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VENTURE CAPITAL INDUSTRY IN FINLAND – COUNTRY REPORT FOR THE VENTURE FUN PROJECT

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ABSTRACT: This report is a descriptive account of the major features of the Venture Capital (VC) Industry in Finland. It has been prepared as a background report for a project entitled Venture Fun, carried out in an EU Network of Excellence PRIME and funded from the Sixth Framework Programme. The report provides a brief overview of the evolution and present structures of the VC industry in Finland, and draws attention to factors that affect the development of VC industry, among others, to the nature of policies pursued in this field. One of its observations is the fact that the primary rationale for policies has been closing the early phase funding gap for start-ups, the promotion of SMEs, regional development or other socio-economic objectives, rather than the promotion of VC industry. As a result, policy measures have tended to be permanent, not temporary, since the objectives are difficult to achieve in a fixed time period. Furthermore, the policies pursued have made a separation of the monetary and non-monetary value-adding functions of VC, and only recently have acknowledged the value of the latter for the growth of high-tech start-ups.

Keywords: Venture Capital, Start-ups, Venture Capital –directed policy, Innovation Policy

JEL codes: O16, O38

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1 Introduction

This Finnish country report for the Venture Fun project provides a short description of the Finnish Venture Capital/PrivateEquity system (shortly VC system and VC industry), its evolution, present structures as well as factors that influence its evolution. The latter include framework conditions affecting both the demand for VC funds (factors promoting early-stage entrepreneurship) and the supply of VC funds (factors promoting VC development and supply).

The European Venture Fun project set out to study 1) the development of Venture Capital industry investing in early stage high tech enterprises and factors affecting the development or non-development in the participating countries, Finland, France, Israel, Italy, and the UK; 2) the co-evolution of the VC industry and high tech sectors, in particular, the ICT and Life Sciences; and 3) the various parts played by the VC industry in the governance and development of high tech enterprises. A central feature of the study is a view of VC not only as a pool of money but as a potentially important industry that could contribute - through its organization, strategies and capabilities - to the development of start-ups in the high tech industries studied.

This report is a preliminary version, to be updated as the project progresses. It largely contains descriptive material intended for the Year One Venture Fun reporting. The report is based on statistical material obtained from the Finnish Venture Capital Association, Statistics Finland, documents, other studies, and eight interviews with three private VC managers and five interviewees from public organizations.

This report uses the Venture Fun definition where VC (*venture capital strict definition*) is defined as oriented to early equity phase finance of high tech start-ups. This definition excludes early phase finance of non high tech innovative SMEs. When describing the evolution and present structures of the Finnish VC system, the report inevitably includes Finnish Private Equity (PE) activities. In all, VC/PE comprises a number of organization classes, as follows:

- 1) VCs = independent specialized VC organizations (focusing on early-phase finance of high tech SU)
- 2) PE = independent private equity firms
- 3) APE = affiliated private equity firms
 - a) Affiliated to corporations
 - b) Affiliated to financial institutions (including banks)
- 4) Public VC/PE funds

2 Structure, distinctive characteristics and the evolution of the Finnish VC/PE industry

2.1 Emergence and growth of the Finnish VC industry

The history of the Finnish VC and private equity industry (hereafter called VC/PE) can be traced back to the late 1960's and the 1970's when the first companies were established. In terms of funds, the first companies were small, at least when compared with the current managing companies. They were development companies that were organised as ordinary limited companies. Interested investors, most importantly banks and big corporations, provided them with capital. These companies made typically minority investments from their own balance sheet (Auer, 1989).

Government intervention has played an important role in the emergence of the Finnish VC/PE industry (Seppä 2000). The Bank of Finland was a majority shareholder with 60 % of the shares in the first Finnish VC/PE-company Sponsor, established in 1967. Sponsor was established as a vehicle to renew Finnish financial system, not primarily to act as a profit-oriented VC/PE-company. However, in financial decision making and in the formulation of company strategy, government soon became passive – despite its majority shareholding (Seppä 2000).

Sponsor was as an important 'incubator' for Finnish VC/PE-activities. Teollistamissrahasto Oy (Ltd), a big fund owned by the Finland's central bank and by all major Finnish commercial banks, became a central financier of Finnish VC/PE-companies in the 70's and 80's, and it made its first experiments in VC/PE activities in Sponsor. Moreover, Sponsor started early stage VC-funding, which, however, was rapidly moved over to Sitra (The Finnish National Fund for Research and Development, an independent public foundation under the supervision of the Finnish Parliament). Sitra, founded in 1967, has had different functions over the years. Even though it had a role in VC/PE-activities already in the 1970's, its role became central in the late 1980's and early 1990s, when limited partnership -structure was introduced to the Finnish financial markets, and when the Finnish VC/PE-sector faced its first real rapid growth period (Seppä 2000). In the early 1990s, Sitra was instrumental in the establishment of a network of regional VC companies, which, after the initial fund-raising, were privatised.

The 1960's and 1970's witnessed a slow growth in the Finnish VC/PE sector. After the establishment of Sponsor in 1967 only three government-funded and two privately funded equity companies were established by 1980. In the 1980s, the number of these companies increased rapidly. By 1988 there were altogether 48 firms, of which only ten were more than five years old. In absolute terms the number of VC/PE firms was larger than the number of active management companies in Finland in 2004 (FVCA, 2005), though the numbers are not strictly comparable, since the fund and the management company were legally the same organisation till around mid 1990s when their separation took place. This factor may to some extent explain the large number of companies towards the late 1980s.

In 1988 sixteen of the VC/PE companies were governmentally controlled, three privately-funded and independent VC/PE companies, and 29 were corporate VC/PEs. The sector was still very unstable, and only two years later, the number of VC/PE-

companies had declined by 18, with major decrease occurring among corporate firms (Seppä, 2000). Some of the companies went bankrupt, others were consolidated and a third reason was a redefinition of their business activities.¹ By the late 1980s, VC/PE companies were similar to Sponsor in terms of their organisation, that is, they were development companies which invested directly from their balance sheet. They often had no exit strategies and investments were considered permanent. Moreover, the companies typically had regional economic policy objectives, and investment decisions were strongly influenced by their corporate shareholders (Seppä, 2000).

In the early 1990s, the Finnish VC/PE sector was small in size but multifaceted in terms of organizational arrangements. Jänkälä (1995) classified Finnish VC/PE firms to eight different types: the most important were bank-controlled VC/PEs, public VC/PEs, corporate venture capital arrangements, regional development companies and sector-specific development companies. Jänkälä (ibid) reported that in the early 1990s, a proper analysis of Finnish VC/PE sector was difficult because of the multifaceted nature of the sector, varying accounting practices, and non-transparent statistics and reporting systems. Moreover, a large proportion of the Finnish VC/PE investments at that time were carried out by firms for whom VC/PE activities were only one part of their activities.

Until 1987 the dominant practice was equity or quasi-equity investments from the VC/PE-company's own balance sheet. In 1987 Teollistamisa rahasto Oy, which by then had been acquired by a major Finnish commercial bank, SKOP, established the first Finnish VC-fund that was organised replicating the structure of the US limited partnership (LP). However, unlike the US or other international LP-structures, in this first Finnish LP-fund limited partners required a strong position in the decision making. Major investment decisions as well as investment strategy formulation were made at an investment committee where limited partners were present. This practice has been copied to all later Finnish LP-funds. One of our interviewees suggested that this peculiarity was introduced to the Finnish LP-funds because investors were dubious about the new LP-structure and because they wanted to learn about the new financial instrument. Further, the interviewee claimed that this, in addition to tax questions to be discussed later on, is an important reason why foreign capitalization of Finnish VC-funds has been very limited.

2.2 Venture capital sector: present structures

Presently, the Finnish venture capital sector consists of 44 venture capital managing companies with about 120 equity funds, and 253 managers. The dominant structure of Finnish VC/PE companies is a management company which is organized as a limited company. Management companies are usually managing several funds which are organised according to the LP-structure. Additionally, there are several small regional funds which are organised as limited evergreen companies investing directly from their balance sheet. They usually have a major public capitalization, aim to invest relatively small amounts in seed-, start-up and early phases, and announce their strategy to be rapidly revolving evergreen funds.

¹ Private communication by Marko Seppä.

The number for the managing companies includes three organisations, which are companies owned by the Finnish State and have a public mission. These three are Sitra, Finnish Industry Investment Ltd, and Veraventure Oy/Ltd. Of these only Veraventure Ltd operates as a fund of funds, while the other two operate both as funds of funds and as direct investors in portfolio companies. They also have some other functions.

Below Figure 1 depicts the current equity managing companies by their year of establishment and shows that the majority of them were founded in the late 1990s, a period when Finnish VC/PE activities grew decisively. Despite the fact that Figure 1 is about currently existing VC managing firms, it is a fairly good illustration of the overall development of the sector in the past few years. It is less well representative of the sector with regard to the earlier years (cf. the previous section).

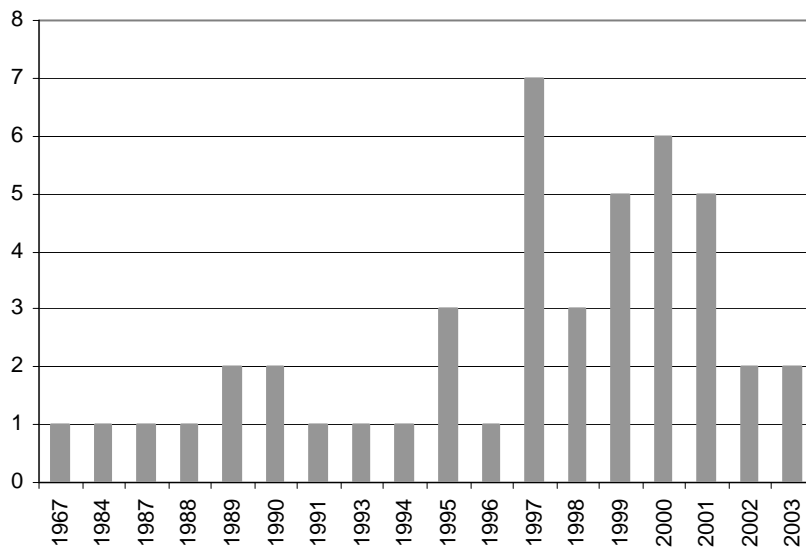


Figure 1. Distribution of the current members of FVCA by year of establishment of the managing companies.

Source: FVCA 2004 Yearbook.

The next sections will first pay attention to the functions of the public organisations active in this field, and further, will present figures on Finnish venture capital and private equity activities. The data are at two levels: 1) total funds at the aggregate level and 2) data on the managing companies; however, there is a lack data on the establishment of specific funds by year, or data by investment stage and technological field of funds raised, or investments at the fund level. As mentioned, a fund and a managing company were one and the same thing before the mid 1990s, which makes these distinctions a bit difficult with regard to the earlier data.

2.2.1 Sitra

The full name of Sitra is The Finnish National Fund for Research and Development. It was originally founded in 1967 to celebrate the 50th anniversary of the Republic of Finland. Its functions at first were related to financing technological product development and research as well as research and test projects of social and economic benefit (Vihko et al., 2002). Sitra was originally under the Bank of Finland, but in 1991 its

status changed into an independent public foundation under the Finnish Parliament. A few years earlier, in 1987, its focus had changed from financing product development projects into the promotion of venture capital investment and commercialization of technology. In 1997, it corporativised two capital investment operations into technology funds and their management companies (Eqvitec Partners Ltd and BioFund Management Ltd). With Finnish Industry Investment Ltd, Sitra was at first the owner of the two new management companies.

Sitra has continued to invest directly in portfolio companies as well as in Finnish and international venture capital funds. Sitra has been an important investor in technology-based early stage companies, particularly in the field of biotechnology. The number of portfolio companies per manager has, however, been large, and even presently, when it has decreased, it is over ten, a sum generally regarded as too high for managers to be able to give added value to the portfolio company in terms of management and business advice (non-monetary assistance). According to the interviews carried out, Sitra is not aiming at a hands-on approach to its portfolio firms.

Currently, Sitra has a fairly heterogeneous set of functions. In spring 2004, its Supervisory Board adopted a new strategy for 2005-2007, aiming at enhancing the social impact of Sitra's activities by concentrating the resources in specific operations dealing with innovation, health care, environmental technology, nutrition, Russia and India (Sitra Annual Report, 2004).

The methods of Sitra's operations on programmes are

- research and training (especially aimed at decision-makers to deepen their knowledge base)
- innovative projects (to find and test new procedures that can accelerate social reform)
- business development (Yrke, Development Programme for Business Incubators, and the PreSeed services), and
- corporate funding.

Sitra's activities are financed by the yield from its own endowment capital and the return on its venture-capital investments. According to its Annual Report 2004, Sitra had some 100 portfolio companies and some 40 equity funds in its capital investment portfolio. The market value of its endowment capital was 573 million EUR at year end and the return on it was 7,1 %. Sitra's role in seed financing will change in the future, and it will only invest in companies that operate in one of its programme areas. New capital investments will focus on the areas that are in its special focus, namely, on health care, environmental technology, and nutrition areas (Sitra Annual Report 2004).

In 2004, Sitra exited from many of the companies in its industry ventures portfolio (Annual Report 2004). It aims to continue to exit especially from companies in the growth and reorganisation stage. Since 1997, Sitra has been an active part in the Finnish life sciences cluster, and had 36 companies in its portfolio in this area in 2004. It made one new initial investment and five exits in the cluster in 2004. Sitra has been seeking to find leading international investors to make additional investments in portfolio enterprises, and for this reason, in 2004 initiated a capitalisation process concerning approximately 20 of its portfolio enterprises. Depending on the success of this process, the outcome may be a new Life Sciences fund financed by Finnish and international capital.

It is to be noted that one of the two funds Sitra corporativised in 1997 was Biofund Management Ltd, which operates, among other fields, in the life sciences area. According to Sitra's annual report 2004, the enterprises involved in the arrangement "belong to the most advanced part of the Life Sciences portfolio", and this means that their further development needs more financing than before and the extension of their ownership base. Sitra intends to bring the process to completion by the end of 2005.

To manage its holdings in management companies, Sitra has a subsidiary wholly owned by it called Sitra Management Oy.

Sitra had an important role in the promotion of VC/PE industry in Finland in the 1990s. Its activities have included the promotion of business angel activities, an injection of funds in a number of VC and private equity funds, the creation of a network of regional funds, and the establishment of the Finnish Venture Capital Association (FVCA) in the early 1990s.

In a series of recent programmes it attempts to promote the development of business, IPR and personnel plans of new start-ups firms, and helps them make marketing surveys and overall develop their business ideas. It also provides matching services to bring start-ups and VCs together and to help start-ups get informal investors involved in the firms as managers with a stake in the firm's equity. If needed, Sitra will promote the deals with its own investment. The success of these initiatives will be seen in the next few years.

2.2.2 Finnish Industry Investment Ltd (FII)

FII is a state-owned company under the Ministry of Trade and Industry. It started its operations in 1995. Its main function is to improve the conditions of particularly small and medium-sized enterprises by making equity investments in venture capital organisations. It may also make equity investments directly into target companies particularly when long-term risk taking is required. The operations of the company must be profitable, but in exceptional cases, a lower return expectation and a higher risk is acceptable. A government decision in 2000 giving the general guidelines for the investments activities of FII stated further that its investments are directed to targets where the market does not channel sufficient funds. Furthermore, its primary focus is on seed and start-up stage firms, on a regional network of funds, and on the channelling of EU finance (Maula and Murray, 2003). It was also given a remit to make equity investments in large business ventures requiring long-term risk-taking. To summarize, the goals of FII are two-fold: to promote the venture capital investment market by investing in new venture capital and private equity funds, and to promote the commercialisation of innovations by direct investments in seed and growth stage enterprises.

As seen in Figure 2, most of FII's investments have been directed to funds and around 10 % have been direct investments, though over time, the direct investments have increased somewhat. FII was planning to increase them a great deal in 2002, but an evaluation report of FII, published in 2002, was highly critical of the effectiveness of direct venture capital investment as a mode of government intervention and recommended that should such investments be made, they ought to be limited to technology areas "with a recognized national policy importance" (Maula and Murray,

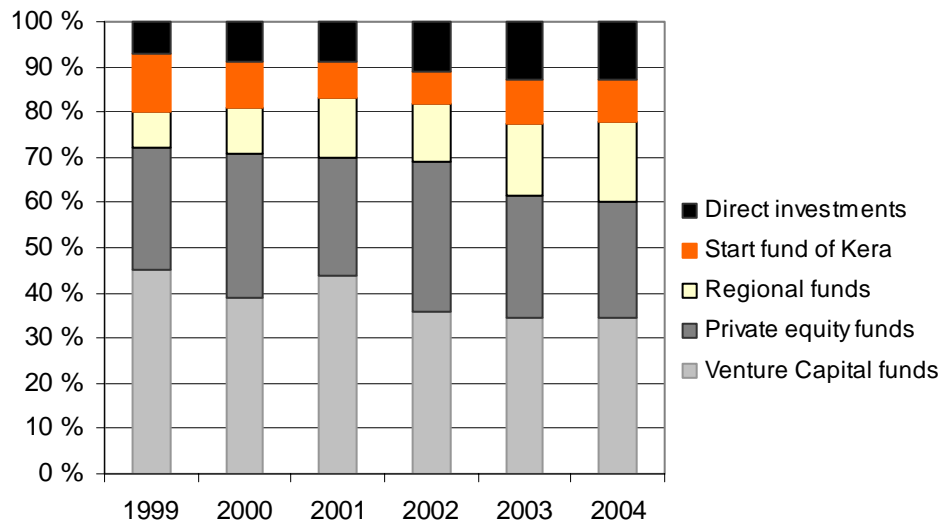


Figure 2. FII investments (money) and investment commitments (2004) at the end of year, for 2004 June 30, 2004.

