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Innovation: Creating knowledge and jobs

Insights from European research in socio-economic sciences

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Foreword

Innovation is a key component of the Europe 2020 strategy aiming at achieving a smart, sustainable and inclusive growth. The "*Innovation Union*" is starting to switch from a conceptual idea to a genuine reality focusing on *creating knowledge*, *creating jobs*.

In the Seventh Research Framework Programme (FP7), the theme Socio-economic Sciences and Humanities (SSH) supports more than thirty research initiatives in the field of innovation and knowledge economy.

This publication draws upon presentations and discussion from the conference on "*Europe 2020 strategy: Innovation insights from European research in socio-economic sciences*" that was held in Brussels on 1 June 2010. This meeting explored the ways in which social sciences research funded under the EU Framework Programme can inform the content and management of European policy initiatives for innovation (cf. http://ec.europa.eu/research/social-sciences/events-107_en.html).

The European Union envisages the emergence of a "Single Market for Research and Innovation". Innovation is today far more than purely traditional industrial innovation. It covers both technological and social innovation. It deals with the manufacturing sector, but also with the services sector. Innovation is open and global.

The following issues were recently covered by the SSH programme and were discussed by high-level academics:

The contribution of intangibles. What is the relationship between growth and innovation and the contribution of intangible assets? A consistent and robust method of measuring these intangible investments (cf. R&D and intellectual property capitals, brand equity, firm training, organisational capital, software and databases) is under way.

The role of finance to push innovation. What are the impacts of various funding vehicles such as loans and venture capital on innovation? The different ways of financing innovation affect the distribution of income and the creation of employment generation across different types of firms and across different sectors.

The importance of entrepreneurship. What enables the creation and commercialisation of knowledge? Start-ups of new and small independent firms, spin-offs and spin-outs from universities and public laboratories are examples of successful entrepreneurship.

The dynamics of institutions and markets. How do the institutions around innovation work? The solution of collective problems is achieved through co-operation

among various constituencies that can mobilise different components of knowledge (cf. Intellectual Property Rights).

The regional economic growth. Is spatial distance influencing the interaction among the participants of innovation systems? The external benefits (or spill-over) of innovation are enhanced by geographical and social proximity.

The social innovation. How is the interaction between a specific technology and a local reality working? The users can be effective in helping design socially applicable technologies that depend as much on their acceptability as they do on their technological merits.

The social entrepreneurs as lead users for service innovation. Are social entrepreneurs developing new business models? The experience of social entrepreneurs is relevant to the delivery of a wide range of social services whilst simultaneously achieving commercial viability.

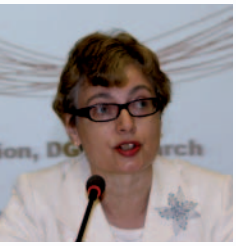
The service economy. Are public-private innovation networks going beyond the traditional R&D and innovation programmes? The service sector has proved to be an important contributor to organisational innovation and public-private networks provide a huge opportunity to improve innovation in services.

The internationalisation of firms and the globalisation of knowledge. What are the features of European firms that successfully compete in international markets and how does the organisation of the "knowledge sector" (universities and research institutes) influence the behaviour of firms and markets in a globalised world? The EU firms involved in international activities are few, large and more productive than other firms ("Happy few" phenomenon). The funding and the organisation of universities and research centres play a key role in their productivity.

The Global Innovation Networks (GIN). How and why are GIN formed and where does Europe stands in this new field? The financial crisis has induced two distinct strategies for the management of innovation by European firms: increase the outsourcing, especially in China to reduce personnel costs and – less common – concentrate innovation in Europe to reduce logistic and management costs.

R&D perspectives. Whether and how R&D should be modified in times of financial and economic crisis? A counter-cyclical research policy could be a way of restoring the economy and achieving the pre-crisis growth targets through efficiency improvements stemming from innovation. Managing the knowledge economy can be envisaged as managing four flows of assets: people, finance, services and knowledge.

