Finnish Biotechnology Industry in a Dynamic Stage[1]

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The Finnish biotechnology industry is in a dynamic growth period, with the number of biotechnology firms growing rapidly since the mid-1990s. However, most firms in this industry are quite small and still in the early stages of their development. It is likely that the industry will undergo restructuring through mergers, acquisitions and bankruptcies over the next few years. This paper provides an overview of the current situation of the Finnish biotechnology industry in terms of its economic performance, funding structures and growth expectations.

The Number of Biotechnology Firms Growing Rapidly in Finland

In this paper, we define the biotechnology industry as including firms that specialise in biotechnology[2], but also firms that have later diversified into new biotechnology in areas such as pharmaceuticals, diagnostics, food products, and chemicals. Our definition also requires firms to engage in R&D activity and be aimed at preparing products or services drawing on new biotechnology. Pure marketing or consultancy firms have been excluded.

According to the above definition, there are approximately 119 firms active in biotechnology in Finland at the moment (based on the number of firms founded by the end of 2001)[3]. This number is based on information obtained from the Federation of Finnish Bioindustries, biocentres, an earlier study of the topic[4], and various other sources. Overall, 134 firms had been established by the end of 2001.[5] The number of firms started to grow rapidly in the 1990s, and has continued unabated into this century. Of the 134 firms identified, 15 currently cease to exist as independent firms active in the field either through a merger or acquisition or for other reasons. Only two have gone bankrupt and one is in liquidation.

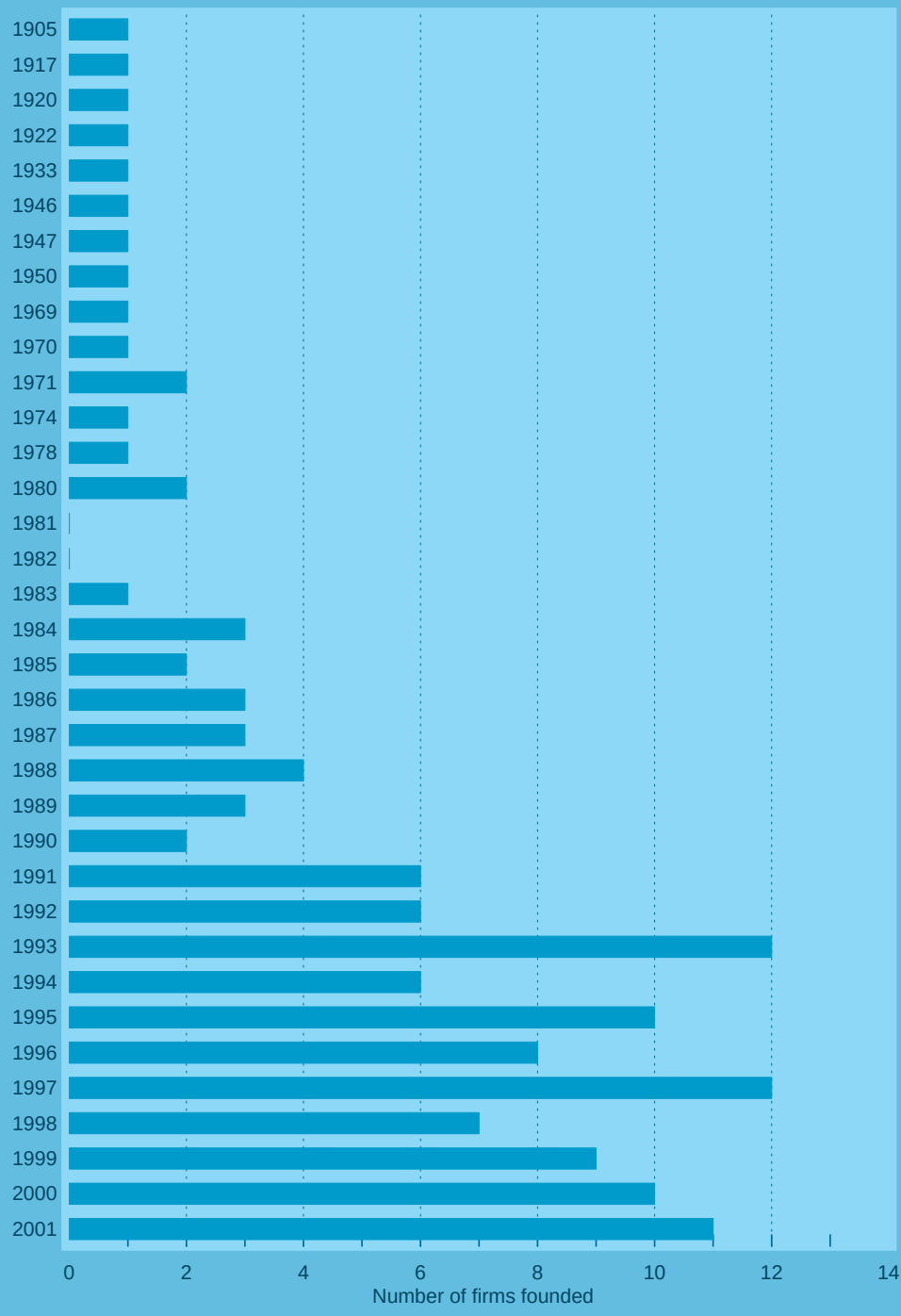
In a European comparison, Finnish biotechnology firms have emerged somewhat later than corresponding firms in the UK, France or especially Sweden, but earlier than those in Germany.