2003). Obviously, this evaluation has influenced the distribution of different investment types as displayed by Figure 2. The evaluation further emphasised the importance of using professional private investors in the management of even 'special situations' funds. The evaluation report also noted that investments in venture capital funds made by FII did not automatically end up in the early stage because the fund label is not a guarantee of investment stage due to scant incentives for funds to invest in the early stage.

In 2003 the Finnish government made a decision to clarify the division of labour between FII, Sitra and Finnvera. According to this decision, FII will particularly finance regional growth-oriented funds with high returns (in Finland Ky, in practice, largely limited-life limited partnership type of funds) while Finnvera Ltd will provide funds for regional funds operating as limited companies (evergreen) (Oy).

All the companies managing regional funds are privately, or mainly privately, owned. There are only five management companies that mainly target selected regions in Finland in their investments activities (Innofinance Oy, Midinvest Management Oy, TeknoVenture Management Oy, Wedeco Group, and Virtaa Hämeeseen Ky).

In 2004 FII started a new seed financing programme according to which FII is prepared to invest 50% of the seed funding in projects which attract 50% of the funding from a private venture fund. By June 2004, FII had made 21 investments decisions (total of 10 million EUR) and the proportion of FII of the investments was 32% (Paasivirta, Valtonen, 2004).

In its direct investments, FII does not aim at providing value-added to the portfolio companies and does not participate in their boards.

2.2.3 Finnvera Plc and Veraventure Ltd

Finnvera Plc is a specialised financing company offering financing services to promote the domestic operations of Finnish businesses, and to further exports and internationalisation of enterprises. Finnvera is owned by the Finnish state. Finnvera was founded in 1998 on the basis of an older government-owned organisation, Kera Plc, to promote entrepreneurial activities in regions. Kera had a mission to promote regional enterprise activity. In 1999 a governmental organisation providing loan guarantees to companies was merged with Finnvera.

Finnvera has three main tasks:

- Development of the environment for the operations of small and medium-sized enterprises (SMEs)
- Promotion of the exports and internationalisation of enterprises
- Implementation of the government's business and industry policy measures as a provider of risk financing supplementing the market.

Finnvera plc carries out its tasks mostly by means of financing. The company grants loans to enterprises and to entrepreneurs, and guarantees and export credit guarantees to enterprises and to financiers. Moreover, Finnvera acts as an intermediary between the European Union's financing programmes and Finnish SMEs.

Finnvera offers its services through a network of 16 regional offices. During its predecessor Kera Plc, a governmental venture capital managing firm SFK Finance Oy was established in 1990 to manage a venture capital fund, Start Fund of Kera. SFK Finance Oy was merged with a private venture capital managing firm 3i in the early 2000s.

Veraventure Ltd is Finnvera plc's venture capital investment company, which was founded in April 2003 to manage and develop the investment activities of regional funds operating as limited companies (evergreen funds). Its mission is to promote the growth and development of SMEs through investments in funds and through the development of their activities. Even though Veraventure Ltd is a fund of funds (the only one in Finland that does not make any direct investments in portfolio companies), its function is not to promote the venture capital markets per se, but the SME development.

The company's operations are guided both by the outlines drawn by the Ministry of Trade and Industry concerning regional venture capital investments and by the goals set by the parent company. Though Veraventure Ltd has a profitability expectation, it is not as high as that for private investors. It is expected, at the minimum, to maintain the real value of its capital. Having this objective, Veraventure is expected to correct for a market failure in the financing of SMEs. The average investments in the funds for which it provides funding are smaller than in funds in general.

Veraventure Ltd has invested in 13 funds, the majority of which are evergreen funds (Oy) according to the clarification of a division of labour between the governmentally-owned financing companies. The regional funds in which Veraventure Ltd invests finance more early-stage ventures than those that have a limited-life limited liability structure. One of the reasons for this is the fact that Veraventure Ltd usually aims at

ownership of one third of the funds in which it invests, while towns and municipalities are responsible for another third and local business enterprises for the rest. In practice, the proportion of ownership varies a great deal, but in practice, Veraventure Ltd ownership share in the target funds is below 50%. All the three investor groups have high stakes in promoting local/regional enterprises and can expect profitability rates that are lower than normally on the market.

2.2.4 Tekes

The National Technology Agency, Tekes, grants capital loans to primarily start-up technology and knowledge intensive firms. The loans are granted applying the EU *de minimis* principle. A firm pays the loan back only if its investment is in credit and pays interest only if its gets a positive balance. A capital loan given at the establishment phase, however, has to be paid back. The maximum loan period is 10/5 years.

2.2.5 Corporate VC

Currently there are only few corporate VCs in Finland. However, a major corporate venture, Nokia Venturing, has a global geographical focus, and as far as we have been able to obtain information, does not invest in Finland. Before the turn-down of the financial markets in 2001, many large Finnish firms had a corporate VC arm (e.g., Suomen Sokeri, Neste, Outokumpu, Kemira, Rautaruukki, Rauma Oy, Partek, Lohja, and Sonera), but these have been discontinued. Seppä (2000) reported that in the late 1980's, there were numerous corporate VC/PE firms, which vanished with the economic downturn in the early 1990's.

2.2.6 Business Angels

A study carried out in 1997 identified 151 business angels in Finland (Lumme et al., 1998). According to the study, most business angels were former entrepreneurs, had started a median of five companies and had an average of 15 years' experience of entrepreneurship (ibid.). The 59 people who provided information on their investment activities had on average three investments and had invested about 42 million EUR. If the figure is multiplied by three, assuming that all investors had invested approximately as much (which may not be the case), 125 million EUR, it is a non-significant sum when compared with 349 million EUR that is the sum of annual investments in 1991-1997 by VC funds (Figure 6). These figures represent the investments before the rapid expansion of VC activity in the late 1990s.

Sitra has been instrumental in promoting business angel activities since the mid 1990s by providing so-called Matching services. Both the investors and the investee firms, however, were somewhat critical about the first Matching Programme in the evaluation of the programme (Paasivirta and Valtonen, 2004). Sitra has recently launched a new programme or a set of programmes which aim to develop the business plans of start-up firms, to provide matching services for business angels and growth-oriented firms needing money and business development experience, and thirdly by providing a matching service to acquire experienced entrepreneurs to manage start-up firms (LIKSA, INTRO, DIILI). All these activities are expected to provide a bridge to further funding by venture capital funds.

2.3 Venture Capital markets in Finland

In the early 1990s, capital under management in Finnish funds was still very small (100-200 M€), but it increased rapidly during the latter part of the decade. For instance, in 1994, capital under management accounted for less than 0.02% of the GDP. By 2002 capital under management reached 3000 M€, and accounted for 0.2 % of the GDP (Baygan and Freudenberg, 2000; Maula & Murray 2003, FVCA 2003 and 2004). Since then, the size of the Finnish VC-sector has remained at this level.

Despite the rapid increase in the size of VC-industry, in 1999 in international comparison Finland ranked far below the OECD average² (Baygan and Freudenberg, 2000) and slightly below the EU-15 average (Maula and Murray, 2003). However, according to EVCA (2005) the downturn of VC/PE-markets hit Finland less severely than most other countries, and as a corollary in 2002 Finland exceeded the European average as total private equity investments accounted for 0.3 per cent of the GDP.

According to EVCA data and calculations by Baygan and Freudenberg (2000), at the turn of the century, Finnish VC/PE market was domestic both in terms of sources of capital and the origin of management companies. In Finland a much smaller percentage of the funds of domestic managing firms originated from abroad as compared to other countries; namely, the figure for Finland was 7% in 1999 while it was 21% for the EU in total. For example, the corresponding figure for Sweden was 52%. Unfortunately, these figures are a few years old, since comparable data was not available for a later time period.

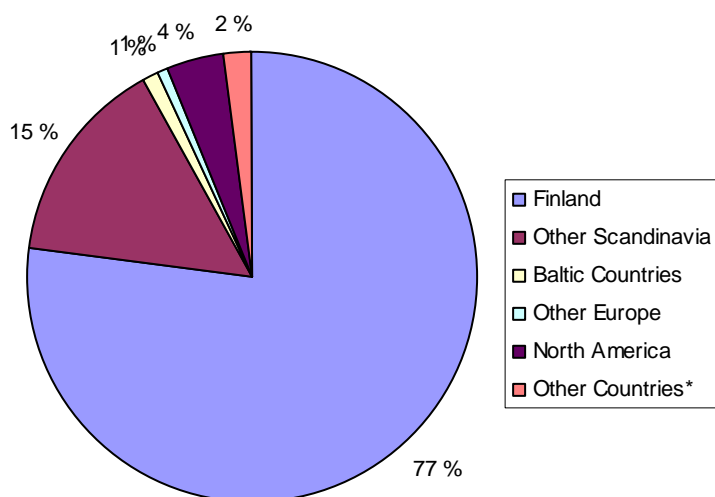


Figure 3. Active Portfolio Investment by country at the end of 2003.

Source: Yearbook 2004, The Finnish Venture Capital Association.

At the turn of the century, 22% of the funds raised in Finland were invested in funds managed by other European firms while the figure for the European Union was 18% (7% for Sweden). However, in total, Finland has had positive net flows (ibid.) mainly

² 1999 OECD average was 0.46% of GDP whereas Finland's figure was 0.21%, OECD 2000.

because direct investments from foreign management companies to Finnish portfolio companies have outweighed the outflow of Finnish capital to foreign funds and direct investments from Finnish funds to foreign portfolio companies. On the other hand, this means that the majority of investments financed from foreign sources are also managed by foreign managing firms, not by Finnish firms.

According to the data published by the Finnish venture capital association (FVCA), 77% of the funds managed by Finnish managing firms have been invested in portfolio companies situated in Finland and 15 % in other Scandinavian countries. The proportion of the other countries is small. North America is the largest among the rest of countries with its 4 %.

2.4 Descriptive data about Finnish VC industry

2.4.1 Funds raised

The most rapid growth in the funds raised in Finland took place very late in the 1990s (Figure 4). 1999 and 2002 were the two peak years; but after the latter, there has been steep decline. In 2004 funds have again grown somewhat after the steep drop in 2003.

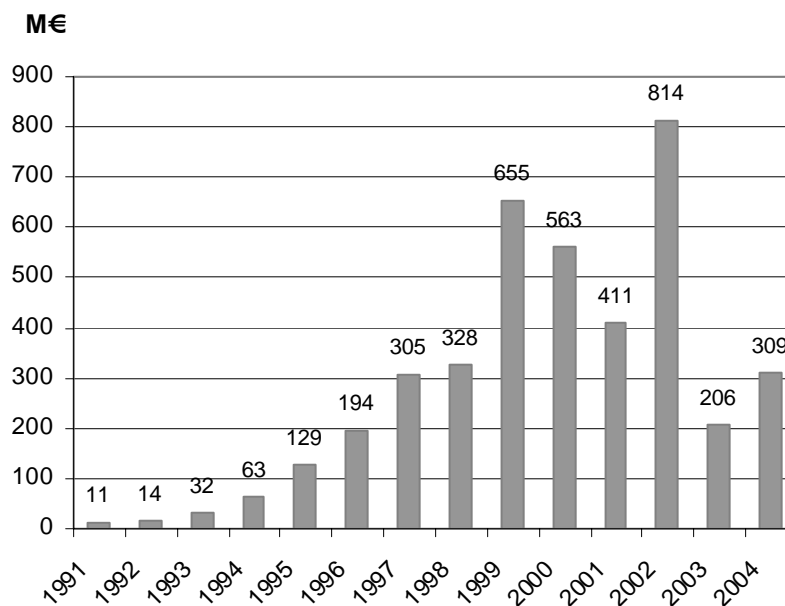


Figure 4. Annual funds raised in 1991-2004 (M€).

Source: FVCA

There is a great year-to-year variation in the proportion of the sources of new funds (Figure 5). Since 2001, these figures do not include funds raised through public and private captive vehicles, and they have been separated in the statistics and are not included in the above statistics. Their sum in M€ was 82 in 2001, 142 in 2002 and 86 in 2003.

Insurance companies and pension funds were active in investments in the late 1990s and still in 2002, but have withdrawn since. In the most recent discussions on the new measures needed for the stimulation of venture capital markets and promotion of growth-oriented businesses, a more active role of insurance companies has been called for.

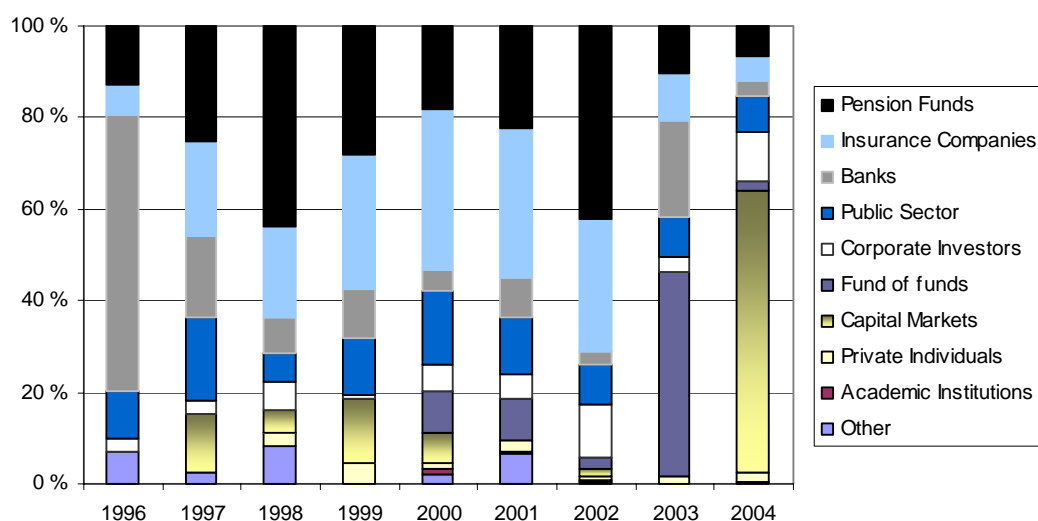


Figure 5. Annual New Funds by Capital Sources in 1996-2004.

Source: FVCA

Table 1. Allocation of funds raised by stage

	1998	1999	2000	2001	2002	2003
Total Venture capital	25	59	64	76	30	52
High-tech, early stage	3	21	32	26	12	19
Others, early stage	2	4	2	2	2	3
High-tech, expansion	10	26	25	41	11	18
Others, expansion	10	8	5	7	5	12
Buyouts	74	34	30	20	68	47
Other	1	7	6	4	2	1
Total	100 %	100 %	100 %	100 %	100 %	100 %

Source: FVCA.

When the stage of funds raised is concerned, early-stage high-tech capital was largest in 2000 and 2001. The proportion of venture capital funds raised grew till 2001 after which its proportion dropped steeply in 2002 to catch up to some extent in 2003.

2.4.2 Annual investments

The number of investments has increased four-fold from 1994 till 2004. Moreover, the average size of investments has increased rapidly from less than 250 k€ to nearly one M€. Since 2000, average investment size has slightly decreased, and in 2004 it was 880 k€ (FVCA, 2005). When compared with the EVCA average, the size of Finnish investments was significantly smaller. For example in 2003, EVCA's average investment was 2.7 M€ (EVCA, 2005). The size of average investment is heavily affected by large private equity deals. In 2004, average size for early stage Finnish investments (seed, start-up, early growth) was circa 310 k€ (FVCA 2005), whereas EVCA early stage investment average was 600-700 k€ in 2002-2003 (EVCA, 2005).

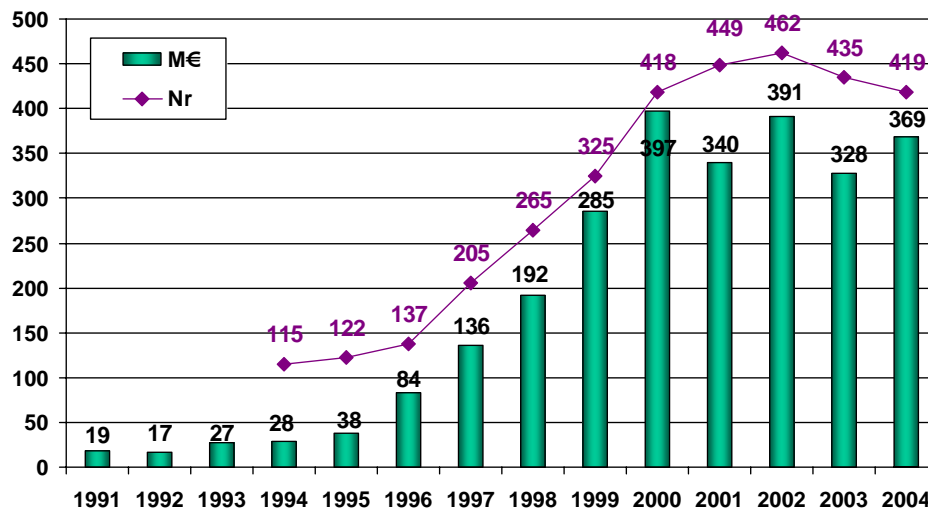


Figure 6. Annual investments in 1991-2004 (capital invested in nominal value and the number of investments); source: FVCA.

The capital invested is dominated by later stage investments (buyouts and secondary financing) which accounted for circa 60 % of capital invested in 2004. In 2004, over 20 % of investments were made in early growth phases and less than 20 % of capital was invested in seed, start-up or other early phase. Since the late 1990s or early 2000s there has been a clear shift towards bigger and more mature investments. For instance, in 2001, the peak year of early stage investments, circa 50 % of capital was invested in seed, start-up or early growth stages. However, the current investment pattern is rather similar with the investment pattern in the mid 1990s. At the European level, current (2002 onwards) stage distribution of investments – as far as invested capital is considered - is very similar to the Finnish distribution (EVCA). However, EVCA expects that there will be a significant change towards later investment stages, especially towards buy-outs and buy-ins.

