

COMMERCIALIZATION OF PUBLIC RESEARCH

- A PIPELINE FOR VENTURE CAPITAL?

Vækstfonden

Vækstfonden is a government-backed investment fund.

Operating independently in the capital market, we facilitate the supply of venture capital in terms of start-up equity and high-risk loans. Our financing is provided on commercial terms.

Furthermore, we invest in private venture funds specialising in specific industry sectors. Our investment strategy extends across a wide range of industries. We invest in companies whose business ventures are innovative with high growth potential. Our vision is to create the best market for innovation finance in Europe.

Our capital base is currently DKK 2,200 million (€ 300 million).

1. INTRODUCTION

The transition to a knowledge based economy combined with increasing globalization means that Denmark needs to improve both the dissemination and exploitation of private and public research. Denmark should not try to compete against other countries on cheap labour and the exploitation of natural resources – Denmark has to aim at developing high-tech industries with great market potential. In this context the creation of new innovative companies is of great importance.

Historically, it has been difficult to get an overview of how public research in Denmark has contributed to the creation of new companies (spin-outs). The last couple of years the effort to disseminate public research has become more commercially orientated as new legislation, "*Forskerpantenloven*", since 2000 has committed the public research institutions to exploit their results commercially, if possible.

Broadly speaking, there are two types of spin-outs: Those where the research institution maintains some degree of ownership in the company and those where the spin-outs are established without any economic ties to the institution. Only for the first type of spin-outs the institution is able to generate earnings which can be used to finance future research. But how many spin-outs are actually created annually in Denmark? How large is the group of spin-outs where the research institution holds a stake? And how many of the spin-outs are able to raise venture capital?

Denmark is among the leading countries in the world, when it comes to starting new companies, but an insufficient number of these companies are able to sustain a period of solid growth. A possible explanation for this phenomenon may be that the companies do not have access to adequate skills and capital in the early years. It is thus important that the entire innovation system that underpins the commercialization process is well functioning.

As a significant player in the Danish market for venture capital it is relevant for *Vækstfonden* to analyze from where the companies originate before they reach the market for venture capital. Other active players in the Danish venture market have similar interests in knowing the dynamics of the innovation system that should serve as a supply channel for the market. Furthermore, it is important for the

players in the supply channel – e.g. the technology transfer units at the universities and public incubators – to get a deeper knowledge of how they can contribute to bringing new companies forward to the venture capital market.

In that respect, the development of new commercial successes can be divided into two phases: Before and after the entry of venture capital. Many articles and reports have already focused on the period *after* companies have raised venture capital. There has been much less attention on the course that lies *before* the infusion of venture capital. However, this report tries to make up for that fact, as the aim is to highlight the commercialization process of new companies - based on public research - before the attainment of venture capital.

2. BACKGROUND AND METHOD OF ANALYSIS

New innovative companies are a precondition for maintaining and growing wealth in our society. In the development of commercial successes the process can be divided into two parts: Before and after the entry of venture capital. In this report the commercialization of new companies *before* the attainment of venture capital is analyzed.

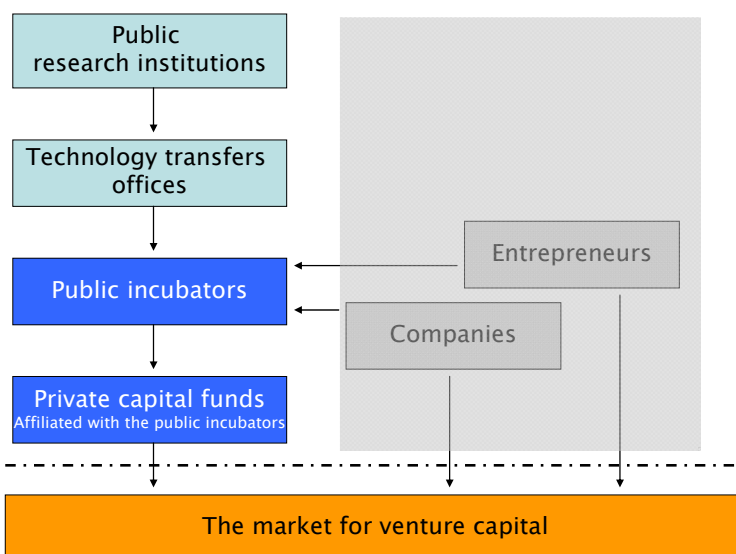
Background and method of analysis

This report highlights two areas which have great importance for Denmark's ability to create new high-tech companies: The supply channel for the venture capital market and the commercialization of public research. Among the questions posed by this report are:

- How many companies (spin-outs) arise from publicly financed research?
- How many of the spin-outs are able to raise venture capital?
- Which road do they take through the pipeline?
- From where do the venture capital funds remaining deal-flow originate?

The deal-flow for venture capital funds can originate from three very different sources; public research institutions, established companies and entrepreneurs, see figure 1.

Figure 1: The supply channel for the market for venture capital



Source: Vaekstfonden and Christensen (2005)

Public research has historically focused on creating new knowledge and technologies, which can increase economic growth, strengthen welfare and create innovation in the society as a whole. With "Forskerpatentloven", which was introduced in 2000, the aim was expanded to include also the commercial exploitation of public research, in collaboration with the business community. To implement the law DKK 58 million (€ 7.8 million) was granted – the money was to be used to establish cross-institutional cooperation while also strengthening the competencies in the so-called "patent offices" associated with the universities. In practise, this means that all public research institutions have established or have become affiliated with a technology transfer office (TTO). It is thus the TTO which acts as the link between the research institution and the outside world.

The purpose of the private research is more narrow – to increase the product portfolio of the company. However, in some cases, a company develops technologies, which it cannot use directly. Potentially, these technologies can provide the foundation for a new company as part of a spin-out. Finally, individuals can start up companies independently from public research institutions and private companies – these are described as entrepreneurs.

When a high-tech company is established it most often requires an infusion of external capital. However, venture capital firms are usually not geared to invest in projects in the pre-seed phase, before the project becomes a real company. To close this funding gap and to increase the collaboration between public research institutions, new innovative companies, established companies and sources of funding, "innovationsmiljøordningen" was implemented in 1998. Initially, 6 public incubators (innovationsmiljøer) were granted a pool of DKK 100 million (€ 13.5 million) annually. In 2005, there are 7 public incubators throughout the country who share DKK 120 million (€ 16.2 million). The funds are to be invested in promising projects and to cover administrative expenses. The incubators help the technology-orientated start-ups gain access to the necessary resources – including capital – early in their development. The public incubators – along with the capital funds associated with several of them - thus act as the link between high-tech research projects and the market for venture capital. Moreover, although the private capital funds are a part of the market for venture capital, in this context they are generally viewed as "captives" and not independent investors since their management teams are identical to those operating the public incubators.

Public spin-outs – a definition

As part of the supply channel for the market for venture capital it is particularly the spin-outs from public research institutions which are of interest. The definition of public spin-outs in this report is *“new innovative companies, which are started up based on technologies or ideas created by research undertaken by one of the public research institutions.”*

These spin-outs include new companies based on licenses (bought directly from the institution), the acquisition of patents, or researchers who resign from their position to continue developing technologies and products. This definition covers both companies which are established through the TTOs and those that are not.

What is a success in this context?

In this report, a public spin-out is defined as successful if it is able to raise venture capital. This signals that the company has managed to overcome the initial challenges which consist of transforming the technology into an idea with commercial potential. Raising venture capital, however, is not a guarantee that the company becomes profitable, as there are many factors which can hinder promising companies in becoming commercial successes – but venture capitalist are specialized in selecting the most promising companies.

3. RESULTS

Public research institutions annually create more than 20 spin-outs. Of these companies about 1/3 make it all the way to the market for venture capital. However, there are indications that the potential is higher as there seems to be room for improvement in terms of streamlining the commercialization process. The most important results are listed below.