Location of Firms

The highest geographical concentration of the biotechnology industry can be found in the Helsinki and Turku regions.[6] About 65 percent of the firms were located in these regions or in their immediate surroundings. Other important regional centres include Kuopio, Oulu and Tampere, listed in the order of magnitude, respectively. A tick mark indicates the location of a single company. It seems that proximity to biotechnology-related knowledge centres in universities is an important driver for the location decisions of the firms.[7]

In total, 50 per cent of the companies are situated in a biocentre or a science park, which again are in proximity to universities. This figure is based on a survey of Finnish biotechnol-

Finnish Biotechnology Firms by Year of Foundation



Source: Hermans and Luukkonen, 2002.

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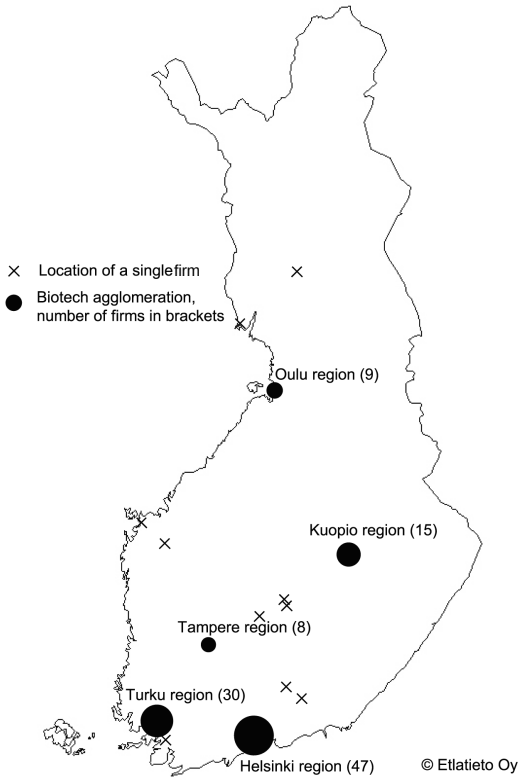
Location of Finnish Biotech Firms



Source: Hermans and Luukkonen, 2002.

ogy companies conducted by ETLA and Etlatieto Ltd. in March-May 2002. The rest of this article reports these survey findings.[8] The proportion of firms situated in a biocentre or a park is larger, the more recently the firm has been founded: 59 per cent of the firms founded in 1991-96 and 68 per cent of the firms founded in 1997 or after are situated in such parks while the proportion is only 20 per cent for firms established earlier. This is not surprising considering that biocentres were first established in the late 1980s and early 1990s.

Finnish biotechnology firms are still quite small: around 60 per cent of the firms founded in the 1990s have fewer than ten employees. These firms are highly R&D intensive: even when these costs are related to total costs, 49 per cent of the firms founded in 1991-2001 had an R&D intensity of 40 per cent or more.