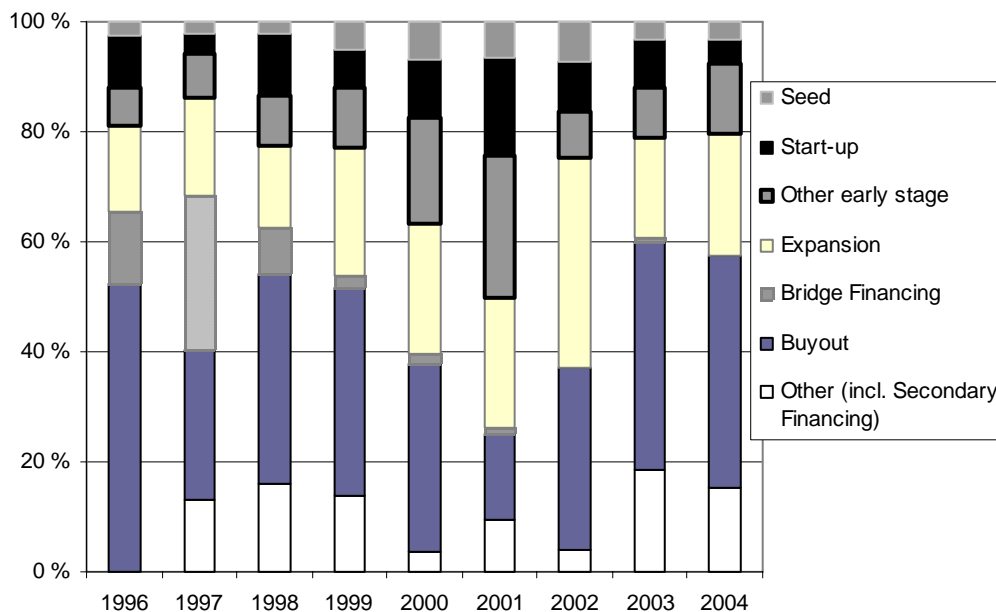


Figure 7. Annual Stage Distribution of Amount invested (M€) in 1996-2004.
Source: FVCA.

With regard to the number of investments, the proportion of investments in seed, start-up or other early stage has varied somewhat around 60% (Figure 8).

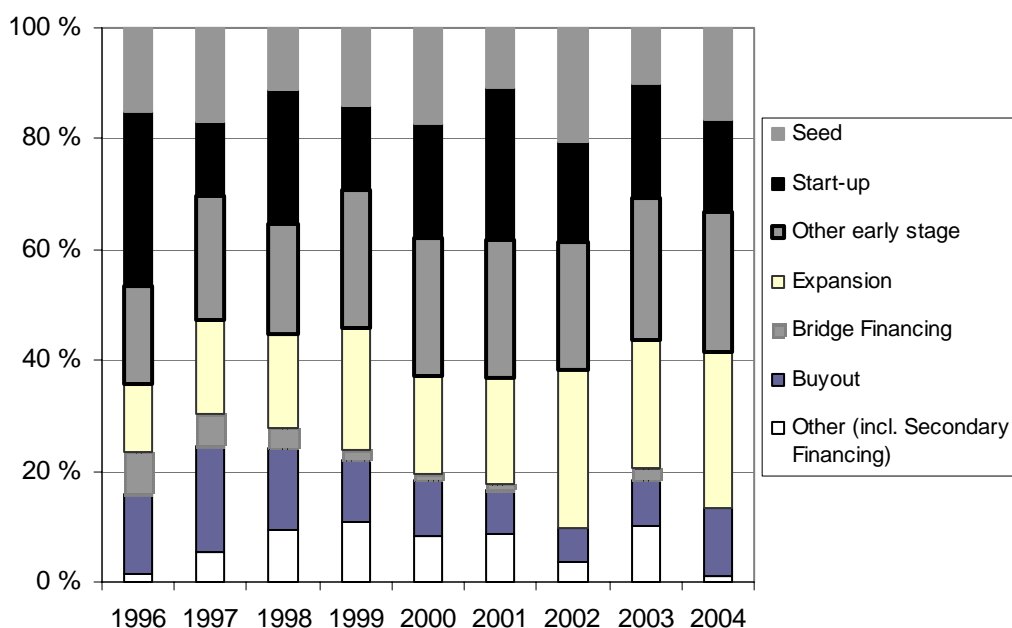


Figure 8. Annual Stage Distribution of Number of Investments in 1996-2004.

Source: FVCA.

In a European comparison and in terms of the number of investments, Finnish VCs make relatively many early-stage investments. In 2003 and 2004, fewer than 40 % of the deals by EVCA members were in seed or start-up phases, and over 20 percent of deals were buy-outs or replacements, whereas in Finland, circa 50 % of the deals were in early-stage financing and fewer than 10 per cent were buy-outs or replacements (EVCA, 2005).

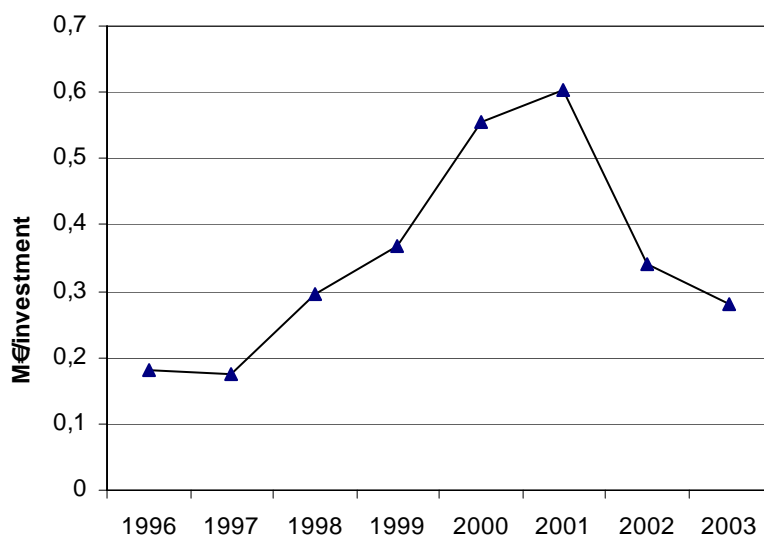


Figure 9. Average investment in early-stage (seed, start-up and other early stage).

Figure 9 indicates that there has been a steep decrease in the size of the average early stage investment. Moreover, when comparing investments during the ICT-boom (1999-2001) and later on, there has clearly been a shift in investments from the early to later stages. However, our time series are too short for us to conclude whether there has been a longer trend shift, or whether 2000-2002 witnessed only a temporary increase in early stage investments in (Figure 9) (FVCA, 2004 and 2005).

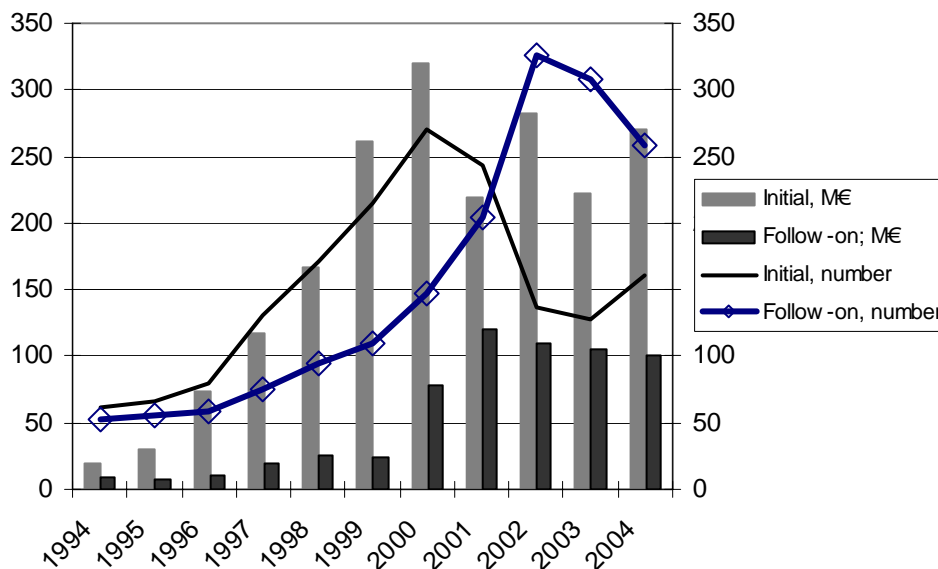


Figure 10. Annual Initial and Follow-on Investments in 1994-2004.

Source: FVCA.

In terms of money, initial investments have been larger than follow-on investments (Figure 10), but since 2000 the number of follow-on investments has grown at the expense of initial investments. Part of this development can be explained by the vintage of Finnish VC/PE funds, as a large number of funds were raised in the late 1990s or in the early 2000. Moreover, a deterioration of exit markets in the 2000s is likely to explain part of the pattern.

2.4.3 Investments by industrial sector

In terms of the number of investments, over 50% were in ICT or life sciences sectors (Figure 11) while their proportion of invested capital was only about 30% in 2004. The share of ICT and life sciences increased in the 1990s and was highest in 2000-2001. Currently investments in these sectors remain slightly below the level of the peak years. However, the average size of investments has declined in ICT and life sciences since the peak years. Average investments in life sciences and the ICT have been smaller than those in all the other fields and decreasing in the past few years, while in all the other fields the investment size has increased over the time-period observed (except for one year, 2001). The explanation is the fact that the latter are more concentrated in later stages, where the average investment size is larger (Figure 13).

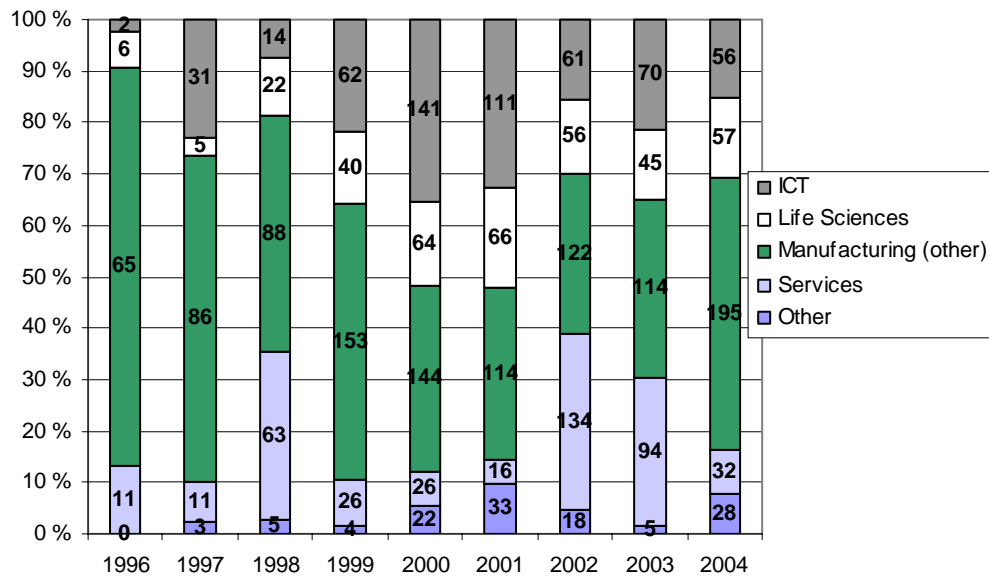


Figure 11. Annual investments by industry (1996-2004); M€
Source: FVCA.

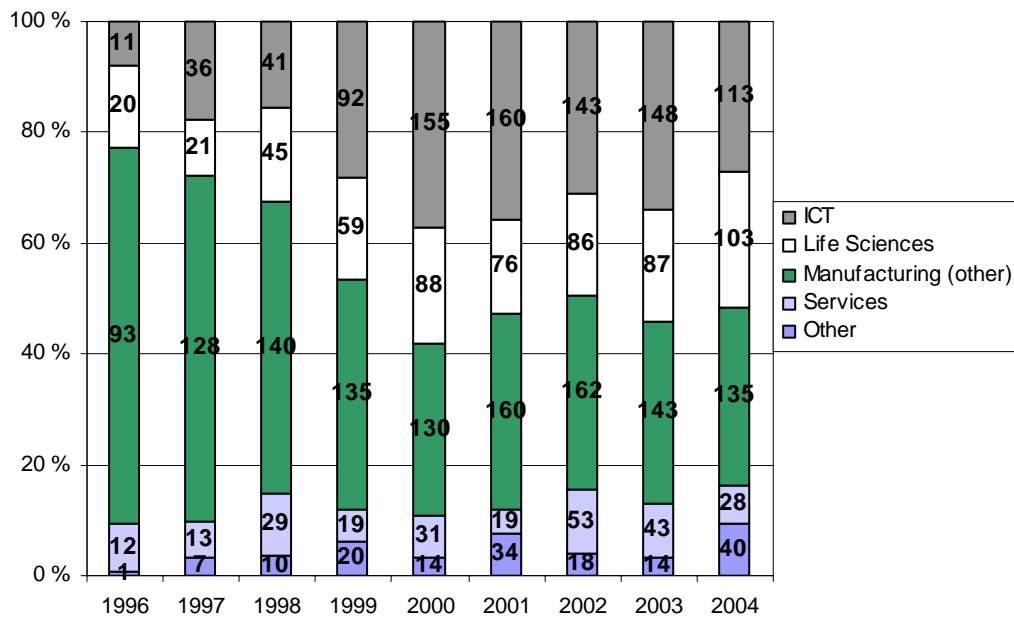


Figure 12. Annual investments by industry (number) in 1996-2004.
Source: FVCA.

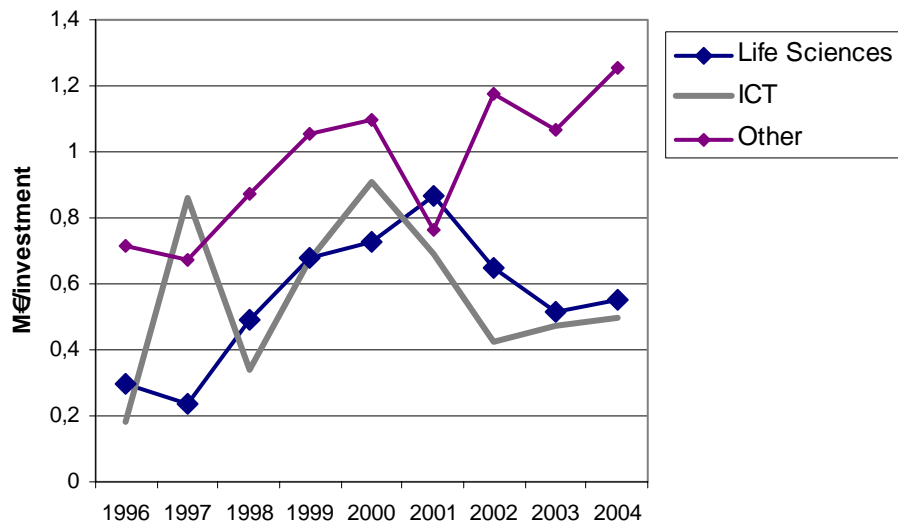


Figure 13. Annual investment size by technological field.

Source: FVCA.

2.4.4 Active portfolio

In the 90's active portfolio was typically below 50 per cent of the total capital under management, after 2000 the proportion increased to circa 60 per cent. (FVCA, 2005).

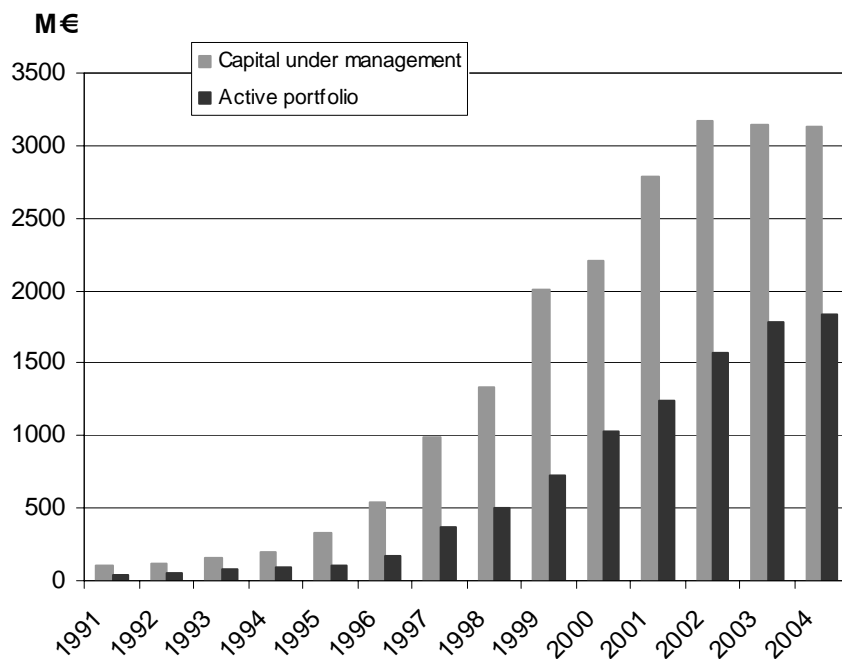


Figure 14. Capital under management and active portfolio in 1991-2004.

Source: FVCA.

2.4.5 Divestments

We have information on the annual divestments (at cost) in 1994-2004 (Figure 15), but our data sources do not include information about the actual exit prizes at which divestments have taken place. Figure 15, nevertheless, indicates that the annual divestments have grown and particularly in the past two years. Trade sales and sales to another venture capitalist and repayment of the principal of loans are the most often used divestment methods. Write-offs have increased in recent years: in 1998, their sum was 2 M€ while the respective number was 29 M€ in 2004.

The growth of divestments reflects the fact that the Finnish VC/PE industry, despite early origins, has been quite scant before 1995 and is thus about ten years old.