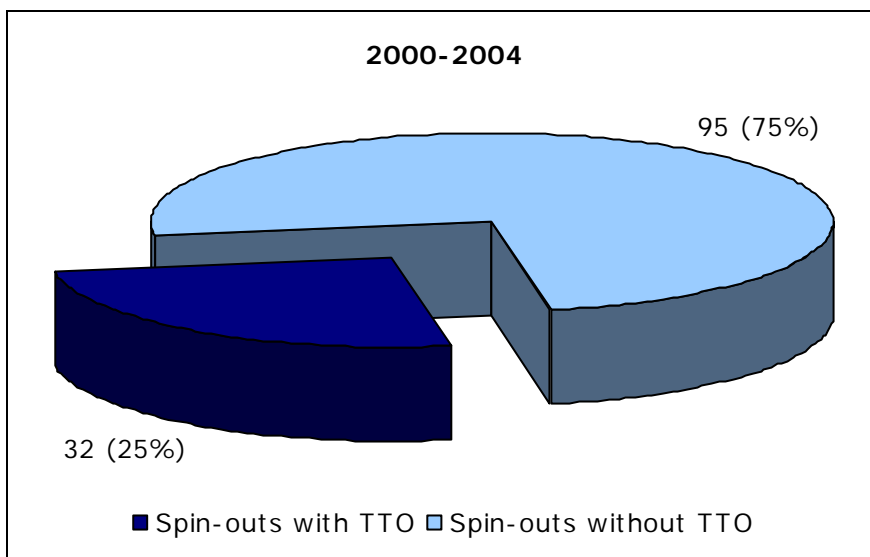
148 spin-outs in seven years

In the period 1998-2004, public research in Denmark created 148 new companies. 119 came from the universities, while the research done by hospitals and so-called sector-research each lay ground to 16 spin-outs. 3 spin-outs were initiated through collaboration between different research institutions. 51 of the spin-outs managed to raise venture capital during the same period.

Technology transfer offices has neutral effect

After the introduction of "Forskerpatentloven" in 2000 $\frac{3}{4}$ of the public spin-outs have been established without the new TTOs seemingly taking any financial stake in the companies, see figure 2.

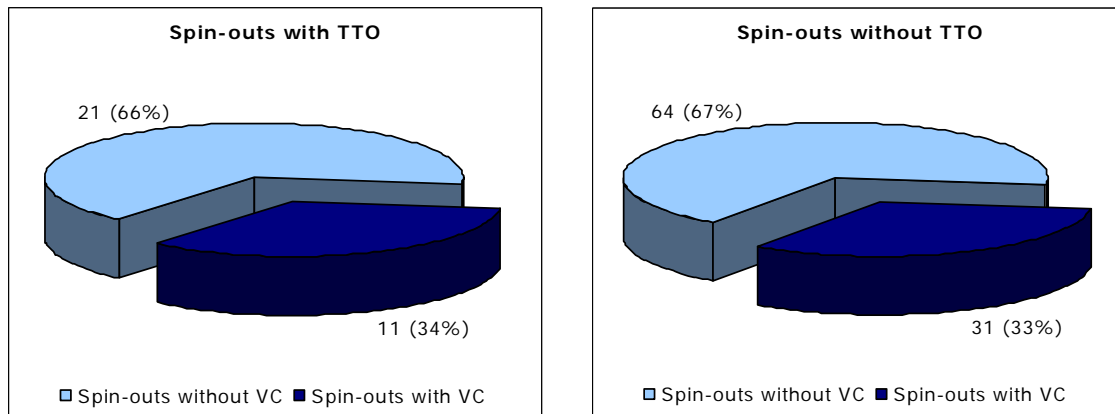
Figure 2: Public spin-outs' road to commercialization



Source: Vaekstfonden and Christensen (2005)

Furthermore, the likelihood of receiving venture capital does not increase when the spin-out is backed by the TTO – the share of public spin-outs raising venture capital is 1/3, regardless of whether a TTO is involved or not, see figure 3.