Jean-Michel BAER
Director
Science, Economy and Society




CONVEST
Competitiveness, Innovation
and Intangible Investment in
Europe

Setting the scene: the Europe 2020 policy context

The EU research and innovation challenges for smart, sustainable, inclusive growth

Anneli Pauli in her opening presentation on behalf of Máire Geoghegan-Quinn, the Commissioner responsible for research, innovation and science, emphasised the timeliness of the event. Europe faces huge internal and external challenges. Within the Union – an ageing population will make high and novel demands on social services, but will contribute less to taxation; the aspirations of a more diverse and less instinctively cohesive society must be met in terms of education, welfare and employment – young people and minorities seek to feel assured of their future in a rapidly changing and testing environment. Beyond the EU – the constraints of resource availability and environmental carrying capacity tighten; the industrial presence of Europe in the world wanes; the dynamic new economies of China, India and Brazil compete ever more vigorously; the global financial crisis damages the European economies and harms especially the euro-zone.

It is clear that practices must change. Change implies innovation and innovation is a main theme of the Europe 2020 strategy designed to help Europe emerge stronger from the crisis and endorsed by the Council in its Spring Meeting of 2010. The priority of the strategy is to shape the character of growth and to ensure it is coherent with social aims. Growth should be: Smart – developing an economy based on knowledge and innovation; Sustainable – promoting a resource efficient, greener and competitive economy; Inclusive – fostering high employment and social and territorial cohesion.

Europe 2020 stands in continuity with the Lisbon Agenda, but has the advantage of more nuanced and differentiated targets covering R&D, education, environment and employment. It acknowledges the differences in economic development among Member States by articulating the EU goals with country-specific targets. The goal most directly relevant to innovation is the 3 % of European GDP that should be invested in Research and Development by 2020. We need to invest more and better in research to accelerate the transformation from a resources-based economy into a knowledge-based society; a society that can do more with less is more easily sustained.

The achievement of the head-line targets is assisted by seven flagship initiatives: an Innovation Union; Youth on the Move; a Digital Agenda for Europe; Resource Efficient Europe; an Industrial Policy for the Globalisation Era; an Agenda for New Skills and Jobs; and a European Platform against Poverty. Innovation is directly addressed by the Innovation Union, but all the other flagship initiatives require high levels of innovation for their success. Innovation is at the heart of this strategy; this message was made clear by

Innovation is at the heart of this strategy; this message was made clear by Anneli Pauli, Deputy Director-General of DG Research of the European Commission. This statement was confirmed strongly during the course of the meeting.

The central role of innovation is clearly perceived by the European institutions; in Autumn 2010 the Commission will publish a "Research and Innovation Strategy" that will set out the ways and means by which innovation can be strengthened and can in turn strengthen other EU goals. The strategy will address new concepts and ideas of innovation and will define means to help transform scientific knowledge into the useful and well adapted products and services that people want, but it will go further. Innovation is today by far more than purely traditional industrial innovation; it covers both technological and social innovation; it deals with the manufacturing sector, but also with the services sector. Innovation is open and global.

The innovation process, so conceived encompasses a large spectrum of activities and actors: funding research; making that research work; creating the right environment for it to flourish and to be implemented. It also requires the participation of many users; to go from invention to innovation requires well articulated initiatives from the EU institutions, from the Member States and from businesses. Increasingly we understand that fully to benefit from the contributions that innovation can make to achieving social goals we must work also with actors that can support the delivery to and application in those fields, particularly with non-governmental organisations and with citizens.

The research and innovation strategy aims to smooth the flow of knowledge from the laboratory through to the delivery of social goals. The Commission envisages the emergence of a "Single Market for Research and Innovation". Two aims of this market will be to facilitate the protection of intellectual property and to enhance the mobility of researchers; to this end the Commission proposes a renewed effort to overcome obstacles to the European patent and will seek ways of reducing the barriers that can discourage people from moving between business and academia and between countries, such non-transferable pension rights and diminished career prospects.

Financing is critical. Innovative companies need more suitable funding mechanisms; venture capital should be more widely available across borders. The Framework Programme for research and development is the biggest public research programme in the world (more than €50 billion for the 2007-2013 period); its programmes may be adapted to match the goals of innovation and the leverage of this programme and other existing finance for research and innovation should and can be enhanced. Concerted application of instruments will be made, particularly the facilities of the European Investment Bank, the Structural Funds and the European Institute of Innovation and Technology.

