. Chris, a

Sainsbury Management Fellow, holds a DPhil in Engineering Science from Oxford University and a MBA from IMD in Switzerland.

Tim Minshall is the Project Manager at St John's Innovation Centre in Cambridge, one of the UK's most successful technology-based incubators, and Acting Programme Manager at the newly formed Cambridge Entrepreneurship Centre, part of the University of Cambridge. He is a Senior Associate of both the Judge Institute of Management Studies and the Institute for Manufacturing. He has worked previously as a plant engineer, consultant and freelance writer in the UK, Japan and Australia. Tim has a Bachelor's degree in Engineering from Aston University and a PhD from Cambridge University Engineering Department.

Martin Rigby set up Egan & Talbot Capital Ltd in 1988 as a venture fund manager. Egan & Talbot manages a general smaller companies enterprise fund as well as QTP, a fund specialising in technology-based firms and university spin-outs. Martin joined 3i (the largest providers of venture capital in Europe) as an investment controller in Cambridge after completing a Cranfield MBA. He did his first degree at Oxford and was a regular army officer for ten years. He lectures on venture capital at Cranfield management school.