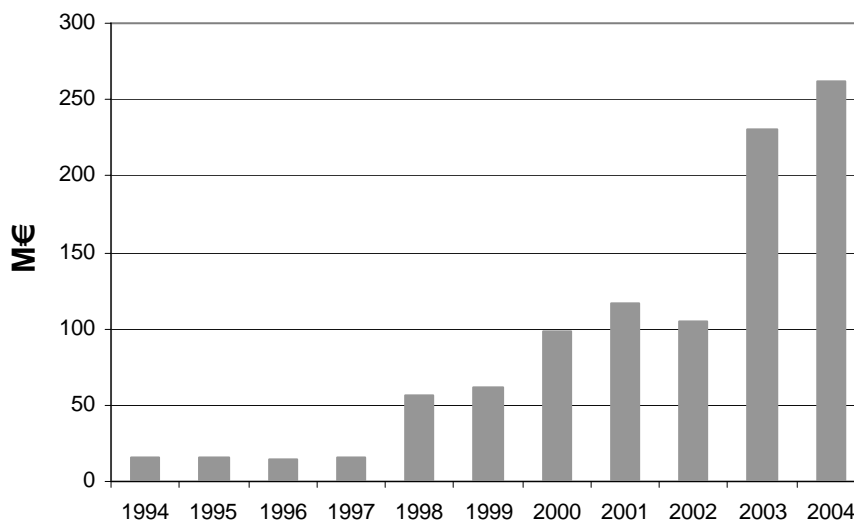


Figure 15. Annual divestments in 1994-2004 (M€, at cost).

Source: FVCA.

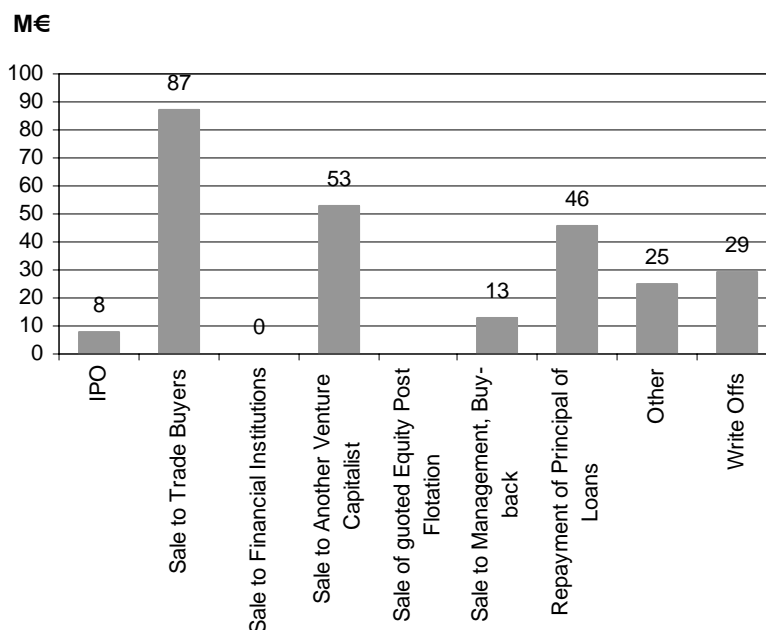


Figure 16. Divestments methods in 2004 (M€, at cost).

Source: FVCA.

3 Framework conditions and policy

3.1 Financial system

Finland's financial system has traditionally been bank-centred, as in the other Nordic countries. In Finland as well as particularly in Sweden, banks have served as house banks for large corporations and held either directly or indirectly large ownership blocks in many of their client firms (Niskanen, 1999; Hyytinen and Pajarinen, 2003).

At the beginning of the 1980s, the financial system in Finland was heavily regulated. Lending and foreign capital flows were regulated. Following the example of countries such as the UK, Finland as well as the other Nordic countries liberalized their financial markets and capital movements within a short time period in mid to late 1980s. In Finland, the residue of restrictions that had been kept (e.g. those related to foreign direct investments and some cross-border capital movements) were abolished in the early 1990s (Hyytinen and Pajarinen, 2003).

Deregulation led to a very rapid growth in lending which the government did not attempt to control, and finally, as economic conditions began to weaken, to increasing bankruptcies. Banking crisis and a collapse of bank lending ensued. Finland faced with a deep depression, which started with the collapse of the trade with the former Soviet Union at the beginning of the 1990s. Bank lending relative to GDP decreased sharply, and the banking system met with a severe crisis (Hyytinen and Pajarinen, 2003). Public support was needed to prevent the collapse of the banking sector. The crisis led to a consolidation development, as a result of which the number of banks almost halved. The consolidation tendency has more recently intensified cross-border mergers in the Nordic countries.

As a result of the economic and banking crisis, real lending rate has decreased in the 1990s in Finland. At the same time, stock markets have grown in importance in relation to the size of the economy (GDP) and as compared with the debt market activity (ibid.). In Finland, however, the real size of the financial markets compared to the real size of the economy has decreased in the 1990s (Hyytinen and Pajarinen, 2003), in other words, the economy of the country has grown more rapidly than its financial markets.

3.2 Special features in the Finnish system affecting VC industry

3.2.1 Supply and demand

Two types of factors affect venture investments; demand and supply (Armour and Cumming, 2004). Demand for venture funding is dependent on entrepreneurial activity, and in our case, entrepreneurial activity in technology-based firms; while the availability of venture funding represents the supply side. Both demand and supply are influenced by systemic features related to regulation, contractual mechanisms, taxation etc.

3.2.1.1 Demand

(a) *Entrepreneurship*

Measuring entrepreneurial activity is not easy. When attention is drawn to entrepreneurial activity, that is, entrepreneurs as per cent of total employment, in 2002, Finland ranked well below the average among the OECD countries (Georghiou et al., 2003). The total figure includes both the so-called opportunity-based entrepreneurship (the proportion of labour force that is trying to start a new business to pursue a new business opportunity rather than because people have no better choice) and the so-called necessity-based entrepreneurs (those who have no better choices of work). It is assumed that in Finland the former plays a major role in entrepreneurship. Because of the double-edged nature of entrepreneurship, international comparisons are tricky to interpret. International comparisons of the proportion of people who would wish to be entrepreneurs rather than employees have, however, shown that Finland ranks below the EU average with only fewer than 30 % of Finns wishing to be entrepreneurs while the EU average is well above 40% (Hyytinen and Pajarinen, 2005). Factors that affect the above situation are certainly many and include taxation³, bankruptcy laws, social security matters related to entrepreneurs etc. While this report cannot provide a thorough analysis of how favourable or unfavourable these factors are for entrepreneurship in Finland, it may be safe to state that social security is less favourable to entrepreneurs when compared to employees and overall, and tax levels are relatively high in Finland creating a less favourable environment for entrepreneurship.

The above figures provide a general picture of the frequency of entrepreneurship. As is shown, in particular in the ICT sector, entrepreneurship as measured by firm entries is frequent as compared with all fields and probably reflects the opportunities offered by a rapidly growing field. Even though there might be general hindrances to entrepreneurship in Finland making it a less attractive career path than that of an employee, once opportunities emerge there are willing new entrepreneurs, and the development of new high-tech sectors is not hindered by general conditions, though it may be made slower than would otherwise be the case. Still in terms of VC deal flow, many interviewees have pointed out that it is insufficient for screening successful cases.

(b) *Innovation policies and other infrastructural programmes*

Finnish innovation policy has for a long time been beneficial to R&D and innovation activities, creating a favourable basis for the development of innovation-based enterprises and promoting demand for venture capital. The success of Finnish R&D, technology and innovation policies is reflected in the favourable development of the 1990s. Nevertheless, it should be emphasised, as indicated in the appendix on ICT, that Finnish success is a happy coincidence of fertile framework conditions and lucky choices of a company “with a vision and strategy to make it happen”.

In Finland the basic structures in science and technology policy were created in the 1960s and 1970s (Lemola, 2002). At the time, higher education was devoted a lot of attention and the nation-wide university network was created. The motivation for the

³ An extreme example is the finding that in Oulu region the tax administration has started to demand that board members of a firm be responsible for damages in bankruptcies even though anything illegal has not happened (Paasivirta and Valtonen, 2004).

emergence of science and technology policy and the creation of its basic structures was economic: to diversify Finland's production structure and to promote industrial renewal (Lemola, *ibid.*).

The 1980s paid particular attention to the promotion of technology development, and new instruments were created for the purpose. The National Technology Agency Tekes was created and entrusted with the mission to pursue policies for this end. As in the other OECD countries, large national technology programmes were started and as elsewhere, the first programmes were focused on information technology. The Science Policy Council, a cabinet-level advisory body which was created in the 1970s and has played a decisive role in the formulation of Finnish R&D policies, had a name change in 1984 into Science and Technology Policy Council reflecting the new priorities. The 1980s also saw the establishment of technology parks and centres of expertise for technology transfer, diffusion and commercialisation of research findings.

Since the beginning of the 1990s, Finnish science and technology policy adopted the framework of the national innovation system, and a little later, in mid 1990s, that of the knowledge-based society. Both concepts came, at least partially, from OECD reports. The former concept gave arguments for the central role of R&D and education in industrial and economic development and supported efforts to intensify national and international R&D cooperation (Lemola, *ibid.*). The concept of the knowledge-based society emphasised the importance of knowledge-intensive growth for the national economy and drew attention to the observation that macroeconomic or labour-market measures do not suffice to ensure knowledge-intensive growth (*ibid.*). New policies recognised that national competitive edge is created at firm level.

The policies and policy instruments adopted in the 1990s emphasised and supported knowledge spillovers through collaboration and networking among industries and public sector research institutes. The acknowledged importance of R&D activities and innovation was reflected in the proposed budgets which were increased even at a time of overall public savings and constraints. The previous deep divide between the funding agencies involved in science policy and funding on the one hand and those involved in technology on the other hand, disappeared and various agencies started collaborating with each other. The agencies have supported, among other things, cluster programmes to enhance collaboration and networking among different stakeholders (Ylä-Anttila & Palmberg, 2005). The policy goal overall has been to promote favourable framework conditions for businesses – that is, facilitation - not to design specific policies or picking up winners – that is, intervention.

The emphasis on R&D, education, and technological infrastructure means that most subsidies to enterprises are channelled through R&D support and that educational policies have responded to the needs of emerging technological sectors (see the appendix on ICT). Tekes (The National Technology Agency) is the major agency to award direct R&D support and R&D loans to companies. It also has capital loans, but it never claims any equity in the firm even though the loan is regarded as part of the firm's equity strengthening the financial situation of the firm.

In 2003, the share of public funding of the R&D expenditures of enterprises (BERD) was 5.4%, which is well below the OECD average. The large majority of these funds comes from Tekes (in 2002 the proportion was 85%). It is to be noted, however, that the

proportion of public funding of BERD is 1,8% for electronics and 9,9 % for other industries (Tilastokeskus, 2005). The low share in electronics is caused by the very low share of Nokia (in 2000 0,3%; Ali-Yrkkö and Hermans, 2000) and the dominance of Nokia in the Finnish electronics industry. Tekes also finances R&D activities in public research organisations (third level, research institutes etc), though other funding organisations, too, especially the Academy of Finland, are important for R&D funding in these organisations.

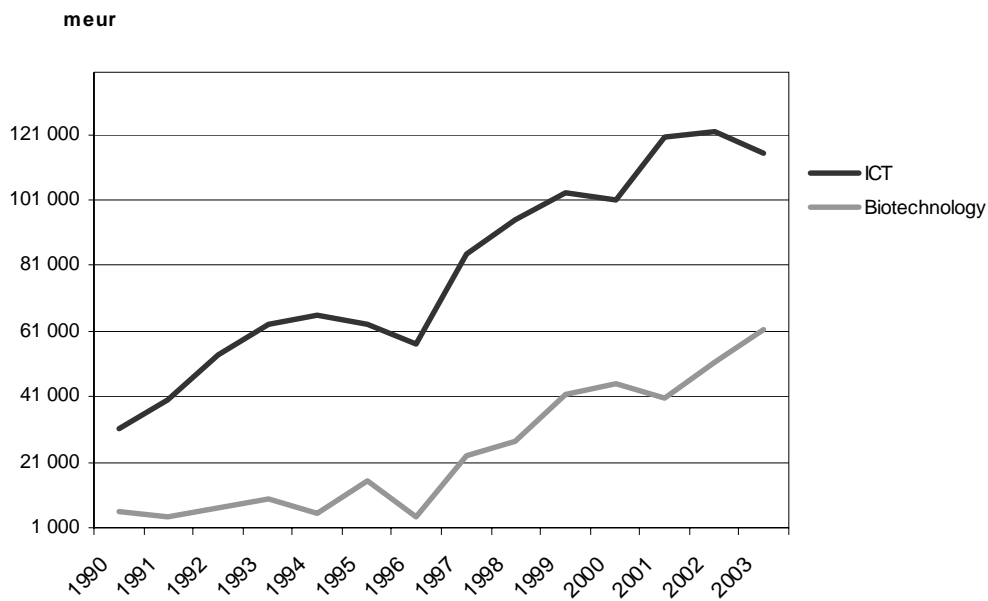


Figure 17. Tekes funding to projects in the ICT and biotechnology fields.

Source: Tekes.

The ICT is the largest technology area funded by Tekes, and in 2003, it received 29% of the R&D funds allocated to different technology areas while biotechnology received 16%, the latter is a sizeable sum when compared with the economic importance of biotechnology industry at the moment. This support is considered as an investment for the future. Figure 17 depicts the growth curves of Tekes funds to these two technology areas and shows that the rapid growth of funding on ICT started a few years earlier than that on biotechnology.

Forty-four per cent of Tekes R&D funding to enterprises is channelled through technology programmes to specific technology areas, while the corresponding figure for public research institutes is over 50% (in 2003). The rest of the funding is awarded as a general support and through various support schemes, such as SME schemes to support to the start-up costs of new firms, to develop the business plans of start-ups, to carry out feasibility studies, or to support technology transfer from universities to firms. These schemes reflect a concern with technology transfer, diffusion and commercialisation of high-tech innovations. Lately, there are new initiatives to promote business skills and business strategies in early start-ups or among potential entrepreneurs of such endeavours (in collaboration with Sitra). Overall, public support aims to cover all phases from fundamental research to its commercial application.

Large companies can benefit from R&D support (direct support and loans) either through individual projects or through projects that are part of technology programmes. To qualify for such support, large companies have to fulfil at least two of five criteria, three of which are related to collaboration (with SMEs, with universities or research institutes, or international collaboration). The policy thus pursues the goal to enhance knowledge spillovers and networking among large and small firms.

3.2.1.2 Supply

With regard to the supply of venture funding, the previous sections have reported the development of the VC industry and present volumes of VC funds raised and invested in Finland. Attention has also been drawn to some systemic features, which influence the development of VC markets and industry. The next section will summarise some of these features, first, by drawing attention to features of the contractual system in Finland, tax issues, market factors influencing investments, and finally policy initiatives for VC.

(a) *Features of the contractual system*

In Finland, there are still two fund types: funds operating as limited companies (ever-green), Oy, and those operating as limited-life limited partnerships (ky). The limited partnership funds operate with expectations of higher returns than the limited company funds. The latter are largely regional funds, and among the former there are both regional funds and those without specific regional targets. While thanks to the lower return expectations, the limited company funds can be expected to be more oriented to early-stage investments which have higher uncertainty, however, in practice there is not much difference, because market factors lead both types of funds to shift their investment activities towards later stages, as will be elaborated below.

The contractual practice adopted in the Finnish model of limited partnership funds does not fully replicate the US model of limited partnership funds because in the Finnish funds, the limited partners have a strong position in the decision making. Major investment decisions as well as investment strategy formulation are taken at an investment committee where limited partners are present. The reasons for adopting this practice included the novelty of the instrument when it was first adopted in the late 1980s and early 1990s, and an overall caution by Finnish investors as an outcome of the deep depression in the early 1990s.

According to Gilson (2002), an important feature of the contractual system of the US venture capital industry is, however, the fact that “the limited partners may not participate in the day-to-day management of the fund’s business, including especially the approval of particular portfolio company investments” (p. 6). The US governance structure formalises the separation of ownership and control and gives a disproportional discretion to the general partner for him to exercise his skills on the investors’ behalf. The Finnish system clearly does not follow this principle. The Finnish practice can, in principle at least, increase the potential liability of the limited partners in a case of the bankruptcy of the portfolio company. Even though no cases could be cited of such adverse events, according to some of our interviewees, this factor may play a role, in addition to tax questions to be discussed later on, in the difficulty in obtaining foreign investments in Finnish VC-funds.

(b) *Taxation*

As regards taxation, Finland has been one of the countries where the participation of international investors in Finnish funds created a permanent establishment; they had to pay taxes to Finland and their home country. In the past few years, this has been identified as an important disincentive for foreign investors to invest in Finnish funds. The problem was finally solved as the beginning of 2006.

Overall, tax levels for individuals whether capital gains or income tax, and company tax rates are above the European average according to the EVCA benchmarking report (EVCA 2004) thus creating unfavourable environment for VC activities. There are also more specific issues related to taxation which are unfavourable.

(c) *Market factors*

While overall, there are no signs of general shortages in VC/PE funds, there are several factors that may contribute to a market failure with regard to early-stage investments in Finland. These factors were identified in the interviews carried out for this study:

Investments are much smaller in Finland than in a country such as the US because the markets are small and the expected returns are small. Even if the future markets of a firm are abroad – as is the case for most firms in biotechnology - reaching them creates additional difficulties and requires extra knowledge and networks.

Since investors in the early-stage cannot expect large returns from a project, they have to make a large number of small investments; hence, the costs of screening and coaching the portfolio companies would become far too large as compared with the expected returns in terms of management fees and carried interest.

High risk and a long period of waiting for the returns create higher expectations of returns than investments in later stages; since the IIR is counted against the number of years that the investment takes before the returns. However, early-stage investments cannot fulfil such expectations.