Finnish firms are most active in medicine and diagnostics.[9] The oldest firms are active particularly in diagnostics while the firms founded between 1991-96 are active in medicine, diagnostics and biomaterials. The youngest firms are active in medicine, services, and food and feed. The activity sectors are clearly expanding with new entrants in the field. The number of service firms has grown, particularly among the youngest firms. These are, for example, firms selling research and development services to other companies.

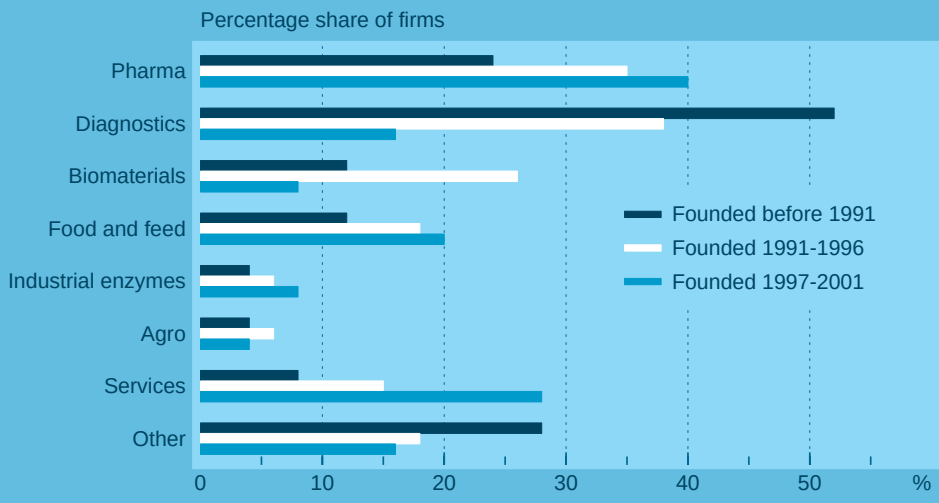
European Dedicated Biotechnology Firms: Distribution by Cohorts of Entrants, %

	Finland	UK	Germany	France	Sweden	EU-15
-1990	26	33	20	32	38	31
1991-95	38	25	23	25	26	25
After 1995	36	42	57	43	36	44
No of firms	105	448	504	348	235	1 930

Notes: The data include only dedicated biotechnology firms. The Finnish data are similarly defined. New start-up companies, which were not part of large incumbent firms, were regarded as dedicated biotechnology firms. The data may not be fully comparable, however, since for Finland they span up to the end of 2000 while for other countries the source used does not provide the last year of observation.

Sources: For countries other than Finland: BID, University of Siena, in European Competitiveness Report, 2001, European Commission. Data for Finland are based on Hermans and Luukkonen (2002).

Sectors of activity among Finnish Biotech Firms



Source: Hermans and Luukkonen, 2002.

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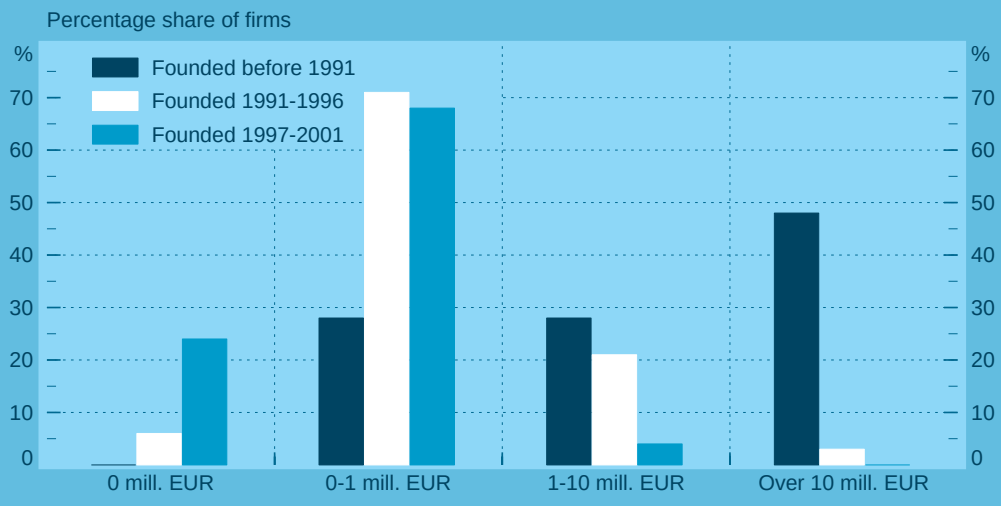
Turnover Distribution of Finnish Biotech Firms



Source: Hermans and Luukkonen, 2002.