These activities will be delivered through "European Research and Innovation Partnerships" that will ensure the coherence of R&D programmes with demand-side measures such as public procurement, standardisation and regulation. The Partnerships will build upon and integrate the activities of the existing arrangements including the Joint Technology Initiatives, Joint Programming, the public-private partnerships from the European Recovery Plan, the Lead Market initiatives, and the European Technology Platforms. The Partnerships will bring coherence and focus.

European innovation policy – the view of the Presidency

Juan Hernani, on behalf of the (Spanish) Council Presidency, confirmed its support for the position of the Commission. The financial crisis engulfing the world is doing great damage to all society; it recalls the events of 1910 that lead eventually to the two world wars, but the present crisis is compounded by the physical constraints of resource depletion and climate change that need a well-functioning financial structure if they are to be managed effectively.

The political envelope containing the priorities for the Spanish presidency for research and development is defined by Integration, Involvement and Inclusion. "Integration" brings Research, Development and Innovation (RDI) policies to the forefront of the European Strategy and forges stronger links between research and innovation; "Involvement" stimulates better coordination of the European, national and intergovernmental policies for tackling the major societal challenges; "Inclusion" will enhance the role of science and innovation to promote social cohesion and combat poverty.

Within this political envelope are five operational objectives: poverty, simplification; mobility; private public partnerships; an innovation plan. Poverty in the union and elsewhere in the world must be reduced; it is a horizontal issue, like gender, that needs to be addressed in all activities. Activities that can contribute to this aim are: to encourage the dissemination of scientific knowledge and access to technologies in a manner that maximises their impact on society as a whole, especially in those countries most affected; to incorporate research and innovation into development co-operation and aid policies and programmes; to help close the divide with less developed countries through co-operation in RDI.

Clarity of research objectives and instruments, consistency and stability of rules and lightness and speed of administrative procedures make research programmes attractive and accessible to researchers. Simplifying R&D support programmes by reducing bureaucracy will ease the construction of the European Research Area (ERA) and strengthen the Europe 2020 strategy; this has been a main objective of the Spanish presidency in this area.

Simplification of governance is also needed if all levels are to work effectively together; community, national, regional and intergovernmental level, must be better coordinated through new and generalised mechanisms. The European Research and Innovation Partnerships, Juan Hernani agreed, will be a powerful instrument in this regard.

Improved mobility of researchers is still needed to strengthen the European Research Area; the key to success is to provide an environment that combines flexibility in the market for researchers with security for the individuals – flexicurity. The main barrier is the transfer of pension rights, but mobility can also be assisted by better information about the market for research skills, better social security coverage especially in the early stage of a career and more facilities for the acquisition of new skills.

The path from public-funded research to private delivery of innovative goods and services self-evidently requires a partnership of the public and private sectors. The path is not always easy, especially in the "valley of death" where promising research seeks industrial capability and finance. Industry-driven initiatives in research and innovation, conducted in the framework of public-private partnerships can improve exploitation of research and enhance competitiveness.

How are these objectives to be delivered? The success of the Framework Programme in stimulating research across frontiers encourages us to believe that this can be emulated in innovation through the Research and Innovation Strategy to be published by the Commission in the autumn 2010. Juan Hernani, the Spanish Secretary General for Innovation, proposed some priorities and instruments that should be reflected in the Strategy. Finance is critical; the gap between the funding of research by public bodies and the adoption of results by private capital is still not properly bridged. Few EU countries are by themselves big enough to have the liquidity to fund innovation. Mechanisms to support cross-border funding are essential. Public procurement, he proposed, can also be helpful in creating a cash-flow at the critical point of market entry and in shepherding innovation to market. This route faces several legal obstacles concerning state aids and legislation for public procurement. It also begs the question concerning the competence of public officials to judge novel technology.

Innovation depends eventually on people. A supply of well-equipped innovative people should be assured through training, life-long learning and the mobility that promotes transfer of knowledge and cross-fertilisation. This could be helped by a scheme for innovation similar to the ERASMUS programme in education.