Exit markets in Finland are problematic for early-stage investments. A major problem is the small size of the Helsinki stock exchange, which makes the liquidity poor and prices highly volatile. An IPO as an exit route has been very limited since the downturn in the financial markets in 2000-2001. In biotechnology, the only IPO's in the past few years have taken place outside Finland.

The above problems are persistent and faced even by funds promoted with public money: soon after the early period, when the public organisations are no longer in control (in terms of ownership), early-stage funds move to investing in a later stage. They do this in order to become profitable.

(d) *Other matters*

Preliminary findings suggest that non-monetary value-added provided by the VC system to new, technology-based firms, is in many cases insufficient. Public organizations are a case in point in this respect; they do not even attempt at providing it and stay as passive investors. Some interviewees justified this practice by a division of labour

among public organizations according to which special programmes, such as those Sitra and Tekes has for developing business plans in start-up firms, can look after the function.

There is a suggestion, though this has not been verified by a systematic study, that the background of general partners in VC funds is not favourable for providing non-monetary value-added since a great many of them in Finland have a banking background while business as well as previous VC experience in the invested areas would be desirable. The extent of non-monetary value-added and the competencies of general partners in VC funds are areas that would need to be studied further.

(e) Policy initiatives for VC

There has been a succession of public initiatives to promote Venture Capital funds and Venture Capital investments, particularly those oriented to promoting SMEs and for regional purposes. Government intervention has also played an important role in the emergence of the Finnish VC/PE industry in itself, as described in the beginning of this report. Public intervention has in many cases been successful: it has led to the foundation of private VC organisations, provided for early experimentation in VC/PE activities, and it led to the foundation of the Finnish Venture Capital Association.

Section one describes the current structure of VC/PE organisations, and the three important public organisations involved in VC/PE activities. Two of the latter, Finnish Industry Investment Ltd (FII) and Sitra, invest in funds and make direct investments in portfolio companies. In their latter role, they act as passive investors (hands-off). They do not aim to provide additional value in terms of business knowledge at the firm level. Private investors need them for their syndicates to be able to accumulate enough funds, but regard their role as difficult since they feel that they themselves devote a lot of time and energy to help the portfolio firm grow and develop - for the benefit of the passive investor. The situation becomes more difficult if in later investments rounds the public investors do not join in, but nevertheless, do not give up their ownership, thus diluting the ownership of follow-on investors.

In their role as funds of funds, the Finnish Industry Investment Ltd and Veraventure Ltd have supported the foundation of small, largely regionally-oriented funds. Around half of these are currently evergreen funds, and half limited-life partnerships. Irrespective of their organisational form, in order to be profitable, both types have difficulties in staying active in the early stage, as referred to above. We may conclude that measures to promote early stage venture funding are typically short-lived in their efficiency.

There are no economic studies of the success of regional funds in the promotion of regional development. The investments of such funds are typically small and placed on regionally-based endeavours, taking into account regional criteria in the selection of portfolio companies. Whether such funds can even in principle be efficient is an important question.

There is a recent policy initiative in Finland to provide more public funds to seed and early stage risk funding in new innovative growth-oriented firms, launched in 2005. This initiative (AISP strategy) identifies two major problems in the Finnish system, one in the supply and another in the demand side: 1) systemic factors are not conducive to the provision of early-stage risk funding and 2) the process of developing innovative

ideas into commercial enterprises is not functioning well and thus there are not enough firms suitable for investment; there are many reasons for the latter with insufficient business skills in early-stage companies being one of them (Paasivirta, Valtonen, 2004).

The proposed strategy includes measures to set up a new seed fund entitled Veratek Seed Fund Ltd (Oy), to be managed by Veraventure Ltd. There ought to be an injection of public funding in the fund at least during the first three years, after which period the fund is expected to be self-sufficient. However, further public capitalization is expected to be needed later on, if the fund size needs to be increased, as – according to the AISP-strategy – it is not likely that the new seed fund can attract substantial capitalization from financial markets. The overall plans include an idea of promoting later stage risk funding in order to provide the working of the venture cycle.

To help correct for some of the problems in the demand side, the initiative suggests more cooperation between public actors in the field, such as the regional network of Finnvera, science parks, Sitra preseed programmes, so-called local TE centres etc. to help screen and coach potential portfolio companies and to provide a steady deal-flow. The initiative takes a stand that the help of public organisations is needed because the screening and coaching of a large number of projects is time and resource consuming and the expected returns in early-stage in a country like Finland are not sufficient to attract private investors. The initiative proposes to act as a broker to link experienced business angels and business mentors with promising new firms, a target that Sitra has started to promote in its new DIILI programme. These suggestions mean that the traditional separation of business advice and the ‘coaching’ function (non-monetary value-added) from the funding function is being reinforced in the public sector organisations active in VC area.

4 Pre and post 2000

Finland’s VC/PE industry and the present fund structure developed in the 1990s. Funds and investments grew particularly quickly towards the latter part of the 1990s. 2000 was the peak year for annual investments though funds raised grew until 2002. Annual funds raised dropped dramatically in 2003 and 2004, though there had been a drop in 2001, too. Perhaps because the funds raised had been so abundant until 2002, there has not been a dramatic drop in the annual investments by 2004.

The proportion of high-tech early stage funds (raised) have decreased after their peak year of 2000 (32%), and overall, the proportion of early stage (seed, start-up, other early stage) investments (in MEU) has clearly decreased after 2001. There has also been a fairly steep drop in the size of an average early-stage investment in MEU. In a similar vein, the share of ICT and Life Sciences of investments has decreased since 2000 and 2001.

However, the change with regard to capital sources is probably more profound. Pension funds and insurance companies provided nearly 80% of the annual new funds until 2002, while their share dropped to about 20% in 2003 and to 12% in 2004.

Even though there have been changes in the funds raised and invested, aside from sources of funds, the changes in Finland have not been dramatic.

5 Conclusions

With regard to factors influencing the demand for VC money, innovation policy has been very favourable to supporting the creation of innovations. There is thus a good basis for the development of knowledge-based firms, as is evident in the dynamic development of the ICT sector. It is to be noted, however, that the phenomenal growth of Nokia, currently the global market leader in mobile handsets, has been a major driver of the ICT sector development in Finland in the 1990s, though public R&D policies have reinforced positive developments through their flexible support to R&D, training, and regulatory affairs in the area. The public sector has invested a great deal in R&D in the biotechnology area, too, and this has promoted a rapid growth of new biotechnology firms, especially towards the end of the 1990s. Nevertheless, most of these firms are still in an early stage in their business developments, and aside from diagnostics, their sustainability over a longer time period is uncertain.

Overall, in spite of a favourable innovation base, in terms of entrepreneurship, Finland ranks below EU average in people's willingness to become entrepreneurs and below OECD average in the proportion of entrepreneurs of total employment. These findings are related to less favourable conditions in entrepreneurs' social security as compared with employees, taxation rules, and probably also to bankruptcy laws. Still, dynamic entrepreneurial activities in the ICT sector highlight the fact that less favourable framework conditions do not hinder positive developments once opportunities emerge. Yet, many interviewees for this study have pointed out that overall VC deal flow in Finland is insufficient for the screening of successful cases.

The Finnish system of private, limited partnership VCs is largely about ten years old and has lived through one major business cycle in VC investments. There were VC companies before, but they were largely captive, and governmental companies among them were development companies rather than VCs in the present-day meaning. The US model of limited-life, limited partnerships was adopted in the 1990s with some modifications; namely, a separation of control and ownership is not complete, which may be among the factors disfavours foreign investments. Tax treatment of foreign investments has, however, been a major hindrance in the latter respect, but the situation will change as of beginning of 2006.

The public sector has been instrumental in giving impetus to the development of the Finnish VC system and the publicly-owned organizations have provided a platform for early experiments in VC activities. Nonetheless, the Finnish policies have not been VC-directed initiatives, but overall their primary rationale has been the promotion of SMEs and regional development or other socio-economic objectives. The three major public organizations currently active in VC and equity provision (Sitra, Finnish Industry Investment Ltd, Veraventures Ltd) have functions that reflect this situation. Since each of them has a mission related to market failures that cannot to be corrected rapidly, they have tended to be long-term organizations and not, like the Israeli Yozma programme, a temporary intervention to be discontinued as soon as it has achieved its target. Because of the importance of the three public VC/PE organizations, the Finnish VC system can be described as a dual one where the other part of the system consists of private VC funds. Even many of these have been initiated by public intervention.

Even though in Finland a fairly large proportion of investments have been made in the early stage, the situation has changed somewhat since 2001. Furthermore, market factors disfavour early-stage investments in technology-based firms, particularly those in biotechnology. The impacts of public initiatives to promote early-stage investments have overall remained short-lived. An important reason is probably the fact that in small markets, growth expectations cannot be large and the incentives and design of the programmes have not been conducive to longer-term impacts. A mere provision of new funds is not enough to bring about longer-term change.

Preliminary findings question the sufficiency of non-monetary value-added provided by the VC system to new, technology-based firms. Public organizations are a case in point in this respect; they do not even attempt at providing it and stay as passive investors. Some interviewees justified this neglect by a division of labour among public organizations, according to which special programmes, such as those Sitra or Tekes have for developing business plans in start-up firms, can look after the function. The recent policy initiative to provide more funds to seed and early-stage investments (AISP strategy) follows the same thinking making a separation between the non-monetary value added (business development advice) and financing functions in public-sector organizations, though this implies an acknowledgment of the importance of non-monetary value-added for the development of start-ups. We may, nevertheless, question whether the separation of monetary and non-monetary value-added is efficient and overall, whether the incentives or a lack of them, in public organisations are adequate for successful VC activities.

Exit markets in Finland are difficult for early-stage investments. A major problem is the small size of the Helsinki stock exchange, which makes the liquidity poor and prices highly volatile. An IPO as an exit route has been very limited since the downturn in the financial markets in 2000-2001. A major change after the bubble is a decrease of pension funds and insurance companies, as sources of funds. In biotechnology, the only IPO's in the past few years have taken place outside Finland and a major exit route is that of trade sale, which are growing in numbers quite recently.

With regard to a major research question in the Venture Fun project, that is the emergence or non-emergence of the VC industry and/or markets (Marcus and Teubal, 2005) Finland is probably in the process between emergence and pre-emergence. Finnish VC industry grew rapidly in the second half of the 1990s, a time period in which the ICT industry expanded manifold. There is a strong co-occurrence of the rapid growth of both the ICT and VC industries. Nearly forty percent of the current VC managing companies manage funds that seek investments in the ICT field, which leads us to presume that not only co-occurrence but also co-evolution has taken place. The 2000-2001 bubble did not undermine the VC industry, though it affected the focus of investments activities (to later stages) and sources of funds (withdrawal of institutional investors). In the preliminary definition of the emergence of VC industry in the Venture Fun project (Marcus and Teubal, 2005) important criteria of a VC industry include a critical mass of activity and its accelerated growth; furthermore, it involves collective organizations to supply sector-specific goods (physical and knowledge), specific institutions related to arbitration, standards etc., as well as networks and links between the various types of agents within the industry and between them and outside agents. This preliminary country report has been able to cover only some of these aspects, and therefore, it can only make a preliminary suggestion as to the interpretation. Further studies in the Venture Fun project will be devoted to a more thorough examination of the conditions that define and characterize VC industry in Finland and the other studied countries.

Appendix: ICT and biotechnology (life sciences) evolution

A1. ICT

This appendix reports data on the evolution and dynamics of entrepreneurship in two high tech sectors, namely those of the ICT and biotechnology, and the role of policy initiatives in their promotion in Finland. These two high-tech sectors were examined more closely, because they are subject to special attention in the Venture Fun project. The ICT revolution has played an important part in the development of the VC industry by providing new profitable opportunities for business ventures, while at the same time, offering and requiring wide-ranging experimentation with new technologies. Its influence on the development on the VC industry has been pronounced in Finland and can be seen in the rapid growth of VC management companies (Figure 1) in the late 1990s, the time of the most rapid growth in the ICT sector, too. Biotechnology is an area which offers special challenges to commercialisation of new technology and the funding arrangements to support this activity.

A1.1 Importance of the ICT sector for the Finnish economy

Finland is among the countries most specialised in the ICT: in 2000, in terms of the value added of ICT equipment manufacturing as per cent of the total business sector, it was second to Ireland and in terms of ICT employment and R&D, the first among the OECD countries (OECD, 2002).

This situation is the outcome of developments in the 1990s and the result of a structural transformation that took place in the Finnish economy after a severe economic crisis in the early 1990s. In less than a decade, electronics became the most important single branch in production and exports. The Finnish industrial structure which was previously raw material-, capital-, energy-, and scale-intensive, became knowledge-intensive (Rouvinen and Ylä-Anttila, 2003). At the same time, Finland's R&D intensity (GERD as a per cent of GDP) grew to be the third highest in the world (3,5 % in 2002) with only Israel and Sweden surpassing it.

A1.2 Growth of the ICT sector and Nokia's role in it

Before the 1990s, metals and engineering as well as pulp and paper were the two most important manufacturing sectors of the country. In the 1990s the ICT industry became the largest industrial sector in terms of manufacturing production (Figure 18).

By the early 2000s, the value added of the ICT as per cent of GDP grew to nearly 10%, the proportion of ICT equipment exports of the total exports to around 20%, and the proportion of ICT R&D of total business sector R&D to around half (see Figure 19).

The growth of Nokia from a rubber, cable and pulp and paper company to a global telecommunications giant is the most important factor in the rapid growth in importance and scale of the ICT industry in Finland. This is reflected in the dominant position of Nokia in the Finnish ICT sector. According to the latest estimates⁴, Nokia's share of the value-added of the GDP was 3,7% in 2003 (as opposed to 10% of the whole ICT sector); Nokia's contribution to the GDP growth was 0,3 percentage points (while the growth

⁴ Communication from Jyrki Ali-Yrkkö, Etlatieto Ltd, April, 2005.

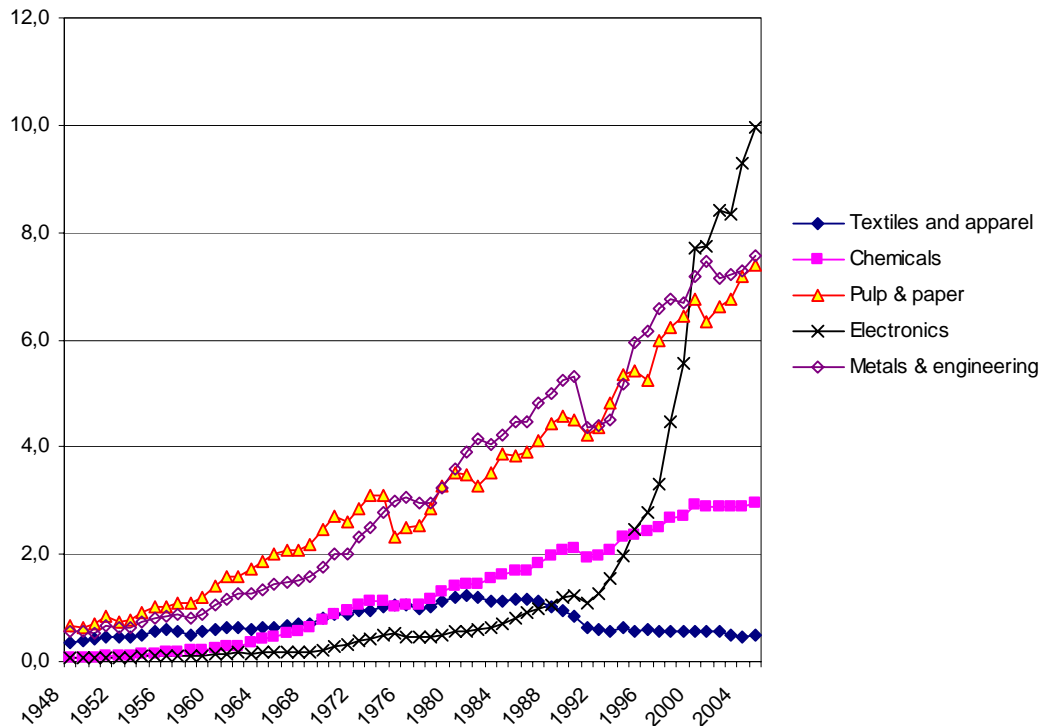


Figure 18. Finnish manufacturing production volume by industry (billion of euros in 2000 prices).

Source: Statistics Finland, 2005; except for the year of 2005, which is based on ETLA's forecast.

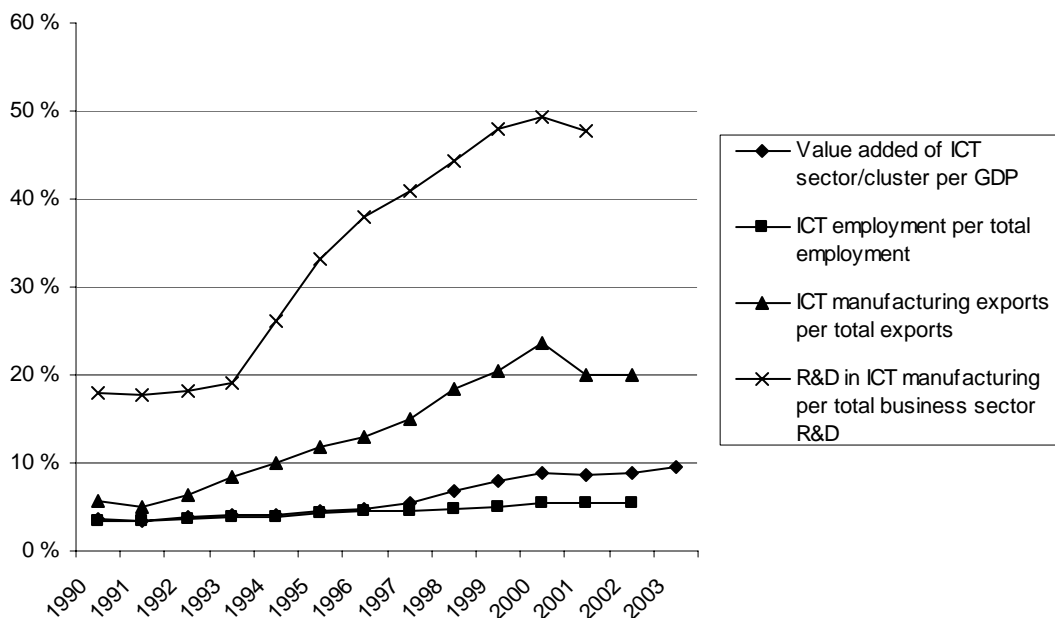


Figure 19. Finnish ICT sector share of GDP, Exports, R&D, and Employment.

