FIRST IRIMA WORKSHOP
INDUSTRIAL RESEARCH AND INNOVATION MONITORING AND ANALYSIS

Identifying policy-makers and business community needs

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DRAFT
Issues Paper

Based on company data collected from public accounts or obtained via dedicated surveys, the Commission has been analysing patterns and trends in corporate R&D and innovation activities for the last eight years. The EU Industrial R&D Investment Scoreboard[1]*, published annually since 2004, monitors top EU based R&D investing companies benchmarking them with top investors located in other parts of the world, trying to understand their contribution to the competitiveness of the EU economy. The Scoreboard is complemented by an annual Survey*[2] *on these top EU R&D investors, providing a forward-looking perspective and direct insights from companies on important issues such as location strategies and perception on the effectiveness of policy interventions aiming at supporting firm's R&D and innovation activities. Results of further research (undertaken on Scoreboard data and on other sources available, such as Community Innovation Survey and commercial databases) are published in a series of working papers and policy briefs*[3]*.*

The objective of these activities is to support evidence-based policy development at European level and to accelerate innovation in the EU. The purpose of this paper is to set the scene for the panel discussions between policy makers and industry representatives during the first IRIMA Workshop that will take place in Brussels on 4th December 2012.

In relation to the two main headings presented in this first workshop's agenda, participants will be requested to provide feed-back on the pertinence and policy relevance of the research questions identified for the next stage of the IRIMA project and to signal any missing areas where further empirical evidence would be needed.

[1] http://iri.jrc.ec.europa.eu/reports.htm
[2] Ibidem.
[3] http://iri.jrc.ec.europa.eu/papers.htm

TOPIC 1
FIRM'S INNOVATIVE PERFORMANCE AND GROWTH

Evidence based on firm-level data shows that the continued deficit in business R&D observed in the European economy is rooted in the structure and dynamics of its industry and enterprises. In comparison with the US economy, Europe has fewer, smaller and less R&D intensive world leading innovators in "younger" high-tech sectors such as biotech and ICT. And evidence shows that the contribution of such companies is important not just in terms of levels of R&D invested but more importantly in levels of sales, productivity growth and employment created. In this context, the need to support the growth of young innovative companies, by improving their access to finance for example, has been identified among the top priorities to allow Europe to get out of the crisis and to ensure sustainable economic growth in the long run.

The design and implementation of specific policies to support the emergence and growth of innovative companies in Europe raises questions such as: What do we know about this population of (potential) fast-growing innovative firms in Europe? Why their number, size and growth capacity appear to be lower than those of their counterparts in the US? Is there sufficient rationale for targeting support to these companies and, if the latter is confirmed, what exactly should be targeted and how? The following sections present some of the evidence already available and the main areas where further research is needed.

What do we know already? Some facts

Innovation and growth

Academic and empirical evidence show that investments in R&D and innovation can positively affect firm's growth and employment. At the same time, evidence shows that the sign and intensity of these effects can vary significantly for different types of companies (young versus mature, small versus large) and for different sectors of activity.

In terms of factors influencing the growth rates of companies, the age of the companies seem to be a stronger explanatory and predictor factor than size. Evidence from the Scoreboard sample of companies (those that most invest in R&D worldwide) shows for example that a significant number of large companies have experienced "fast-growth" (as defined by the OECD) during the period analysed (2002-2009). Interestingly these fast-growing companies among largest R&D performers are concentrated in three sectors of high R&D intensity (pharma & biotech, software & computer services and technology hardware & equipment).

The definition of innovation in this context should be broad, in order to capture the importance of non-technological changes - such as, organizational, marketing and business models innovations – and non-R&D innovative inputs. Recent research undertaken in the context of the IRIMA project confirms the importance that expenditures in training, design and marketing can have on firms' capacity to successfully launch and sell new products and services.

Evidence shows that periods of "fast-growth" by firms are limited over time. Favouring conditions for "fast-growth" of innovative companies need to be accompanied by measures allowing for sustainability of minimum rates of growth and profitability over time. Moreover many sectors have an optimal company size model and the ultimate policy objective should be to ensure the presence of a sufficient number of highly innovative, dynamic and competitive companies (of any size) in key strategic sectors.

The role of public intervention to support the growth of innovative companies

Support measures targeting the fast growth of innovative companies should address both the supply and the demand side. On the supply side, two key policy issues in Europe are easing the access to finance for young innovative companies, and supporting early-stage venture capital. While many Member States have developed tax incentives to support R&D activities in all types of companies, some of them have also catered for a specific, more favourable, fiscal treatment for young innovative companies. Cluster policies can also be a critical tool, notably to support the internationalisation of young innovative firms. On the demand side, there is a need to pay attention to those regulatory aspects most relevant to innovative companies, such as the protection of intellectual property and the well functioning of standards creation mechanisms for new products. Also on the demand side, attention is being put on the role that the public sector could play as lead user of new technologies and products in order to compensate the lack of demand at the early stages of market development.