Research in social sciences is indispensable at all levels of the innovative process. It is needed to understand how public policies can best support innovation, what governance structures are effective, how innovation takes place in the industrial environment, what are the characteristics of the most innovative industrial actors, what enabling factors in the wider social environment create successful innovations, how cross-fertilisation and mobility affect the process, how innovation can be most successfully adapted to manage social issues.

The appointment of a Commissioner for Research and Innovation is an important step that underscores the importance of the subject for the Commission, but coherence of governance must be assured and subsidiarity properly observed. SMEs are vital agents in innovation, but they are numerous and not amenable to direct relations with Brussels or even national governments; regional development agencies are generally best placed to handle them. This must be done within an effective framework of communication to reduce fragmentation and excessive competition.

The presentations of Anneli Pauli and Juan Tomas Hernani revealed the extent of the common perception of the Commission and the Council Presidency and the strength of their common resolve to ensure that innovation is understood as the prime recourse of Europe both to manage the secular evolution of its place in the world and to handle the immediate crisis. The European Research and Innovation Strategy and the European Research and Innovation Partnerships were seen by both speakers as the decisive instrument; the subsequent sections of this paper will show how the research projects funded under the Framework Programme (Social Economic Sciences theme) can inform this vision and assist the process.

The remainder of this report is composed from presentations made at the conference, supplemented by material from the project websites where this helps elucidate important points and contributes to a coherent narrative.

Innovation, entrepreneurship and smart growth

The relationship of innovation to the economy can be studied through aggregate indicators, but it also has many linkages to the institutional structure of the economy, its finance and political management. The first paper reviewed in this section explores the relationship largely through economic aggregates and the subsequent papers examine some of the implications for finance, regional policy and firms.

Competitiveness, innovation and intangible investment

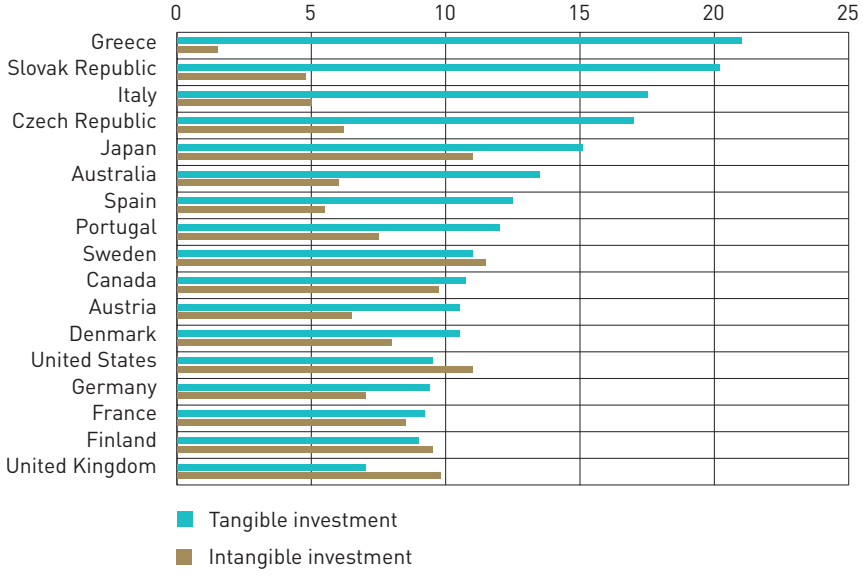
The traditional idea of innovation is that some scientific or technological change allows something to be done that could not be done before and following appropriate investment the innovation is put into production. The series of innovations that have brought the internal combustion engine from a curious toy for the rich to a device that almost defines the modern world are mainly of that sort. We attempt to measure the amount of effort put into this kind of innovation by measuring expenditure on research and development. On this measure, much of the economy is not apparently innovating at all, including financial services; the bulk of R&D spending is made by a few large companies, for e.g. in pharmaceuticals and defence sector. This observation is inconsistent with our perception of rapid change all around us and especially in information and technologies. Part of this contradiction arises from the failure to capture in currently-defined R&D much of the broad range of intangible assets including software, design, training, branding and firm-specific organisational capital. That failure means in that the accumulation of intangible assets goes unrecognised and the perceived level of investment is less than the reality.

