

NEW INSTRUMENTS FOR FINANCING TECHNOLOGY TRANSFER

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Summary: We live in an era of knowledge-based economy and globalization. In order to remain competitive at the international level, the European Union needs to boost education, research and innovation. Competitiveness is impossible without innovation and for that technology transfer is necessary. The existing methods for financing technology transfer should be further improved and new methods developed.

Introduction: Europe has a strong science and technology base but does not perform well in commercializing research results. To be developed, technology requires large amount of capital, while the uncertainty remains. Financial constraints are the major obstacle to innovation, especially for SMEs. Public funding of research is increasingly linked to technology transfer objectives. At the same time there is an increasing pressure on R&D public budgets because of fiscal deficits, so there is a clear funding gap because of the divide between academic world and business. Therefore there is a need to develop more financial instruments that are suitable for providing early stage finance for R&D-based spin-outs.

The process to commercially exploit research varies widely. It can involve licensing agreements or setting up joint ventures and partnerships to share both the risks and rewards. Other options, like spin-outs, are used where the host organization does not have the necessary will, resources or skills to develop a new technology. Often these approaches are associated with raising of venture capital as a means of funding the development process, a practice more common in the US than in the EU.

Challenges: The main problem in Europe lies in market shortcomings with regard to the provision of early stage funding. There are several ways to cope with the early stage funding gap: the provision of government grants, incentives for venture capital funds to invest at this stage, raising finance from larger companies, and reducing the cost of early stage development.

Investment in venture capital is characterized by a higher risk than more traditional investment in securities listed on stock exchanges, but also by a potentially higher return on investment. Venture capital investment is directed at young, fast-growing companies, notably at their early stages. By channeling funding to companies introducing new technologies or products, venture capital plays a vital economic role in supporting innovation and technology transfer. Investment in venture capital by institutional investors, such as pension funds, banks and funds of funds, is usually indirect and made through investment funds, in the same way as investment in other alternative assets, including hedge funds. There are some successful examples of funds, like UMIP Premier Fund and IP venture fund in the UK, Leuven CD3 in Belgium or Chalmers Innovation in Sweden.

Venture capital financing has an important role in technology transfer although this generally applies at a later stage in the process. One problem is that compared with the US, the average size of venture capital investments in the EU is much smaller (€3.8 million compared with €8.7 million). One possible explanation for this is the greater risk averseness of investors in Europe. From the perspective of the spin-out it means that the level of investment may not be sufficient to totally cover the development and commercialization of an R&D project. This, in turn, can jeopardize the prospects of success.

Another complication is that venture capital funds can often obtain a higher return on their investment by selling their interest by means of a trade sale at a relatively early stage, i.e. once an acceptable internal rate of return is achieved but not necessarily before the company has achieved independent maturity. This might typically happen at a stage in a company's development before it

has fully made the transition from being still essentially a start-up to being a medium-sized firm. Whilst this may maximize the financial return to the investor, it can harm the long-term growth prospects of the firm in the area in which it was developed. A trade sale might result in the firm being moved to another country or region.

Possible solutions: One of the main priorities should be to attract business angels, like in the USA, where these are key source of technology transfer financing. Linkages between business angel networks and venture capital funds should be strengthened. Presently, these instruments tend to operate separately despite being complementary in terms of meeting a company's financing requirements. In addition, venture capitals often provide the exit mechanism needed by early stage investors. At the same time, differences between business angels and providers of venture capital need to be recognized. Venture capitals typically handle larger investments.

At the same time, more 'traditional' alternatives should not be overlooked as a way of covering the costs of the 'proof of concept' stage in an R&D project's development. In particular, debt and/or grant financing of R&D 'proof of concept' projects is an obviously alternative to private sector investment but there is a need for more flexible schemes, e.g. lending on a contingency basis so that the loan is only repaid if the project leads to successful commercial development. Also, more innovative ways of funding Technology Transfer Offices themselves should be developed. The example of the Technology Transfer Office of Imperial College (London University) being listed on the UK's Alternative Investment Market is an interesting example of how these can be made attractive to investors.

The EU actively promotes the development and funding of research by its framework programmes for research and technological development. Following the end of the Sixth Framework Programme (FP6) in 2006, the Seventh Framework Programme (FP7) runs from 2007 to 2013. Under FP7, the Commission and the European Investment Bank have also developed the Risk Sharing Finance Facility dedicated to the financing of innovation. It will be targeted at large research projects and research infrastructures eligible under FP7, supporting all types of organizations participating in multi-partner consortia.

The Structural Funds for Research, Technology, Development and Innovation cover six fields: infrastructure, development of science parks, incubators; supporting activities in research centres and firms; technology transfer to SMEs; promotion of environmentally-friendly products and processes in SMEs; training of researchers, post-graduate studies, networking etc.; and supporting the creation of regional and trans-regional clusters.

At EU level, there is also a continued emphasis on developing new financial instruments to promote technology transfer. Recently, the European Investment Fund assessed the feasibility and defined the operational modalities of a new type of targeted risk capital and technology transfer investment vehicle linking centres of excellence from different European countries. The aim is to bridge the financing gap between research and early stage financing through a financial scheme called the *Technology Transfer Accelerator*. This programme seeks to assess the feasibility of a new type of investment vehicle focused on financing the commercialization of the results of research. It presents an opportunity to find, develop and optimize European ideas from research and academic institutions. The Technology Transfer Accelerator facility will use the following instruments: equity, subordinated convertible debt, (participating) loans, and guarantees.

At the international level there are agreements between countries, which involve different programmes, funds or foreign direct investments. Innovative options for financing technology transfer were developed by United Nations Framework Convention on Climate Change and will be used as a tool to enable countries to transform project ideas resulting from technology needs assessments and other sources into project proposals for financing. Resource economics including public and private financing instruments are competence of the Expert Group on Technology Transfer. A significant progress has been achieved in establishing innovative financing partnerships such as the Global Energy Efficiency and Renewable Energy Fund and the European Union Energy Initiative. Among other options, this organization supports increasing of the potential of public

funds to leverage private sector capital and increasing options for sharing and mitigating risks and for bundling small-scale projects to bridge the distance between large-scale infrastructure investors and small-scale project and business developers.

Conclusions: Global policy discussions increasingly focus on innovation and the knowledge economy as a driver of long-term growth. In parallel, new forms of innovation processes are emerging, notably open innovation and innovation networks, stressing the importance of links and connections between the various stakeholders. Older business and innovation models do not hold anymore, and likewise new financing models have to emerge. Investment in supporting innovation calls for new financing models, particularly in knowledge commercialization and diffusion. Direct support to technology transfer, pre-seed and seed capital, business angels, and incubators are important instruments, notably through a more active commercialization of intellectual property. Scaling up technology transfer as a policy measure to support the commercialization of research is a separate area within the financing arena, with its own characteristics requiring a targeted approach and dedicated financial products and approaches. Financial engineering in this market segment must be flexible and blend financial products as needed (certainly equity but also guarantees, lending etc.) to share the risk between universities, inventors, entrepreneurs and investors appropriately and to maximize the potential value of intellectual property so as to make this a powerful attractor for further capital.

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