Beyond the remits of the research and innovation agenda, there is consensus on the importance of removing existing regulatory barriers that hamper the entry, growth and exit of firms. For instance, bankruptcy regimes that severely penalize "failed entrepreneurs" have been found to discourage high-growth entrepreneurship. Equally important is the removal of unnecessary barriers to rapid organisational growth (such as regulatory compliance requirements that jump when companies pass a certain size threshold or uneven tax fiscal treatments for different sizes of companies).

Finally, it is essential to foster the development of an entrepreneurial culture, notably through the education system. To stimulate growth ambitions in new and existing businesses and to support the provision of training/ coaching in young and small enterprises, notably in relation to management skills, should also be considered.

The case for public support instruments targeting specific innovative firms

The academic and empirical evidence available confirm the great heterogeneity of enterprises having the potential of becoming "fast-growing innovative firms". However, there is at the same time evidence that supports the case for differentiated innovation measures and targeted financial support to a particular sub-set of firms within the broad population of innovative companies with fast-growing potential: the young R&D driven/high-tech firms.

First, empirical evidence shows that for reaching the 3% R&D intensity target of the Europe 2020 agenda, Europe needs more and bigger firms in high-R&D intensive sectors, particularly in ICT, medical equipment and biotech. Second, recent research shows that the impact of R&D on firms productivity is non-linear and increases with the size of the R&D stock created. The empirical evidence shows notable positive impacts on productivity for high-tech sectors in contrast with no significant effects for low-tech. Results from the 2012 SMEs performance review, one of the activities within the European Small Business Act, showed

that firms in the so-called "high-tech manufacturing" and "knowledge-intensive services" performed particularly strongly in terms of productivity and employment.

Given the particularly severe financial constraints of young and small R&D driven innovators, countercyclical direct financial support from the public sector play a crucial role for them. In particular, it could allow them to avoid the outsourcing of research activities. Furthermore, it could provide them with margin for using part of their innovation budgets to finance marketing expenditures, which are crucial for successful market entry and successful innovative products and services. These public support instruments to R&D investments should also promote the collaboration of these young and small innovators with other companies and with universities and research centres.

What next? Pending questions requiring additional research

1. More empirical evidence about the phenomenon of "high-growth" is needed to answer questions such as:

- *To what extent is "high-growth" caused by companies' innovation activities?*
- *Is such high-growth persistent over time?*
- *What differences exist between different types of companies (e.g. age, size, sector, research intensity, degree of internationalisation)?*
- *How framework conditions and location affect these differences for similar companies (e.g. EU vs US, differences between Member States, etc.)?*

2. Evidence shows that the public support to the research and innovation activities of enterprises needs to be differentiated in function of the type of enterprises (in terms of development stages, sectors, etc) so as to best answer their specific needs. However additional analysis is needed to support the identification and design of policy instruments that could support the performance of particular types of companies. Additional questions that emerge are:

- *How to identify ex-ante what innovative companies have more potential for "high growth"?*

- *Would the targeting of particular sectors, activities and/or technologies be appropriate (e.g. high R&D intensive sectors and/or enterprises developing key enabling and industrial technologies –ICT, nanotech, biotech, new materials…)?*

3. R&D investments can't be used by companies as an exclusive innovative input. Especially in the case of SMEs, in order to translate into innovation and high-growth, R&D needs to be complemented by other intangible drivers, such as training, brand and reputation, and organizational capital. The role of these intangibles in accounting for growth – of productivity in particular - has been recently re-addressed in a number of European Research Programs and proved to be at least as important as that of tangible investments.

- How could policy makers stimulate firms to invest in these intangibles, in such a way that they contribute to their growth and competitiveness?

- Are interventions on the firms' framework conditions (e.g. accounting rules) more needed/effective than direct support to intangible investments?

4. Given the EU's lacking specialisation in high-tech sectors and the shortage of emerging world leading companies coming from the EU, the IRIMA project aims at paying more attention to the determinants of entrepreneurship and company creation and growth in high R&D intensive sectors. The trend towards open innovation calls for renewed attention to corporate venturing initiatives, as these ventures seem to offer good potential for initiating high-growth innovative firms. In addition company creation in knowledge intensive sectors from universities and public research centres will also be analysed. In this context the lack of managerial experience is mentioned as an important bottleneck and hence the need for mentoring support to young and small innovative companies is highlighted.