This elusive character of innovation in the modern economy is widely recognised. The Oslo Manual of the OECD and Eurostat ("Guidelines for collecting and interpreting innovation data") defines innovation as the "implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations". Whether the innovation is a product, process, marketing method or organisational method it must be new (or significantly improved) to the firm. This definition therefore encompasses not only changes that are entirely novel, but also those that are adopted from outside. Although this more persuasive and subtle nature of innovation is now recognised in principle, our capacity to measure and understand the process in practice still needs work.

The European COINVEST project [1], presented by Jonathan Haskel, from the Imperial College London, aims to develop a better understanding of the relationship between growth and innovation and the contribution of intangible assets to that relationship, leading in turn to a consistent and robust method of measuring the investment and growth impact of knowledge asset spending on GDP. The prerequisite for such work is to compile data on the extent of investment in intangible assets, so the project includes work to measure intangible assets across seven countries with different levels and types of industrial development, then to integrate the data with National Accounts and finally to calculate effects on productivity and growth.

Surveys were conducted in France, Germany, Portugal, Sweden, the UK and the US; the assessments covered software, innovative property (such as R&D, design, product development in finance) and firm competencies (such as branding, training and organisational capital). The preliminary results showed that the proportion of intangible investment to tangible investment varies considerably among countries; they also demonstrate that intangible investment can be as high as tangible investment and even exceed it. *Figure 1* shows the amounts of tangible and intangible investment as a proportion of GDP in the market sector.

Figure 1 – Tangible and intangible investment, 2006 (% market sector GDP)



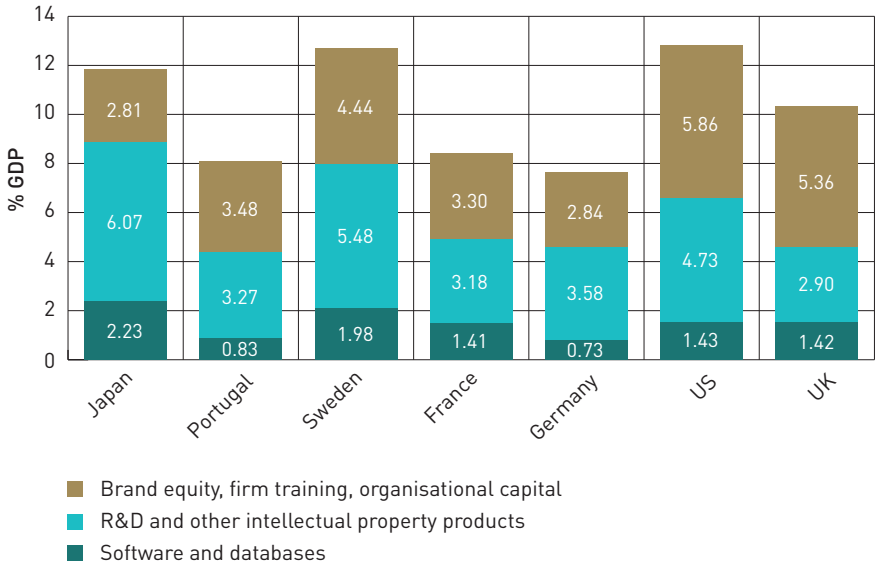
Source: European COINVEST research project

(1) http://www.coinvest.org.uk/bin/view/CoInvest/WebHome

Greece, a country that made many tangible investments in 2006, made almost no intangible investments. Australia also has a low proportion of intangible investment, probably because of its focus on extractive industries; Spain similarly has a large construction sector that favours tangible investment. The countries spending most highly on tangible investment are the US, Japan, Sweden and the UK. The countries with the highest ratios of intangible to tangible investment are the UK, the US, Finland and Sweden.

The composition of the intangible investment among the different categories is shown in *Figure 2*. Expenditure is classified by firm competencies, innovative property and software. Again the data is heterogenous; Japan makes the highest expenditure on R&D and software, but relatively little on firm competencies; Sweden, the US and the UK have the greatest expenditures on firm competencies and the UK has a relatively small expenditure on R&D (the lowest of the countries shown).