Source: OECD: STAN and ANBERD, ETLA database.

was 2% overall); and Nokia's share of exports was 18% while the share of ICT manufacturing products of the total exports was around 20% in 2003. Furthermore, Nokia was responsible for about one third of total R&D expenditures in Finland in 2003, and a little less than for half of R&D expenditures in the private sector.

When considering Nokia's effect on the Finnish ICT industry and on the whole national economy, we have to take into account that it is not only restricted to its immediate and direct effect, but that Nokia has a strong networking effect. Nokia has a large network of suppliers and subcontractors: in 2000 Nokia's "first tier" partner network was estimated to be around 300 firms (Ali-Yrkkö and Hermans, 2002). Moreover, it has research collaboration with SMEs and public sector research organisations, and some of its strategic R&D partner laboratories are situated in Finland. Nokia was still a relatively important recipient of public R&D funds from the National Technology agency TEKES, though the proportion of TEKES funding in Nokia's R&D is estimated as low as 0,3% in 2000 (Ali-Yrkkö and Hermans, 2000).⁵ Most of these funds were directed to the projects of Nokia Research and they involved collaboration with either SMEs or public research institutes and universities. Towards 2001, around 90% of these projects involved collaboration with a research institute or a university and around 40% with an SME (Ali-Yrkkö and Hermans, 2002). With its networking strategies, Nokia provides strong spillover effects on the Finnish research system and the ICT sector in general both for the development of know-how, learning, and economic activity.

A1.3 Structure of and growth trends in the ICT industry

Because of the strong Nokia effect, manufacturing plays a major role in the Finnish ICT industry as compared with services or contents⁶. Manufacturing is responsible for over 50% of ICT turnover and its share has grown since the mid 1990s, while the proportion of services and contents is much smaller (Figure 20).

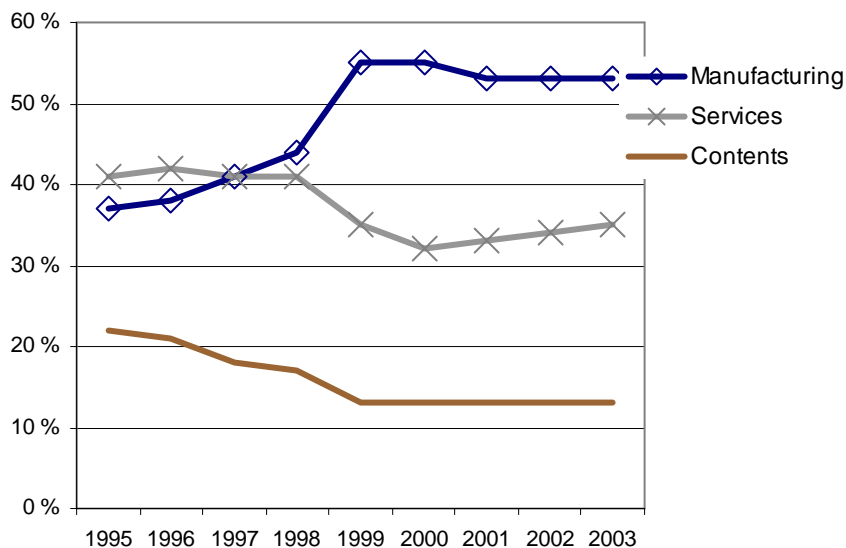


Figure 20. Distribution of ICT turnover by manufacturing, services and contents.

Source: Statistics Finland.

ICT services and contents have grown more quickly than manufacturing in the past few years, while the latter has suffered from a clear decrease in turnover since 2000 (Figure 21).

⁵ Overall, the share of public funding of the R&D expenditures of the enterprises was 5,4% in 2003, with 1,8% for electronics and 9,9% for other industries (Tilastokeskus, 2005).

⁶ Figures on manufacturing are based on NACE classes 3001, 3002, 3130, 3210, 3220, 3230, 3320, and 3330; those on services are based on classes 51432, 51840, 51862, 642, 7133, and 73; and those on contents on classes 221, 7413, 7414, 744, 921, 922, and 924. When telecommunications is shown separately, it is based on the class 642.

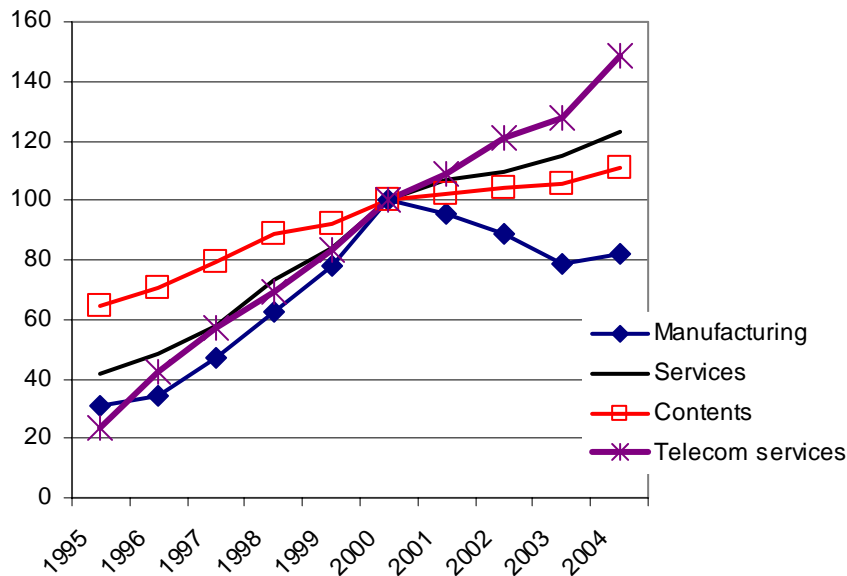


Figure 21. Annual turnover growth by ICT sector (year 2000=100).

Source: Statistics Finland.

Telecommunications services are indicated both as part of services and separately in Figure 21, and we can find that telecoms turnover has continued to grow more steeply than total services.

Services provide more jobs than the other three subclasses of the ICT industry and its share has further increased in the past few years (Figure 22).

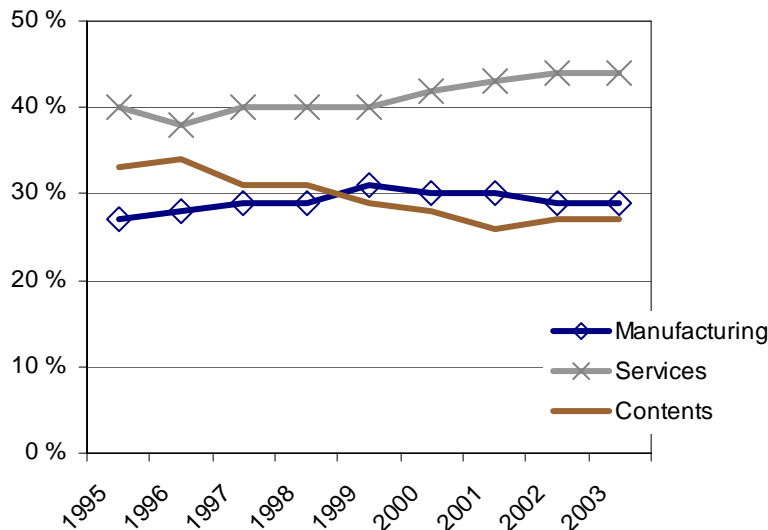


Figure 22. ICT employment by manufacturing, services and contents production.

Source: Statistics Finland.

A1.4 Patenting as an indicator of inventiveness

Figure 23 gives patenting figures in the US patent system for both the ICT and biotechnology. It shows a steep upwards trend in patenting in the ICT area by Finnish inventors.

The figure illustrates further the dominating position of Nokia, which was responsible for 75% of the patents in ICT in the late 1990s. When Nokia's patents were excluded, patenting in the ICT was still growing, but much more modestly, and only a little more rapidly than in the biotechnology area. The driver of Finnish patenting in the ICT is thus Nokia.

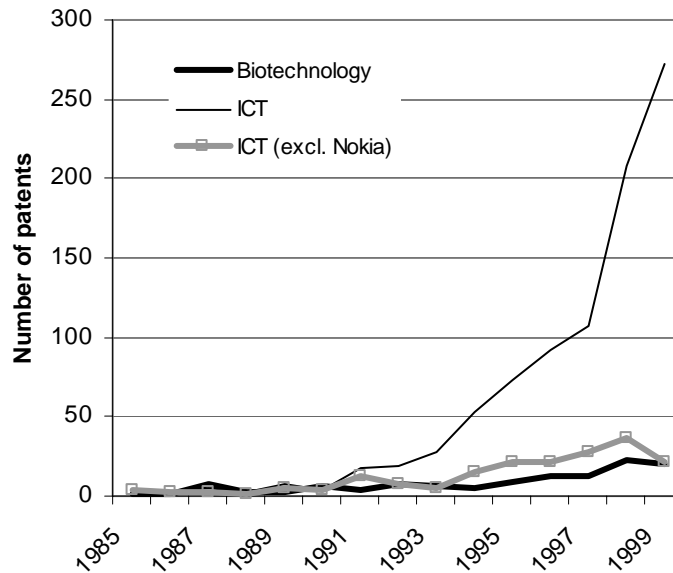


Figure 23. Patents with a Finnish inventor at the USPTO 1985-1999 compiled by year of grant⁷.

(Source: USPTO and Jaffe and Trajtenberg, 2002).

A1.5 Firm dynamics

Firm entries and exits, changes in the size distribution of firms, the number of market participants, and the number of self employed business owners in an industry have all been used as proxies for entrepreneurship (cf. Carree and Thurik, 2000). This paper draws attention to both firm entries and exits as an indication of the dynamics of entrepreneurship in the sector. Exits are as important as firm entries, because they are expected to weed out the firms that are not profitable, and be one of the indications of selection mechanisms of evolutionary growth in action ('creative destruction').

Overall, there has been a lot of dynamism in firm growth in the ICT as measured by firm entries. The rate of firm entries is well above that in the Finnish economy on average (Figure 24) and above that in biotechnology.

There is a caveat in Figure 24 in that the data for biotechnology is based on the checking of changes in firm population almost case-by-case, while the data for the ICT and all fields are based on statistical information obtained from general firm registers. The numbers for the ICT were checked through taxation data to include firms which have economic activity and to exclude firm entries or exits which are purely ownership

⁷ Compilation of patent data by year of filing the patent application was also checked, and from the point of view of studying inventiveness is, in principle, a better procedure. However, since the data series in this source extended only to 1999, and using application dates would have made the annual statistics lag behind even more, compilation by year of grant was used in this context. The different procedures did not change the picture.

arrangements or represent other ‘artificial’ entries or exits. Nevertheless, the data for the ICT and particularly for all fields may still be inflated because the two series of numbers – checked and unchecked in ICT for 1995-2004 - only differed by three percent.

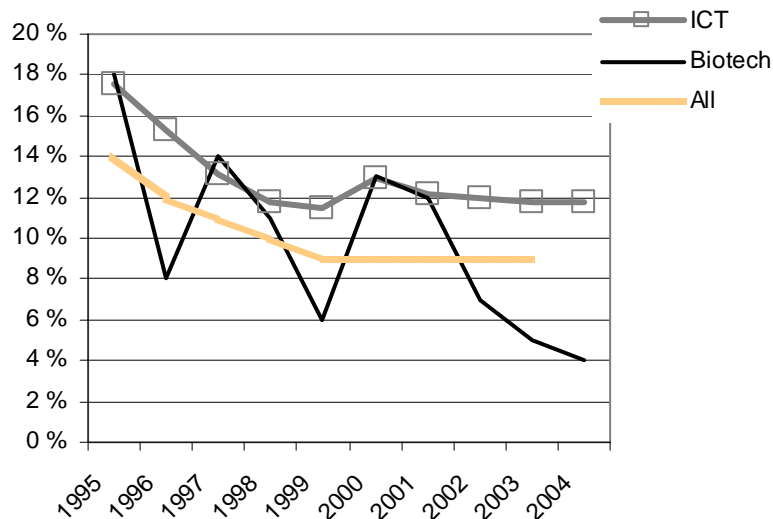


Figure 24. Firm entries in the ICT, biotechnology and all fields.

Source: For the ICT and all fields: Statistics Finland; for biotechnology: ETLA database on Finnish biotechnology firms.

We expected this number to be much higher. This would mean that the relative level of firm entries in biotechnology could be higher in relation to that in the ICT or all fields than Figure 24 seems to indicate.

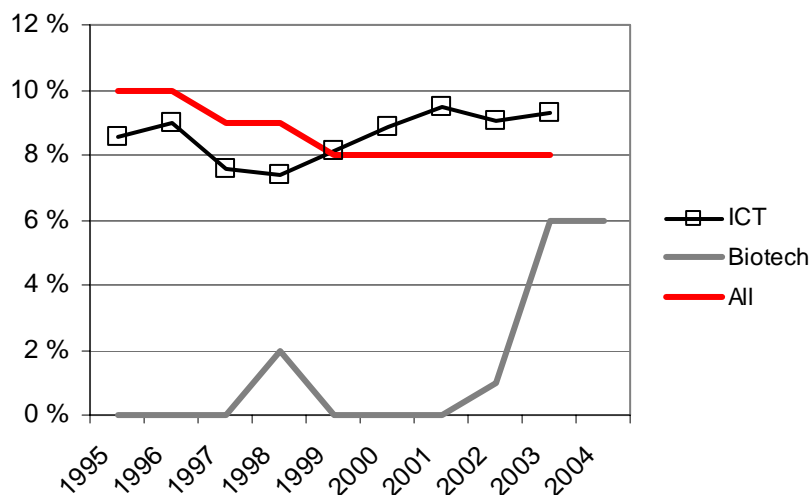


Figure 25. Firm exits in ICT, biotechnology and all fields.

Source: For the ICT and all fields: Statistics Finland; for biotechnology: ETLA database on Finnish biotechnology firms.

Bearing this in mind we may observe that overall, there was a relatively high rate of firm entries in the ICT around mid 1990s, after which the rate for the ICT had first decreased and

then stayed level. There has been a lot of fluctuation in the entry rates for biotechnology, largely because of the small numbers of firms, especially in the beginning of the period.

Firm exits in the ICT are at about the same level as in all fields while in biotechnology they have been few, though rapidly increasing in the past few years. Overall, the balance between firm entries and exits is positive leaving a growth in the overall number of firms in all the sectors compared. In biotechnology, the number of exits is, however, too low for weeding out unsuccessful projects.

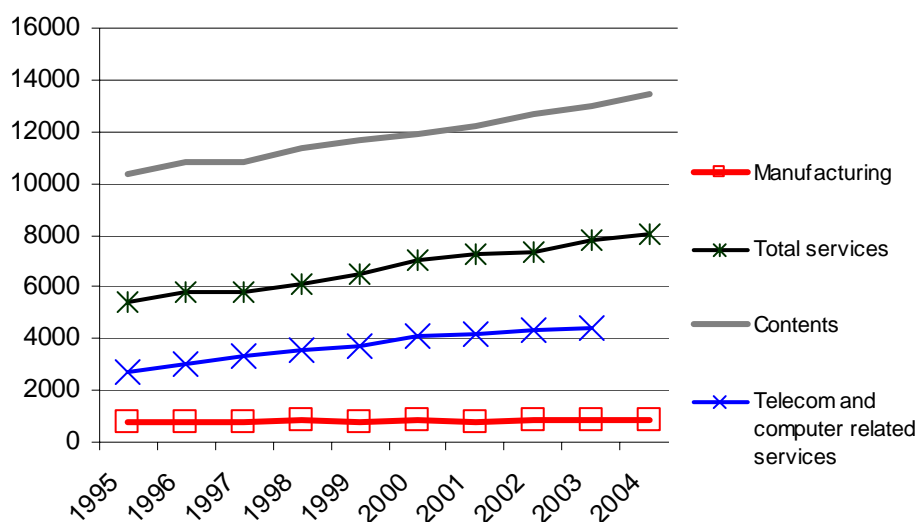


Figure 26. Number of firms in the ICT sector. Stock of firms in the year end.

Source: Statistics Finland.