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The turnover distribution of the firms suggests that very few of the younger biotechnology firms had a turnover of one million euro or more. However, expectations concerning the growth of turnover are relatively high. Generally speaking, the younger the firm, the higher are the expectations. However, even the oldest cohort expects to have larger growth rates than firms in the overall Finnish economy.

Export intensity is depicted in the figure on the right and is measured by the exports-to-sales ratio. Sixty-seven per cent of the firms export their products. Over 60 per cent of all firms expect their exports to exceed half of their sales within the next five-year period. Even the older firms expect their export intensity to increase noticeably in the next five years. It is obvious that Finnish biotechnology firms are seeking growth by expanding to foreign markets. Particularly firms in the youngest cohort anticipate rapid growth in export intensity and a structural change in their exports.

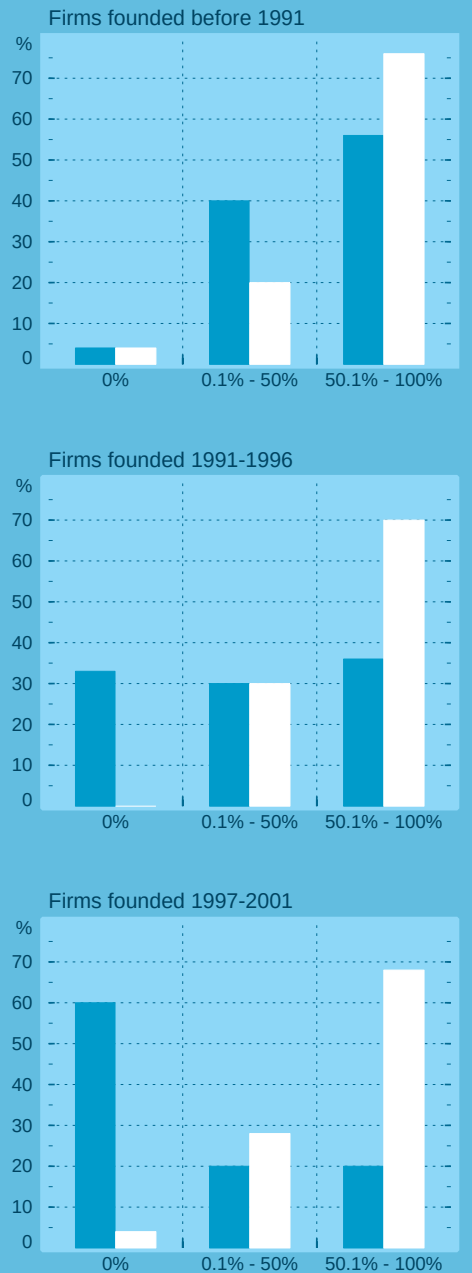
The European Union comprises the most important export region for Finnish biotechnology firms. Sixty-one per cent of the companies have some exports to the EU. This is not different from the general pattern of exports of Finnish industries, since the EU is overall the most important export area for Finland.[10] Over 90 per cent of the biotechnology firms were planning to export to the EU area over the next five years. Thirty-five per cent of the companies exported to North America. Asia and the rest of the world were also fairly important export destinations, with 26 per cent of the firms exporting to each of them. The oldest firms had wider export markets than the other firm