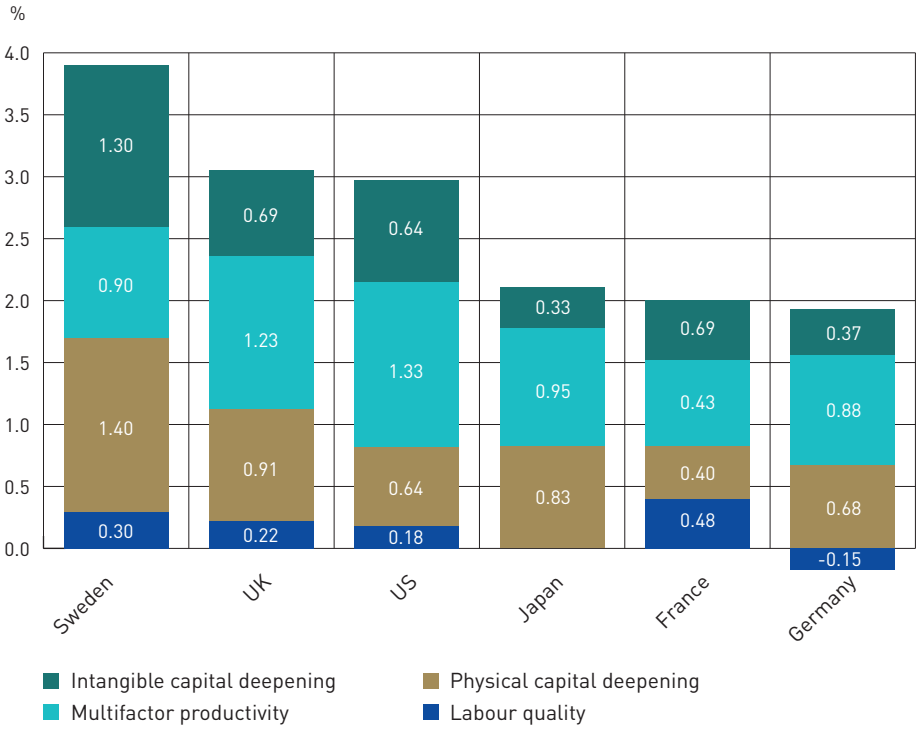
Figure 2 – Investment by intangible asset, 2006 (share in GDP)



Source: European COINVEST research project

The tentative implications of the analysis for growth are shown in *Figure 3*. Intangible capital has accounted for about a third of growth in Sweden, significant shares in the US and the UK and has had a somewhat smaller impact in the other countries.

Figure 3 – Growth accounting (1995-2006)



Source: European COINVEST research project

The project found evidence of a strong relationship between investment in intangible investment and the strength of barriers to entrepreneurship. As a proxy for the barriers the investigation took the days required to open a new business as reported in the World Bank Doing Business Report; analysis showed a strong negative correlation with intangible assets suggesting that investment in intangible assets is helped by an open business environment. Correlation does not prove causation and it is possible, if not likely, that the result reflect an underlying entrepreneurial environment that conditions both variables, but the correlation is nevertheless striking.

COINVEST has had policy impact in the UK, where the methodology has been adopted for the UK Innovation Index (National Endowment for Science, Technology and the Arts, November 2009); it has also informed the OECD ministerial report on Innovation Strategy that uses data from the project to show that intangible capital accounts for a large share of labour productivity growth.

COINVEST has relevance also for the EU Research and Innovation Strategy; the work suggests that rather than setting an R&D target of 3 per cent of GDP, it may be more useful to consider broader measures of expenditure on

innovation to capture the contributions from product design, organisational innovation and business investment in human capital. A wider measure of innovation investment may be a more efficient indicator of the success of innovation policy than a simple focus on R&D.

Financial markets, the real economy and innovation

Business experimentation is a necessary part of bringing novel ideas to market; experimentation needs money and the contribution of capital markets to commercialisation is important. Defining and promoting effective arrangements to supply finance to innovation is the central concern of the European FINNOV project [2], presented by Mariana Mazzucato, from the Open University. This project seeks to analyze, empirically and theoretically, the relationships between capital markets and innovation in order to better understand how national and EU policies can create a more effective financial environment for innovation and improve the rate and nature of economic growth.