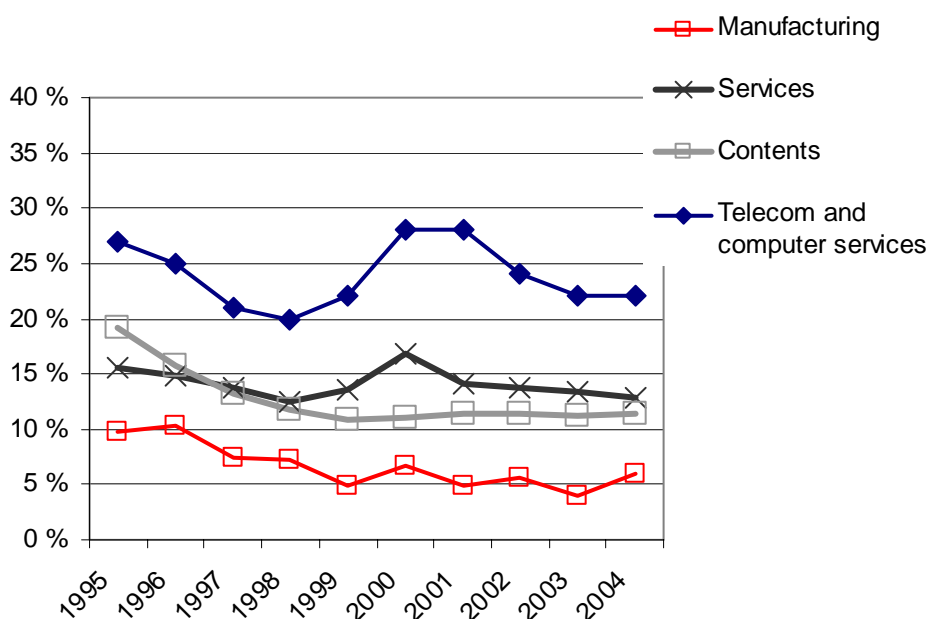


Figure 27. Firm entries in the ICT sector. Proportion of entries of the total stock in the area.

Source: Statistics Finland.

A1.6 Firm dynamics in subsectors of the ICT

When looking at firm entries in the ICT sector in more detail, we may observe that while manufacturing is by far larger than the other two subsectors, services and contents, the overall number of firms in manufacturing is much smaller. This is because manufacturing includes besides Nokia, other large firms, while it is typical particularly of contents, but also of services, that they consist of a large number of smaller firms. In line with higher growth rates in services and contents, there are more firm entries and exits in the latter two (Figures 26 and 27). Telecom and computer services is indicated in two ways, both as part of total services and separately. Telecom and computer services have higher numbers of both entries and exits than the rest of the ICT sector.

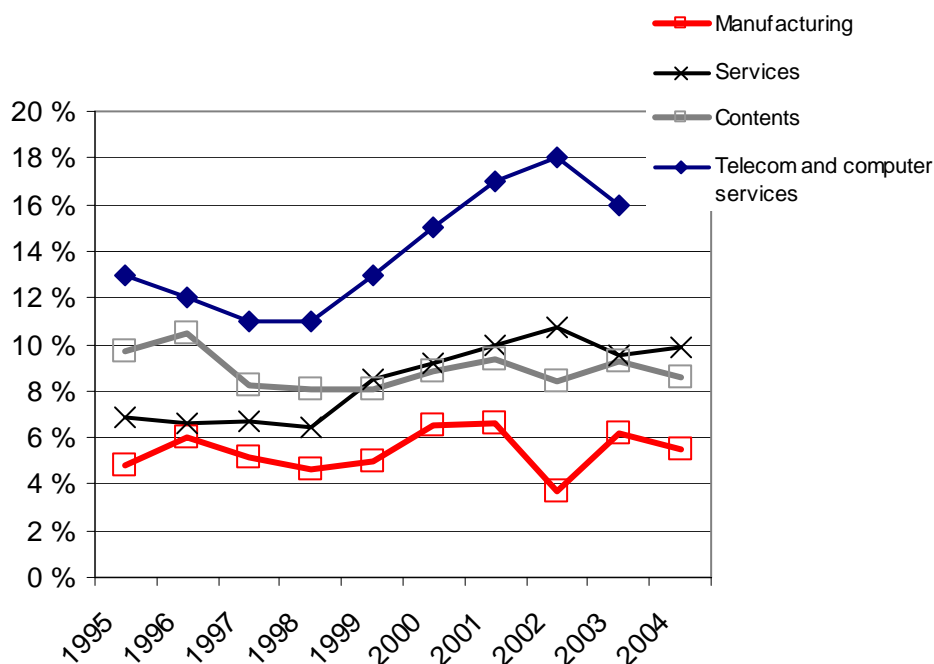


Figure 28. Firm exits in the ICT sector (exit for any reason).

Source: Statistics Finland.

A1.7 Explaining ICT developments

In Finland, many studies have searched for answers for the phenomenal growth of the ICT sector, and its flagship, Nokia, in particular (see, e.g., Rouvinen and Ylä-Anttila, 2003; Hyytinen et al., 2005). The profound change that has taken place in Finland – leapfrogging – does not generally succeed, and especially, not in a very short time like in the Finnish case. The change in the 1990s does not only include the phenomenal growth of the ICT sector, but the development of Finland’s economy into one which has been ranked as among the most competitive economies in the world.

There is a consensus that the change was not the result of any master plan to restructure the Finnish economy or to build a globally competitive ICT sector. As Hyytinen et al. (2005) recount:

“...an array of processes and policy measures were working simultaneously. The country itself provided a particularly fertile framework conditions and had accumu-

lated a great deal of ICT-related expertise by the early 1990s. Due to unfavourable macroeconomic shocks, it had resources available and a desperate need for something new. Digitalization presented a technology opportunity. Furthermore, the country had early exposure to two successive generations of winning standards and faced on its way to EU membership increasing competition and pressure for liberalization. On top of this, there was a company that had the vision and a strategy to make it happen. These factors, combined with quite a few lucky breaks, served to put Finland out in front of the pack.”

As highlighted, one company, Nokia, has been a central player in the change. Over the period of 1980-95 it transformed itself from being largely a forest products, rubber and cable producer with less than 20% of its sales in electronics, to a 100% electronics and telecommunications manufacturer (Arnold et al., 2002). Furthermore, in the 1990s it has concentrated particularly in mobile communications, and consequently, the Finnish ICT sector is overall highly specialised in mobile communications.

The ‘fertile’ framework conditions will be dealt with in section 3 of this document. With regard to specific policies for the ICT, we can note that the flexibility of educational and research policies have benefited ICT developments. These policies reacted quickly to emerging needs to train more people in the ICT area and to increase R&D funding to the area as a response to rapidly growing needs and new emerging opportunities. In 1993-98 the government increased the number of student places in higher education institutions by nearly doubling the total intake, and nearly tripling the intake in polytechnics. In 1998-2002 there was a programme to further increase training in the ICT area (Hyytinen et al., 2005).

In 1997-99 over half of a sizeable increase in government R&D funding was allocated to Tekes (National Technology Agency)⁸ to raise industry’s spending on R&D. Tekes used this additional appropriation in new business operations, cluster programmes, technology-based services and ‘enhanced basic research’ (see e.g. Arnold et al., 2002). Of the latter, major part was used to strengthen R&D particularly in the ICT, and to a lesser extent, in the biotechnology area.

Lately, Tekes has drawn attention to the commercialisation of research findings and has supported the commercialisation process as well as the development of business plans of new emerging firms.

⁸ Tekes is the main public financing and expert organisation for research and technological development in Finland. Tekes finances industrial R&D projects as well as projects in universities and research institutes. Tekes especially promotes innovative, risk-intensive projects.

The primary objective of Tekes is to promote the competitiveness of Finnish industry and the service sector by assisting in the creation of world-class technology and technological know-how. Specifically, Tekes’ activities aim to diversify production structures, increase production and exports, and create a foundation for employment and social wellbeing.

Tekes funds come from the state budget via the Ministry of Trade and Industry. Tekes has a budget of 400 million euros, a source of funding for 2000 projects annually.

A2. Biotechnology⁹

A2.1 Introduction

This report summarises recent research findings on biotechnology industry in Finland based on studies carried out at ETLA. Biotechnology is defined in the manner of the OECD as “the application of Science & Technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services”¹⁰.

The field of biotechnology and the commercialisation of biotechnology research findings have attracted a lot of policy and media interest in Finland in the past few years. There have been large investments of public money in biotechnology since the late 1980s (Luukkonen & Palmberg, 2005) based on underlying expectations concerning economic returns. Finland has indeed witnessed a rapid growth in the number of biotechnology firms in the 1990s and particularly towards the end of the decade (Figure 31). Yet, these firms are to a large extent unprofitable and the development of their products is still mid-way. The commercialisation of biotechnology has turned out to be more difficult and a much longer process than was foreseen and finding this has drawn attention to the field.

A2.2 Patenting in biotechnology

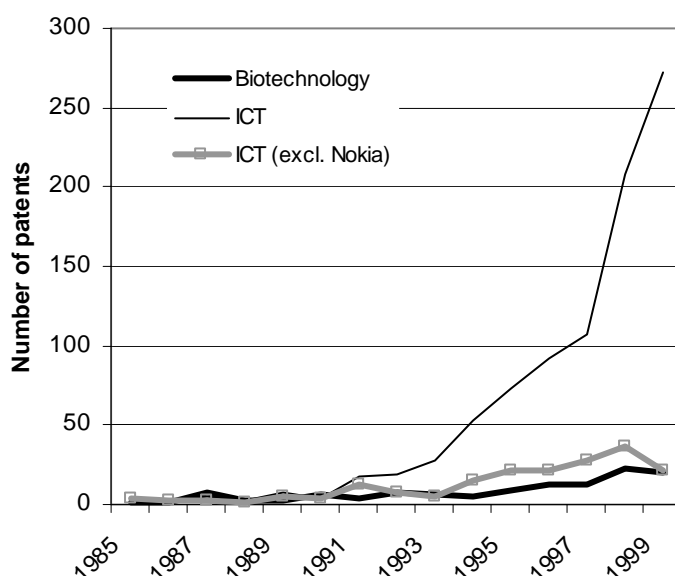


Figure 29. Patents with a Finnish inventor at the USPTO 1985-1999 compiled by year of grant¹¹.

(Source: USPTO and Jaffe and Trajtenberg, 2002).

⁹ This country report will deal with biotechnology, not life sciences, which is a broader field than biotechnology. Attention is here devoted to biotechnology which has drawn a lot of attention in Finland in recent years and because of this, the field has been studied. By contrast, this is not the case for the broader field of life sciences.

¹⁰ The third OECD ad hoc meeting on biotechnology statistics was held in Espoo, Finland 13-15 May 2002

¹¹ Compilation of patent data by year of filing the patent application was also checked, and from the point of view of studying inventiveness is, in principle, a better procedure. However, since the data series in this source extended only to 1999, and using application dates would have made the annual statistics lag behind even more, compilation by year of grant was used in this context. The different procedures did not change the picture.

Figure 28 gives comparable patent data for biotechnology and the ICT fields in the US Patent Office. These data are fairly conservative, since they have been compiled on the basis of the grant year and the last year is 1999. Finnish patenting in the ICT is highly concentrated on Nokia (75%) while in biotechnology, the largest share of patents was owned by the pharmaceutical company Orion Corporation with only 14% of the patents. When Nokia's patents have been excluded, the level of biotechnology patents is about the same as that for ICT-related patents with a Finnish inventor. Taking into account the relative size of both sectors – in the ICT thousands depending on the definition, while in biotechnology, approximately 120 firms – patenting frequency in biotechnology is more pronounced and at a high level.

Nevertheless, it is to be noted that patenting is of different importance and plays a different role in the two sectors. In the biotechnology area, patenting is of greater importance in its traditional function - as a protection of immaterial rights (Cohen and Walsh, 2001). Product development process is very long and companies need to secure immaterial ownership in order to have a chance to get returns to their investments in research and product development. In the ICT sector, by contrast, patenting is of importance in strategic competition amongst companies; such as in patent-blocking, strengthening the firm's position in negotiations with other firms (in cross-licensing agreements), and the prevention of infringement suits (Cohen and Walsh, 2001).

Figure 30 gives biotechnology patents in the European Patent Office and the USPTO by the year of application until 2003, and thus provides somewhat more recent data. Patent grant process lasts a fairly long time in each system, but much longer in the EPO, where it takes on average six years for the Finnish biotechnology patents to go through the patent approval process while it is on average three years long in the USPTO (Luukkonen, 2004). Decreasing numbers of granted patents in Figure 30 partly reflect the length of the process. Nevertheless, it is also possible that the number of Finnish biotechnology patents, and thus inventiveness, may be decreasing.

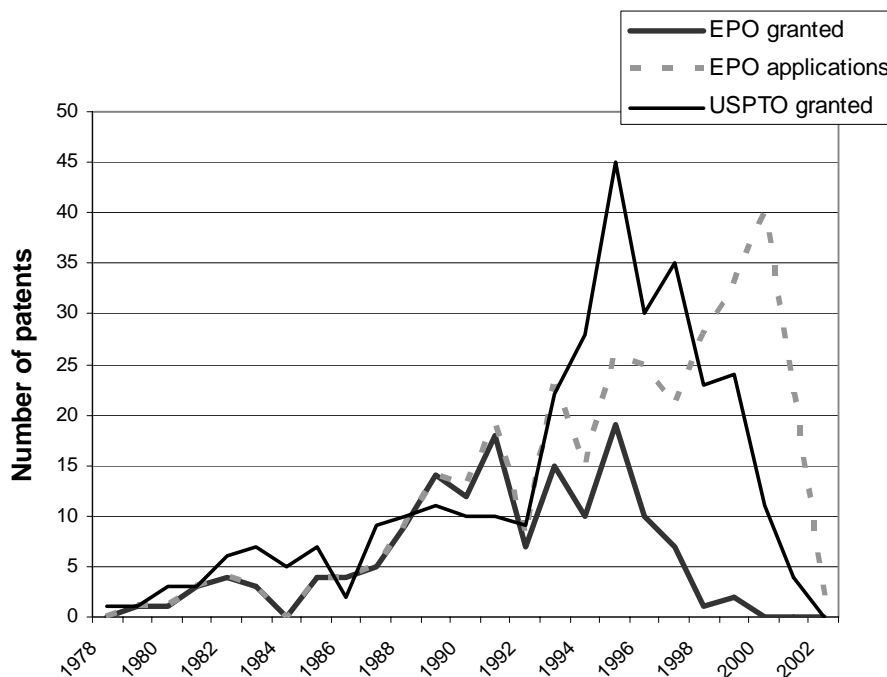


Figure 30. Finnish biotechnology patents in the European Patent Office and in the USPTO. Compiled by year of application. At least one of the inventors is Finnish. Source: Luukkonen, 2004.

A2.3 Number of firms

Figure 31 gives the total number of biotechnology firms in Finland since 1978. All firms founded before this year and currently applying modern biotechnology are incumbent firms (in e.g. food, pharmaceuticals) that have expanded to new biotechnology in later years. Most of the firms in the figure are dedicated biotechnology firms. The number of firms grew rapidly till 2002 after which it decreased both because of decreased entry and increased exit rates.

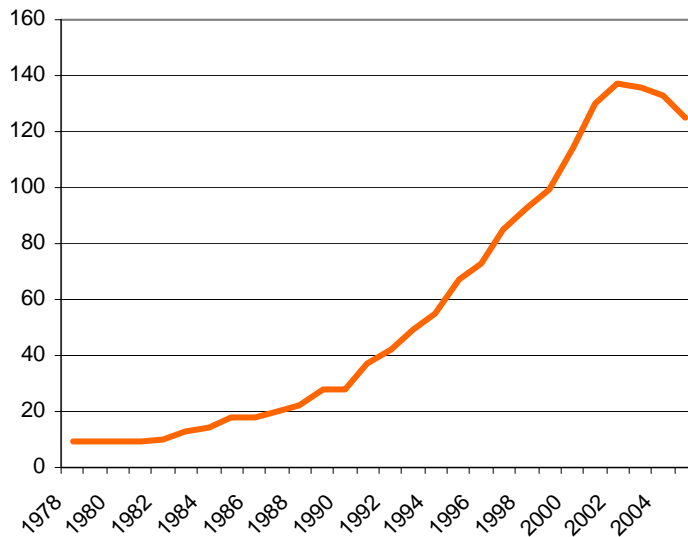


Figure 31. Finnish biotechnology firms.

Source: ETLA database on Finnish biotechnology firms.

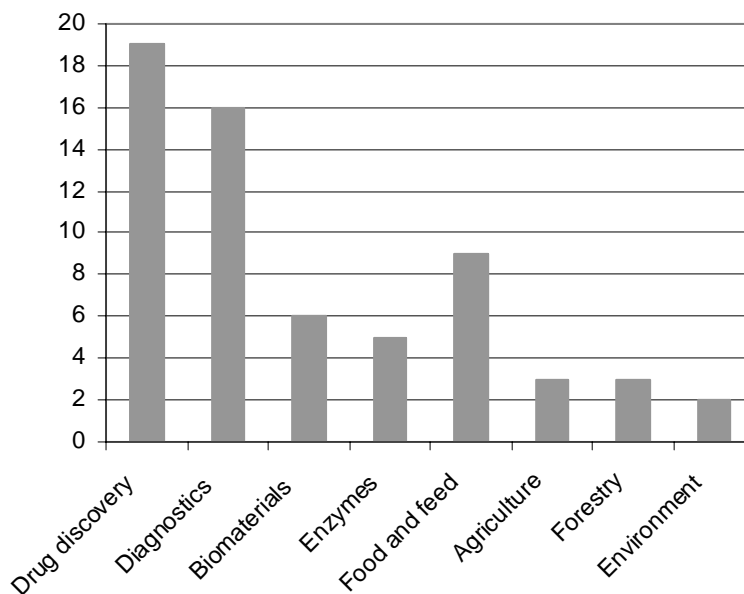


Figure 32. Finnish biotechnology firms by sector in 2004.

Source: ETLA database on Finnish biotechnology firms.

Drug discovery and diagnostics are two sectors of application which have by far more biotechnology firms than any other sector in Finland (Figure 32). Food and feed is also a fairly active sector.

A2.4 Firm entries and exits

Figure 33 gives the number of new firms by year of foundation (moving averages of three years to even out sharp fluctuations), and this figure shows a sharp decrease after year 2000. Additionally, as seen in Figure 6, the number of mergers and bankruptcies increased in the early 2000s, though their absolute number is still quite low. The number of firms is thus decreasing both for decreasing entry rates and increasing exit rates. However, overall, the exit rates have been very low, too low for weeding out unsuccessful projects. The slight increase of the rate in the past few years (Figure 34) may be an indication of a change in the situation in this respect.