Anticipated (5 yrs) annual growth rate of turnover, %*

Founded before 1991	7
Founded 1991-1996	53
Founded 1997-2001	114
Total	10

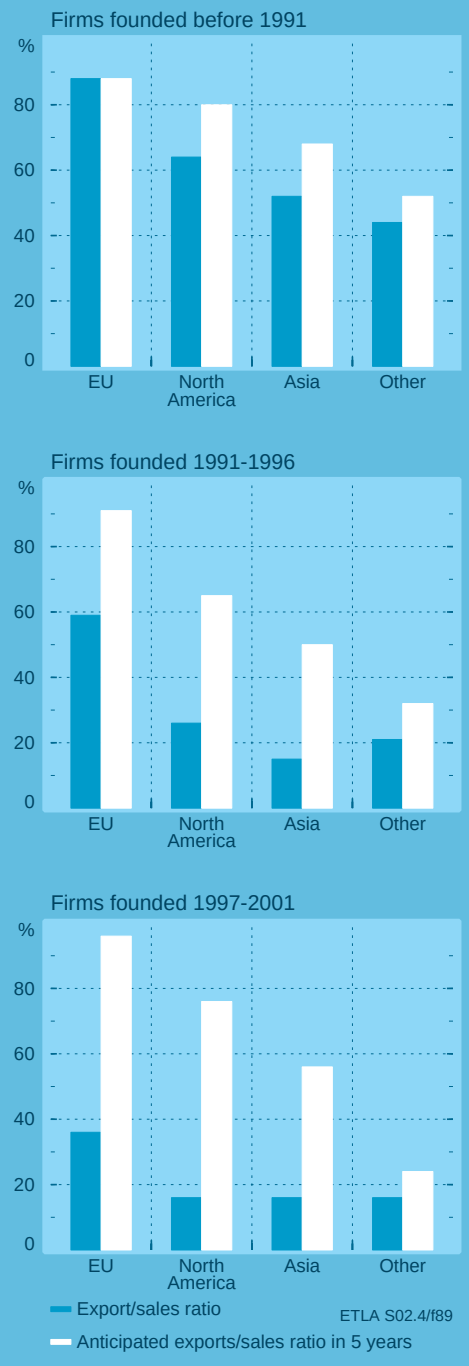
* Weighted by firm size.
Source: Hermans and Luukkonen, 2002.

Present and Anticipated Export Intensity of the Finnish Biotech Firms (percentage share of firms)



Source: Hermans and Luukkonen, 2002.

Present and Anticipated Export Regions of the Finnish Biotech Firms (percentage share of firms)



Source: Hermans and Luukkonen, 2002.

groups. By contrast, the younger firms were expecting their exports to grow significantly and their export regions to widen globally.

Funding

Forty percent of the new firms (founded in 1991-2001) had negative profits in 2001. New biotechnology firms have a long period in which they depend heavily on various outside sources of funds to finance the development of their new products. These sources include equity, debts and loans, loan guarantees, and direct aid. The principal owners and for younger firms, management and personnel, are the most important providers of equity. Sitra is a public foundation devoted to the support of start-up and early stages of companies and it has an important role in the development of knowledge-based businesses. It provides equity especially for the young biotechnology firms, while private venture funding companies more often finance older companies. Overall, private venture capital markets are relatively modest and quite young in this sector in Finland.

The National Technology Agency, Tekes, is the most important supplier of capital loans for biotechnology companies, while private domestic financial institutions are the most important sources of debt financing. Tekes is also an important source of funding for R&D.