- What initiatives could be taken to promote and support the emergence and growth of new ventures in high-tech and knowledge intensive sectors?

- Which actions should the policy makers devise in order to favour innovation cooperation between science and technology? Which ones with respect to innovation cooperation along the value chain (i.e. among business partners)?

5. More sophisticated policy making tools are needed in any case when the objective is to favour and accelerate the growth of particular types of innovative companies, such as the young R&D driven/high-tech firms mentioned above. Such policy tools would include for example the design of specific financing support instruments based on policy experimentation, regular fine-tuning based on continuous evaluation mechanisms and a close monitoring (involving a strong prospective angle) of innovative businesses that would require specific support. This could also include the elaboration of a "firms' identification index" to identify ex-ante innovative firms with high-growth potential, based on a composite indicator or a model incorporating multiple criteria that, apart from size and/or age, takes into account a wide range of factors related to the sector of activity, the nature and risk level of the innovative activities/factors -R&D or non R&D driven innovators- and the location (degree of techno-economic development of their region/country).

- Would the development of a "firms' identification index" to identify ex-ante innovative firms with high-growth potential be of interest? Would such an index be applicable in the context of new supporting instruments targeting high-growth innovative firms?

- Is the governance of innovation policy suitable to enable European firms to purse high-growth patterns? Are local, national and international policies coordinated enough to avoid redundancies and/or action gaps?

TOPIC 2
GLOBALISATION AND FIRM'S R&D INVESTMENTS LOCALISATION

In the light of today's global competition, company location is an important concern for policymakers due to its impact and potential for competitiveness and employment. Dynamics of company location are an indicator of internationalisation, which has been thoroughly studied during several decades[4]. Internationalisation was shown to be increasing and has lead to a more complex environment for companies and policymakers which offers challenges and opportunities, e.g. via the concept of open innovation.

What do we know already? Some facts

Over the last twenty years R&D internationalisation has gained momentum and has become an important driver of globalisation, with R&D expenditures of foreign affiliates growing faster than those of domestic companies.

Foreign-owned firms already account for 20% to 25% of total business R&D in France, Germany and Spain; between 30% and 50% in Hungary, Portugal, the Slovak Republic, Sweden and the United Kingdom; and more than 50% in Austria, Belgium, the Czech Republic, Malta, or Ireland. The internationalisation of business R&D has strengthened intra-EU integration and the circulation of knowledge between EU countries. Around half of all R&D expenditure of foreign-owned firms in the EU can be assigned to firms from other EU member states.

There is also evidence that the European Union is an attractive R&D location for firms from outside the EU-27. Non-EU firms, in particular US firms, have continuously increased R&D expenditure in the EU, especially since 2000. Despite the rising attractiveness of China and India as location for R&D, US firms increased their R&D expenditures in the EU from 12 bn USD in 2000 to 23 bn USD in 2008[5]. While between 1995 and 2000, the share of the EU in overseas R&D expenditures of US firms had declined from 70% to 60%, since 2000 it been stable at about 61-62%, which in the context of the emergence of new S&T powers is quite remarkable. Further, multinationals from India, China, Brazil or other emerging economies are just about to make first steps into the EU as a location for their R&D activities. Strengths of the EU as a location for R&D include developed markets with a sophisticated demand ('lead markets'), the quality and quantity of its pool of skilled labour, a stable economic framework, and excellence in academic and business R&D.

[4] For a recent overviews see Measuring Globalisation: OECD Economic Globalisation Indicators 2010, http://www.oecd.org/document/50/0,3746,en_2649_34173_45938226_1_1_1_1,00.html

[5] EC 2012, "Internationalisation of business investments in R&D and analysis of their economic impact": http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=other-studies

Moreover, EU firms are also very active in R&D abroad, in particular in the US, helping them to open up new markets and expand globally. The home countries may benefit from the global expansion and from reverse knowledge spillovers. Based on today's empirical evidence, it is unlikely that these overseas R&D activities are a substitution for similar domestic activities. Evidence shows that one important reason for European MNEs to move their R&D capacities abroad is to acquire resources only available at foreign locations and to augment their stock of knowledge ('asset augmenting' objective). Other reasons relate with an "asset exploiting" attitude where R&D internationalisation serves to transfer technology to the foreign subsidiaries and is adapted there to better access local markets. Evidence suggests that there is an increasing trend towards international activities of R&D driven by an "asset augmenting" logic as companies increasingly tap into knowledge and technological sources in centres of scientific excellence located worldwide in order to become more competitive at the global stage.

The underlying location strategies combine multiple dimensions, comprising e.g. technological strengths of the countries with respect to those of the company, institutional factors (e.g. public support to R&D, IPR systems, quality of technological infrastructures), or lowering costs of qualified research, especially in emerging countries. Furthermore, reasons to choose a particular location vary by the type of activity or unit. Locating an activity with stronger "Research" focus is usually based on other reasons than locating one with a stronger "Development" component (Table 1).