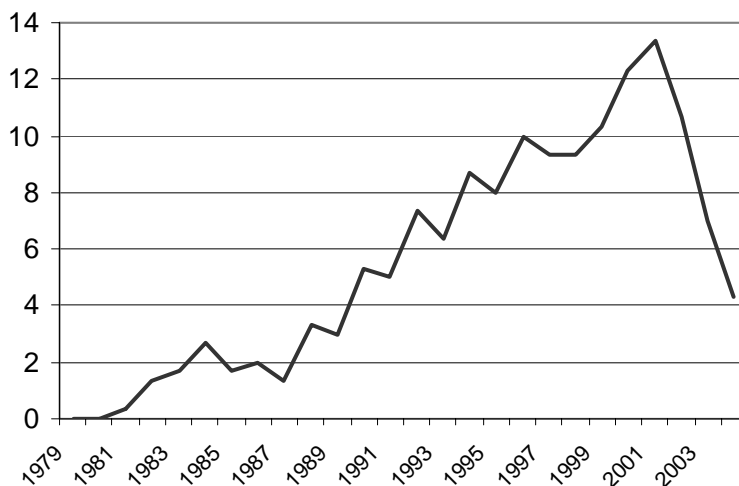


Figure 33. Firm entries in biotechnology. Moving averages of three years.

Source: ETLA database on Finnish biotechnology firms.

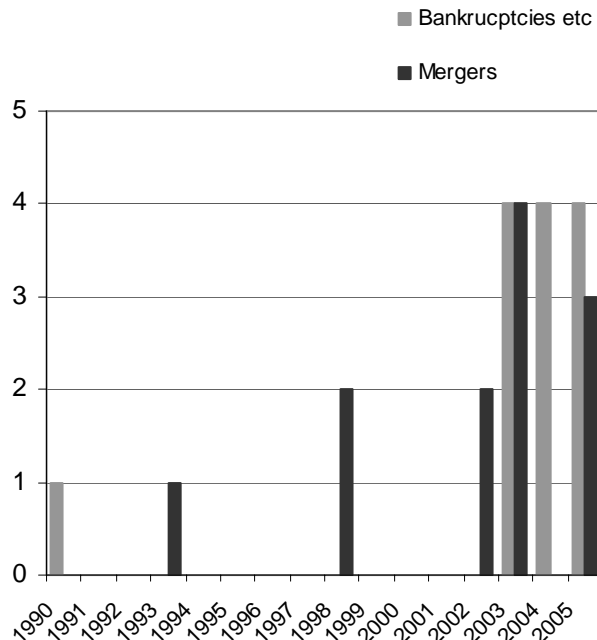


Figure 34. Firm exits in biotechnology.

Source: ETLA database on Finnish biotechnology firms.

When the number of new firms is related to the total stock of biotechnology firms to provide figures that can be compared with those in other sectors, we get sharply decreasing entry ratios for biotechnology firms (Figure 35). Figure 35 also gives the firm entry ratios for

all sectors. The ratio for biotechnology decreases well below the average for all sectors. It is to be noted, however, that the firm entry ratios for all fields and for biotechnology are not fully comparable. The latter figures have been checked and corrected at individual firm level to delete mere administrative changes in registration of firms or the influence of mergers and acquisitions, in the sense that a pre-existing firm is not counted twice after the registration of the new firm name. By contrast, the figure for the whole enterprise sector has not been checked but is based on administrative changes in the business register.

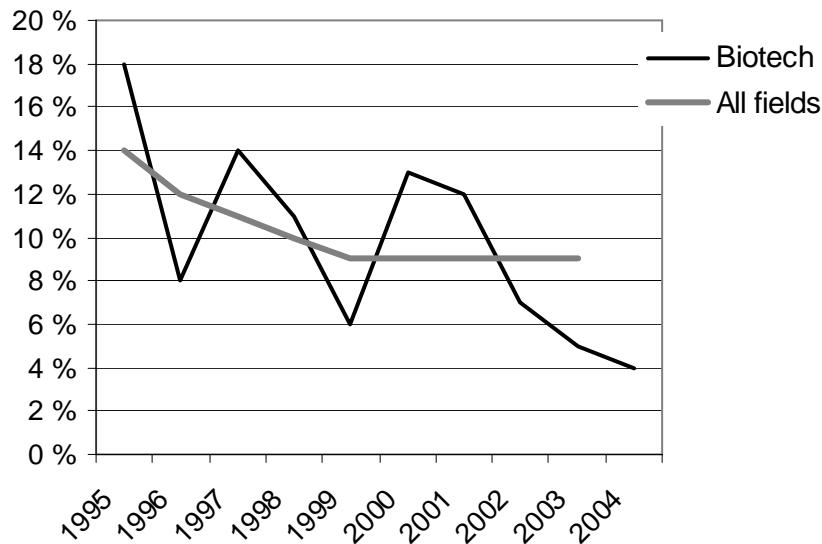


Figure 35. Firm entry ratios for biotechnology and all fields.

Source: ETLA database on Finnish biotechnology firms.

A2.5 Economic performance of biotechnology firms

We have information on turnover of biotechnology firms at one point of time only, namely for 2001 and collected through a survey in 2002 (see Hermans & Luukkonen, 2002; Hermans & Ylä-Anttila, 2004). According to this source, the magnitude of Finnish biotechnology firms is very small in terms of their turnover, value added or any other indicator when compared with the total enterprise sector (see Table 2).

Table 2. Finnish biotechnology industry as part of the enterprise sector in 2001.

	Million euro				
	Bio- technology SMEs	Whole biotechnology industry* (incl. large incumbents using multiple technologies)	Whole enterprise sector	SMEs	Whole biotechnology industry* (incl. large incumbents using multiple technologies)
Number of companies	110	129	224847	0.05 %	0.1 %
Turnover	235	1462	271663	0.1 %	0.5 %
Value added	98	522	88257	0.1 %	0.6 %
Employment	3091	15331	1319000	0.2 %	1.2 %
Exports	124	835	54069	0.2 %	1.5 %
Firms' R&D costs	136	353	3284	4.1 %	10.7 %

2001 data (sources ETLA and Statistics Finland; Hermans & Ylä-Anttila, 2004)

*For large incumbents using multiple technologies biotechnology turnover and exports have been estimated as a percentage of their total turnover and exports, while the employment figures have been taken as a whole.

The figures have been calculated on the basis of the survey findings which represented an 87% response rate. The data have been extrapolated to cover the total 100% of the firms.

Forty percent of the firms in 2001 had losses while most of them had some turnover (Luukkonen et al., 2004). Still, the majority of them were very small and over sixty percent of them had from a zero to one million euro turnover (ibid.). Around sixty percent had 10 or fewer employees (Hermans and Luukkonen, 2002). Sixty-seven percent of the firms reported exports at the time of the survey in 2002 (ibid.), but practically all of them were export-oriented and projected to have some exports in a few years' time. This is a result of the fact that Finnish markets are too small for them to be able to reap returns from their investments in research and product development.

A2.6 Sources of funding and equity

According to the survey conducted in 2002, management and personnel were by far the most important source of equity. Private persons (business angels) were as important as the public venture capital organisation Sitra¹² and a private venture capital company as providers of equity for the biotechnology firms. We have no statistical information of business angels, but this survey highlights their importance for this highly risky emergent technology field. Nevertheless, Sitra was most important for the youngest firms, which corresponds to its role as the financier of the early stage, while private venture capital firms had provided equity more often for the oldest firm group.

Table 3. Sources of equity in 2001.

		Firms founded		
	<1990	1991-96	1997-2001	Total
Management and personnel	32%	50%	76%	52%
Private persons, e.g. business angels	8%	26%	24%	20%
Sitra	8%	26%	28%	21%
Other public sector venture capitalist	0%	9%	0%	4%
Private venture capital company	36%	15%	16%	21%
Private financial institution	0%	15%	12%	10%
Other companies	28%	12%	12%	17%
Other	4%	18%	16%	13%
<i>Number of companies</i>	26	34	25	84

Source: Hermans & Luukkonen, 2002.

The role of Sitra has been vitally important for the sector. According to the survey, Sitra had provided equity over a longer period of time for well over 30 % of the responding firms founded since the beginning of 1990 (Hermans & Luukkonen, 2002). Sitra has, however, changed its strategy in the past year or so and is striving to withdraw from direct investment in portfolio firms and is trying to sell, at least, part of its portfolio to a foreign venture capital firm, without much success so far.

¹² Sitra is an independent public fund under the responsibility of the Finnish Parliament. Its operations are mainly financed through income from endowment investments and project finance. Sitra has had an important role in the development of business based on knowledge and knowhow and public equity investments for the start-up and early stages of companies were for a number of years concentrated in Sitra. It has now, however, changed its strategy and currently Sitra is focusing its operations on programmes through research and training, innovative projects, business development and corporate funding.

A2.7 Policies

Public investments in R&D in biotechnology provide one of the drivers for the rapid growth in new firms in biotechnology. The Ministry of Education started funding biotechnology (molecular biology) through special programmes since 1988. This funding was largely aimed at special biocentres established in connection with universities (total of six in five universities). These biocentres are incubators that provide office space and facilities for new biotechnology firms. In total, 50 percent of biotechnology firms were located in a biocentre or science park in 2002 (Hermans and Luukkonen, 2002), while the proportion was 68% for the most recently founded firms (founded between 1997-2001). In 1998-2000 alone the Ministry of Education invested 13,5 million euros on these centres.

The Academy of Finland, Finnish Research Council system, has invested around 39 million euros in basic research in biotechnology through research programmes in 1994-2003. The National Technology Agency, Tekes, started its first gene technology programme in 1984 and has financed this research field through several technology programmes. Its funding increased decisively in the 1990s.

It is estimated that the total public funding to biotechnology by Tekes, the Ministry of Education and the Academy of Finland in the 1990s and the beginning of the 2000s was nearly 400 million euros. Part of the funds has thus been money for basic research but the largest part has been research and development support or loans to enterprises. Even though this sum is somewhat smaller than the total costs to produce a successful new drug (estimated to be around 500-800 million euros¹³), it is large in the Finnish context. By comparison, Tekes investment in the ICT sector in 1990-2003 was 1,115 billion euros. The latter sum is much larger, but so is the ICT sector in Finland.

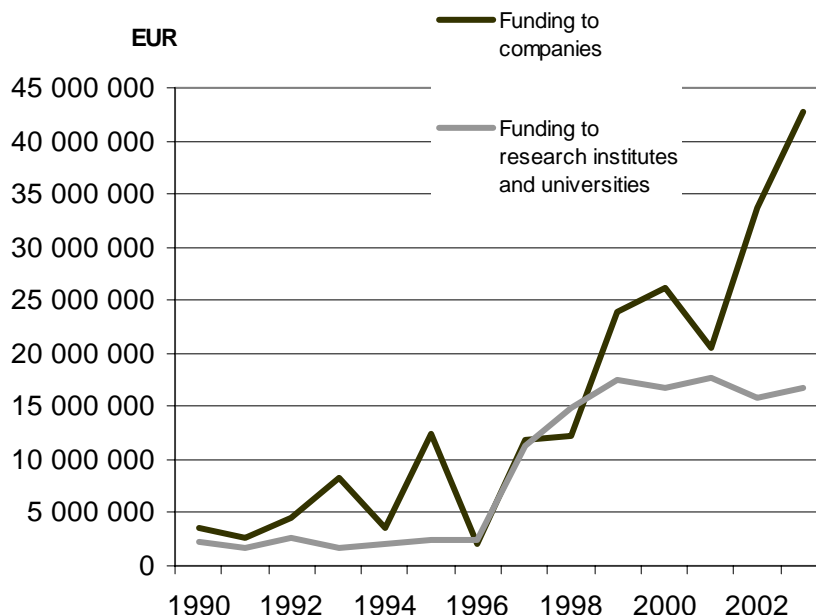


Figure 36. Tekes funding to biotechnology in 1990-2003.

Tekes funding, even to companies, is meant for R&D projects. The support can take many forms, as seen in Figure 36.

¹³ Arne Gillin, NeoBio Business & Biotechnology Seminar, October 28, 2003, Helsinki.

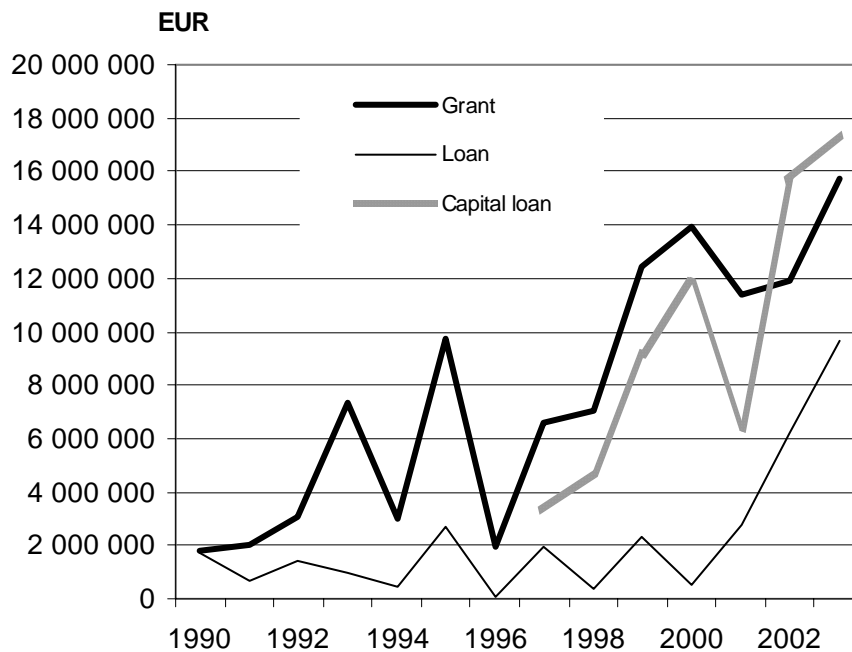


Figure 37. Forms of support by Tekes to companies in biotechnology area.

All forms of support have grown steeply. However, equity loans have grown very rapidly after the launch of this support form in 1997. Equity loans differ from conventional loans in that the loan is regarded as part of the equity of the firm thus strengthening the financial situation of the firm, without Tekes claiming any ownership of equity. The importance of Tekes R&D support and loans is illustrated by the fact that nearly 80 % of the biotechnology firms had received direct aid or loan guarantees from Tekes and over 60% of them had received loans or equity loans from Tekes (Hermans and Luukkonen, 2002).

Tekes collaborates with Sitra in a programme to grant small sums of money to start-up firms or high-growth enterprises for the development of their business models. This kind of programme is not restricted to biotechnology but it is meant for firms in all fields. The programme is in practice run by technology centres or technology transfer firms, which are private organisations. Tekes is planning more measures to strengthen business expertise in high-tech start-ups in general.

A2.8 Special problems in the biotechnology field

According to Luukkonen and Palmberg (2005), a major bottleneck facing the application of modern biotechnology in Finland relates to the lack of *industrialists* with competences to turn innovations into large-scale production for the global market. Small start-ups have not sufficient resources to do this alone. According to their analysis, industrialists provide an innovating firm with complementary assets (Teece, 1986). These assets may vary a great deal from sector to sector and even from firm to firm. Still, overall in biotechnology, industrialists provide the small innovating biotechnology firm with complementary assets (expertise and resources) that are needed in product development and product approval, in building manufacturing facilities and processes, and often in marketing. In biotechnology, the costs of product development through product ap-

proval systems and building manufacturing facilities are high, creating conditions under which firms are not likely to integrate all these functions (Luukkonen, 2005). These conditions differ between different application areas in biotechnology, with drug development firms most often seeking contracts with industrialists, in practice most often large incumbent firms abroad, and out-licensing their innovations to these. Many small firms in other application areas (such as biomaterials and diagnostics) have lower costs of building manufacturing facilities and are also less encumbered by product approval (ibid.). They have a smaller need to seek complementary assets through industrialists and attempt to integrate manufacturing and marketing to a higher degree. Their products, however, are often aimed at smaller niche markets, and their growth prospects are highly uncertain.

Another problem is related to a lack of venture capital funding with its assumed value added function, as 'intelligent' money. A major venture financier in this sector is the public venture financier Sitra, and according to the interviews carried out for Venture Fun project in the spring of 2005, Sitra does not regard a hands-on approach to its portfolio companies as important. According to some of our interviews, it is also criticised for not having had exit strategies when making investment decisions. Overall *venture capital funding* in the biotechnology sector in Finland is at a low level, especially when taking into account the high barriers to entry in terms of the investments required. Qualitative data suggest that biotechnology in particular has suffered from the withdrawal by large institutional investors from longer-term investment with uncertain profits after the ICT hype and subsequent downturn. Further, exit possibilities for VCs that have invested in biotechnology, especially through public offerings, have been practically non-existent. A notable exit route for the venture capitalists is trade sale to a foreign company, of which there are not yet many, but will probably be more in the future.

As is seen in the previous analysis, so far there have been few exits through bankruptcies or other reasons from the firm population in biotechnology, though their number is rapidly increasing. It may be assumed that public support and funding has prevented exits from the firm population, a sort of shake-out, which can be regarded as a 'natural' phenomenon in the early stage of the life-cycle of a technology. Lately, Sitra has aimed at promoting mergers among existing biotechnology firms or the adoption of new innovations to existing firms rather than at the establishment of a yet another firm as used to be the case. This is expected to strengthen the innovation base of extant Finnish biotechnology firms. In order to obtain a turnover of its investments, Sitra is also striving to get rid of a large part of its portfolio companies in biotechnology (see the report on the Finnish VC sector) aiming at a foundation of a new fund attracting foreign investments, but so far the process has been slow. The situation of quite many biotechnology firms is precarious.

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