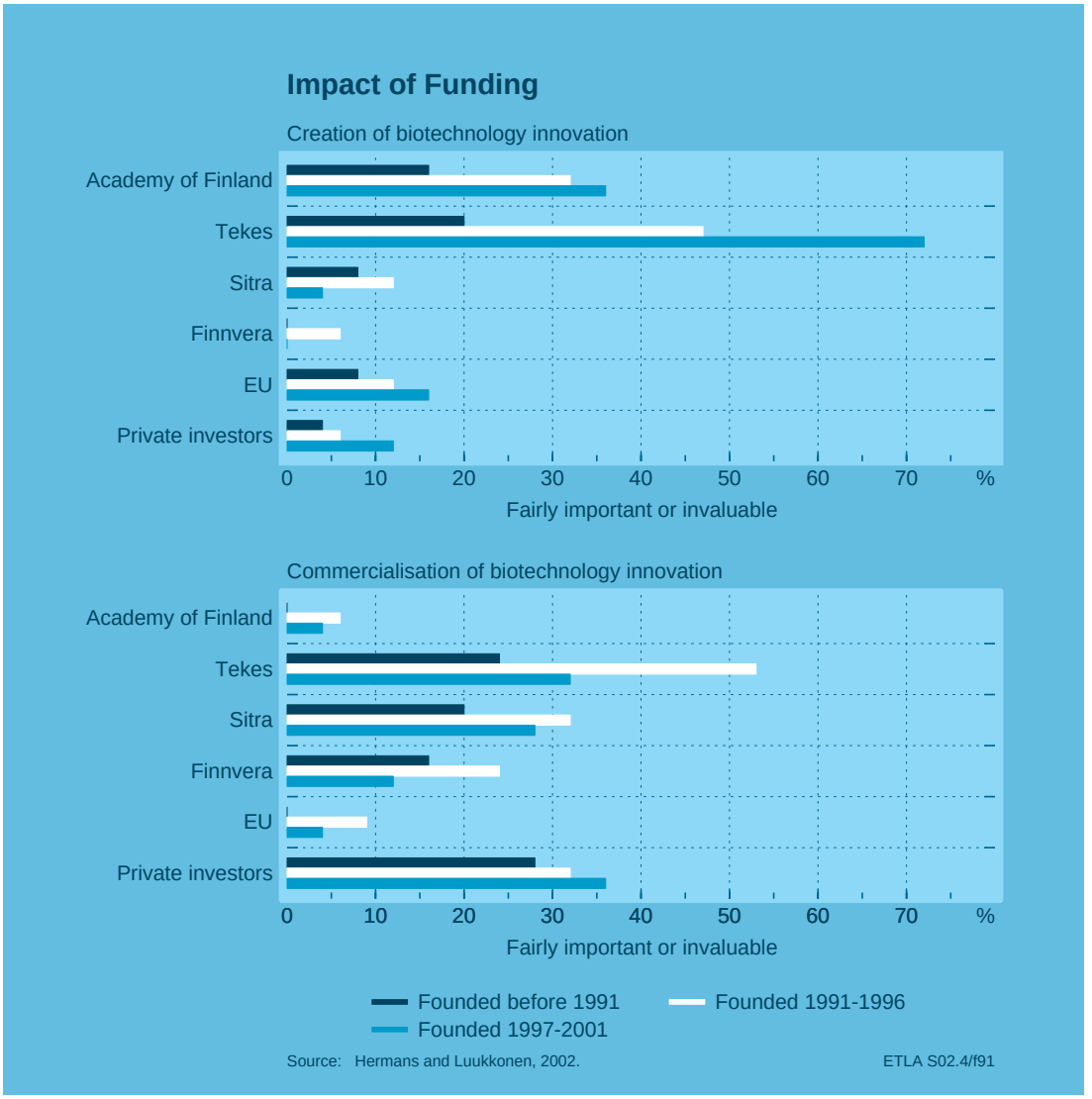
The impacts of the various sources of funding contrast the importance of the different funding sources in the two stages of the life-cycle of a biotechnology company. The first stage involves the creation of biotechnology innovations and the second stage the commercialisation of the innovation. Public research funding agencies, the Academy of Finland, which is a system of Research Councils, and particularly Tekes play an important role during the stage of innovation creation while the public fund, Sitra[11], and private investors are important during the stage of commercialisation.