Figure 3: The involvement of TTOs in spin-outs receiving venture capital



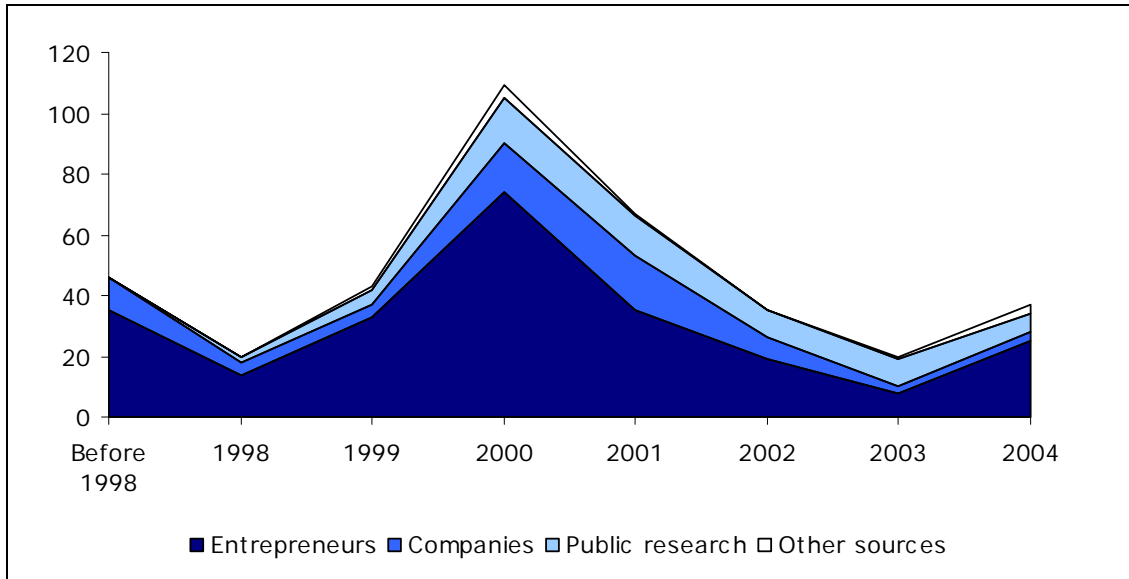
Source: Vaekstfonden and Christensen (2005)

Approximately 50% of the public spin-outs receive financing from public incubators (innovationsmiljøer) – but less than 1/3 of these spin-outs make it all the way to the market for venture capital in the period 1998-2004. A large share of the portfolio companies in the public incubators, which have not yet received venture capital, was still active in 2004 – and thus the success-rate can be increased in the future. The results, however, show that 45% of all public spin-outs, which receive venture capital, chose not to use the official innovation system - including the public incubators.

Public research has become a source of deal-flow for VCs

In 1998, public research was an insignificant source of new innovative companies suited for venture capital. However, as time has passed, this situation has changed remarkably. In 2003, public spin-outs accounted for 45% of all new investments done by Danish venture capital funds, see figure 4 (next page).

Figure 4: Number of new portfolio companies with venture capital – grouped by origin

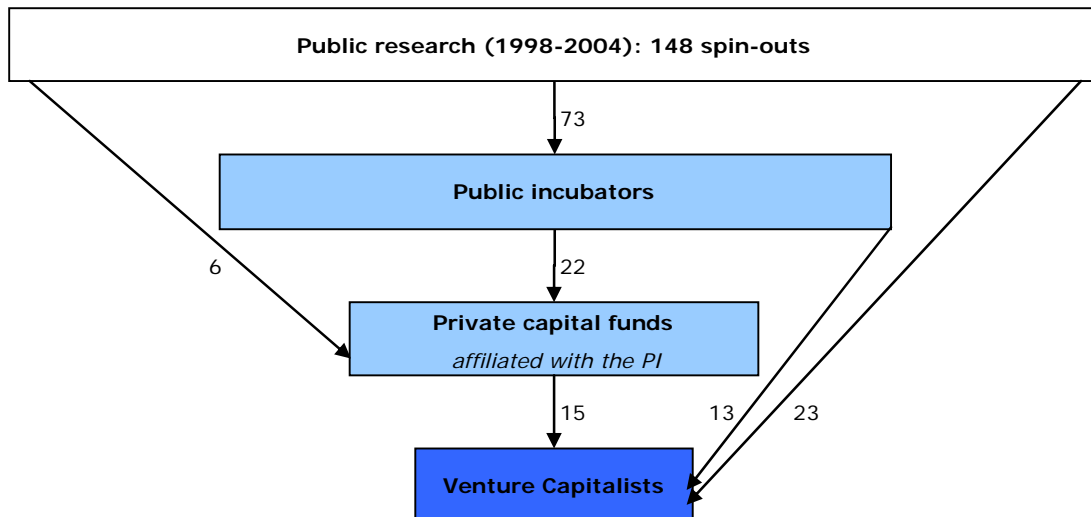


Source: Vaekstfonden and Christensen (2005)

Note: The category "Other sources" consists of companies based on technologies from foreign research institutions, public initiatives and environmental projects.