Table 1: Reasons to locate 'Research' and 'Development' in a particular location

Reasons to locate 'Research'	Reasons to locate 'Development'
Proximity to local universities and research parks	**Local market requirements**
Tapping informal networks	**Global customers request local support**
Proximity to centres-of-innovation	**Customer proximity and lead users**
Limited domestic science base	**Cooperation with local partners**
Access to local specialists/recruiting	**Market access**

Source: von Zedtwitz and Gassmann (2002)

From the company point of view, R&D location decisions are however complex and subject to a number of underlying factors. Evidence from the Survey carried-out by the European Commission on European top R&D investors (EU Survey), the most important location factors were: access to specialised knowledge and results, proximity to other company activities and high availability of researchers. The cost of employing researchers is generally of low importance; however this can become one of several factors that companies consider when choosing a location outside their home country, in particular in the rest of the world (countries other than the EU or the US). For companies choosing their home country as their preferred R&D investment location, other important factors signalled are macroeconomic and political stability, access to R&D cooperation opportunities and access to public support for R&D.

Emerging countries start to show up on the international patenting scene, and doing R&D in these countries may offer companies not only cost reduction, but also faster access to research talent and fast growing markets. Especially China and India become bigger players on the international R&D stage.

Based on results from the EU Survey, companies based in Europe locate around one quarter of their total R&D investments outside Europe. The largest share goes to the US and Canada (13%), followed by India (2.6%), China (2.2%), other European countries (1.9%), Japan (1%) and the rest of the world. Of all locations outside the company's home country, the US is considered as the most attractive, followed by China, Germany and India.

A recent study on the impact of the 2008 crisis on R&D location decisions[6] observed two general patterns: the companies increasing their R&D over the period 2005 – 2011 have done so predominantly within the EU (but also in China, India and the US), while those which decreased their R&D investment between 2005 and 2008 have done so exclusively in the EU (with R&D in the other three areas remaining stable or slightly increasing). Both patterns point to an increasing share of emerging countries and reinforce the evidence that R&D investment follows the globalisation of markets, which is supported by many findings in the literature.

In any case, while the absolute amount of R&D expected to be invested by Scoreboard companies with headquarters in the EU in third countries would be doubled between 2005 and 2012, the amount expected to be invested in the EU during this same period will increase by 25%. This reveals that R&D internationalisation, at least in terms of the companies surveyed, is not a zero-sum game but also a way to enrich the R&D activity in the home-country.

What next? Pending questions requiring additional research

1. From the evidence presented, the policy interest in the globalisation of R&D should not be driven by the fear that moving R&D operations outside the EU might undermine its efforts to become a knowledge-based society, but rather by understanding the opportunities arising from foreign R&D as complementary rather than as a substitute.

Globalised firms tend to do more R&D, innovate more, and get higher returns from doing so than purely domestic firms. From this perspective, one objective for the European economy should be not only to increase the number and the size of companies implementing R&D but to promote the internationalisation of these companies.

Additional questions that emerge in this context are:

[6] JRC-IPTS Working Papers 12/2011: Cincera, M, Cozza, C..Tübke, A and Voigt, P.: "Doing R&D or not, that is the question (in a crisis…)", http://iri.jrc.es/papers.htm

How does this positive view of the internationalisation of R&D activities by EU based large corporate investors stand in the context of the need to retain a strong industrial base in Europe to ensure growth and jobs over time? Should research and innovation policies also include as a policy objective to contribute to the re-industrialisation of Europe and to anchor in Europe manufacturing activities?

How can we best describe / understand the various strategies of multinational firms and their translation in decisions on locations, both for manufacturing and R&D activities, notably in high R&D intensive sectors?

How can we best describe / understand the role of business R&D investments in China, India and other emerging scientific and technological powers? What should be the consequences of these evolutions for European policy-making?

2. Projections show that, even in the most optimistic company growth scenarios, with the existing number and size of current top R&D performing innovators Europe will not hit the 3% R&D intensity target in 2020.

- How to make Europe a more attractive place to attract FDI on R&D and to locate R&D intensive activities? How to best articulate R&I and FDI policies?

- What is the role of the public research base in attracting R&I investments? How can policy-makers make the public research base an attractive factor for R&I investments?

- What is the role of demand-side factors in attracting R&I investments? How can policy-makers best use demand-side policy tools to attract R&I investments?

- What is the role of Human resources availability in attracting R&I investments? How can policy-makers ensure the availability of adequate Human resources to attract R&I investments?