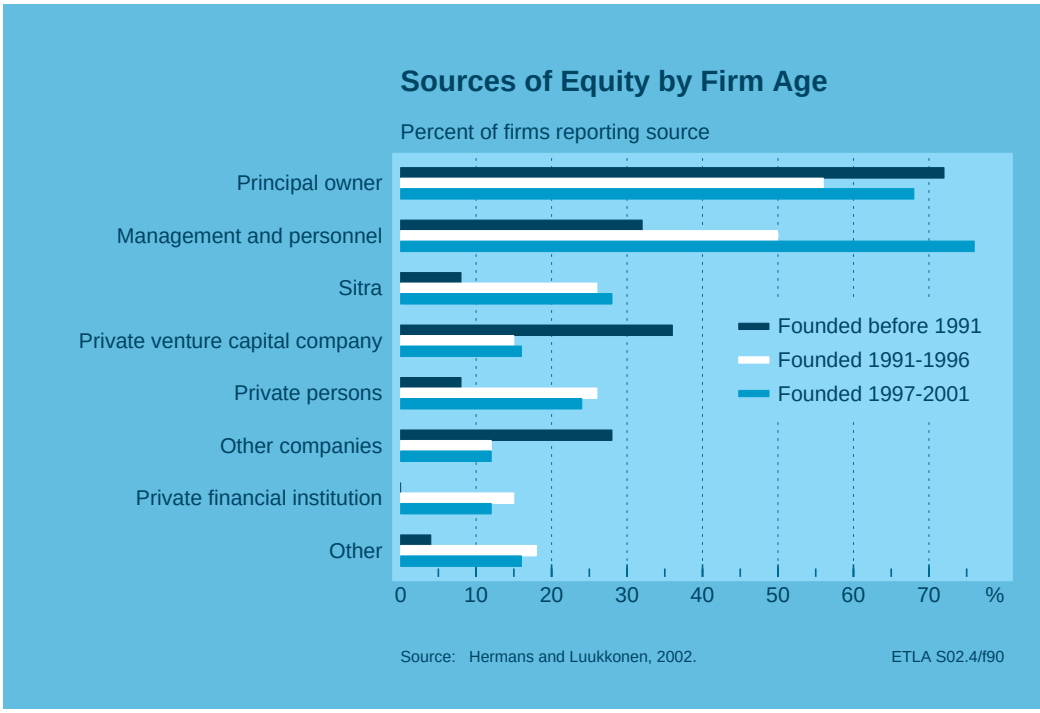
Concluding remarks

The majority of Finnish biotechnology firms are quite young and still in the early stages of profitable economic activities. Their turnover, profits and exports are, for the younger firms in particular, still low, with some firms even incur-

ring negative profits, but their growth expectations are high.

So far, various sources of public funding have been an important driver for biotechnology R&D and a provider of preseed money for companies. With the number of firms growing, there is an increasing need for private risk capital funding, although it has been relatively modest thus far. The structure of the industry is expected to undergo change over the next few years, through acquisitions and mergers, and bankruptcies. The overall number of companies may decrease, but the ones remaining will be larger and have better chances for survival and growth. The extent to which these will benefit the Finnish economy depends on the proportion of firms that will be able to grow through manufacturing and marketing their products in their own facilities, or through subcontracting, and not just out-licensing or selling their property rights abroad.





Footnotes

[1] This article draws on Hermans and Luukkonen (2002).

[2] The third OECD ad hoc meeting on biotechnology statistics, held in Espoo, Finland 13-15 May 2002 defined biotechnology as follows: "The application of science and 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."

[3] By mid 2002, several new firms had been established and this may become a new record year in this respect.

[4] Halme (1994).

[5] The oldest firms are incumbent firms in, for example, pharmaceuticals, diagnostics, and food manufacturing, that have diversified their production methods to include new biotechnology.

[6] The location data are based on the register of the 119 companies active in biotechnology. We have data on the location of 117 companies.

[7] See e.g. Zucker et al. (1998) about the concentration of biotechnology firms in the US.

[8] The ETLA and Etlatieto Ltd survey was carried out through telephone interviews. The number of surveyed firms was 116 and they were obtained from the Finnish Bioindustries Association. After taking into account mergers, acquisitions and other factors, the total firm population was reduced to 97. Eighty-four replied giving a response rate of 87 per cent.

[9] The sum of firms is over 84, since the figure takes into account the fact that some companies have applications relevant for many sectors.

[10] Finnish industry exported over 50 per cent of their overall merchandise exports to EU countries in 2001 (see e.g. de Carvalho, 2002).

[11] 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 an important role in the development of businesses based on knowledge and know-how. Public equity investment for the start-up and early stages of companies is concentrated in Sitra.

Literature

de Carvalho, Anthony (ed.) (2002): The Finnish Economy and Society. No. 2, ETLA and EVA, Helsinki.

Halme, Kimmo (1994) Uudet yritykset biotekniikkasektorilla 1994, VTT Teknologian tutkimuksen ryhmä, Työpapereita no 11/94, Espoo.

Hermans, Raine and Luukkonen, Terttu, Findings of the ETLA Survey on Finnish Biotechnology Firms, The Research Institute of the Finnish Economy, Discussion Papers, No. 819, Helsinki 2002.

Zucker, G. Lynne, Darby, Michael R., and Armstrong, Jeff (1998): Geographically localized Knowledge: Spillovers or Markets? *Economic Inquiry, vol. XXXVI, pp. 65-86.*