The results also highlight the fact that the commercialization of public research does not always follow the formal innovation system which includes the public incubators and their "captive" funds, see figure 5.

Figure 5: Public spin-outs in the innovation system

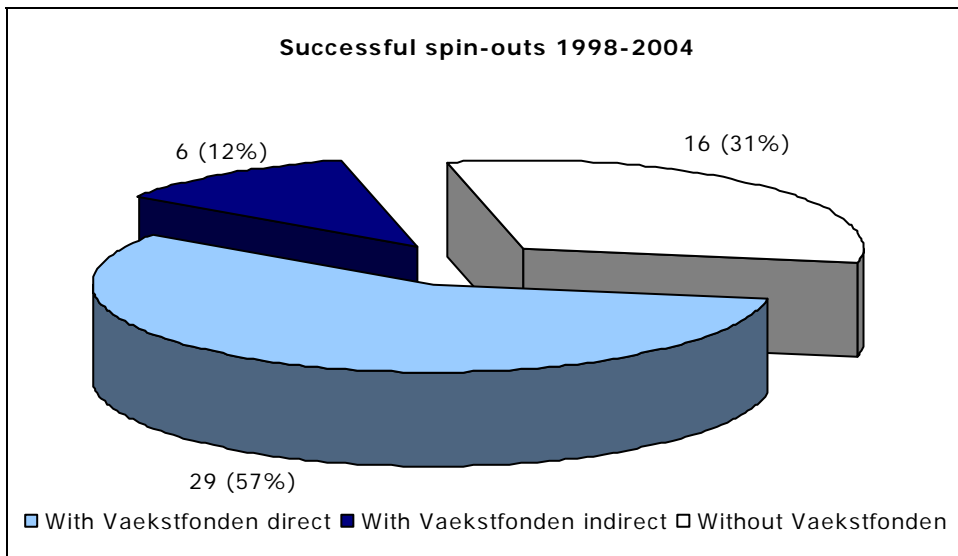


Source: Vaekstfonden and Christensen (2005)

Vækstfonden plays an important role

In the period 1998-2004, Vækstfonden financed 29 companies, which are based on public research, see figure 6.

Figure 6: Vækstfondens direct and indirect role in spin-outs receiving VC



Source: Vækstfonden

In the period 2000-2004 Vækstfonden financed 8 of the 21 public spin-outs, which went directly to the market for venture capital - bypassing the formal innovation system. The results thus imply that Vækstfonden assists a substantial share of the new spin-outs arising from public research.

4. RECOMMENDATIONS

The results of this report suggest a number of concrete recommendations to improve the commercialization of public research in the supply channel for the venture capital market.

4 recommendations to the commercialization of public research

1. *Enhanced skills in TTOs* – With more technological and commercial competencies, the offices will be better equipped to undertake the three areas of responsibility in their mandate: Selection, protection and commercial exploitation of the public research.
2. *Greater economic incentives for the researcher* – Should increase the incentive to report and commercially exploit relevant discoveries.
3. *Closer collaboration between research institutions and public incubators* – The public incubators (innovationsmiljøerne) have a stronger collaboration with the business society and longer experience with commercialization than the TTOs. Moreover, the success rate in terms of public spin-outs is higher among portfolio companies in the public incubators.
4. *Increased proof-of-concept financing* – The need for financing and project management is so extensive for a number of proof-of-concept projects emerging from public research that it is covered by neither the public incubators nor venture capital funds. A possibility could be to establish a dedicated proof-of-concept effort – e.g. a fund, as the one managed by Scottish Enterprise.

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