The research examines the impacts of various funding vehicles including bank loans and venture capital and the manner in which equity markets respond to innovation. It also explores how different ways of financing innovation will affect the distribution of income and the creation of employment generation across different types of firms, and across different sectors. Fundamental to this investigation is the question whether financial markets at present reward or penalise innovation.

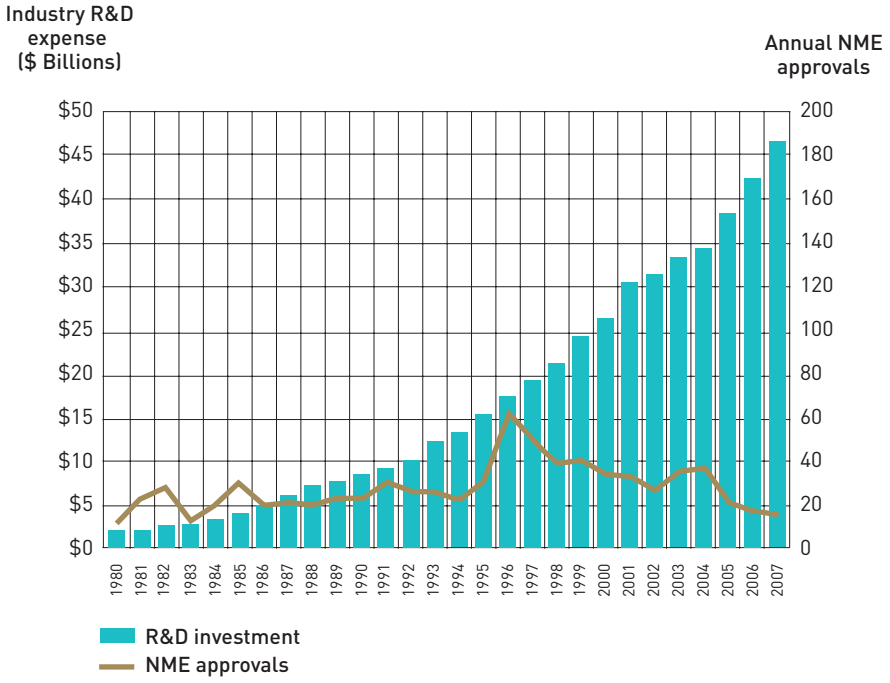
One approach is to analyse the relationship between the effort expended by firms in innovation, their stock-market returns and their growth. The valuation by the stock-market of innovative and non-innovative firms will affect their cost of capital and thereby the allocation of resources in the economy; it is therefore a significant transmission mechanism from the financial markets to the real economy. FINNOV has studied this relationship in the pharmaceutical industry. There is clear evidence for diminishing returns in R&D in this industry. *Figure 4* shows the expenditure on R&D compared to the approval of new molecular entities (NMEs). Evidently, the effects of inflation are partially responsible for the divergence, but even with this reservation it is clear the new entities are increasingly expensive to find and to prove.

Mariana Mazzucato concluded that, in the pharmaceutical industry, innovation only leads to higher sales growth for firms that are persistent innovators, and engaged in biotech alliances. This suggests the wider hypothesis that market selection operates on a broad mix of firm characteristics rather than on innovation alone. Understanding what these characteristics are, and how they differ between sectors, is a necessary condition for the development of policy to improve economic growth through investment in innovation.

(2) http://www.finnov-fp7.eu

Different financing mechanisms can affect the propensity of firms to innovate; the 2008 financial crisis, consistently with evidence from previous recessions, has caused venture capital (VC) investments and R&D expenditures to decline, whilst bankruptcies are rising. In a theoretical sense, this can be beneficial when it affects weak firms that deserve to fail, but it is unlikely that this is always what happens and it is imperative that appropriate mechanisms are in place to support businesses that are essential, but lack finance at some critical moment. The danger is especially great for firms engaged in valuable, but lengthy innovation processes. While short-term objectives are important to stabilise the economy in this phase of turmoil, long-term objectives are essential for the future competitive prospects of European firms.

Figure 4 – Private R&D expenditures in the pharmaceutical industry and approved products (New Molecular Entities – NME)



Source: European FINNOV research project

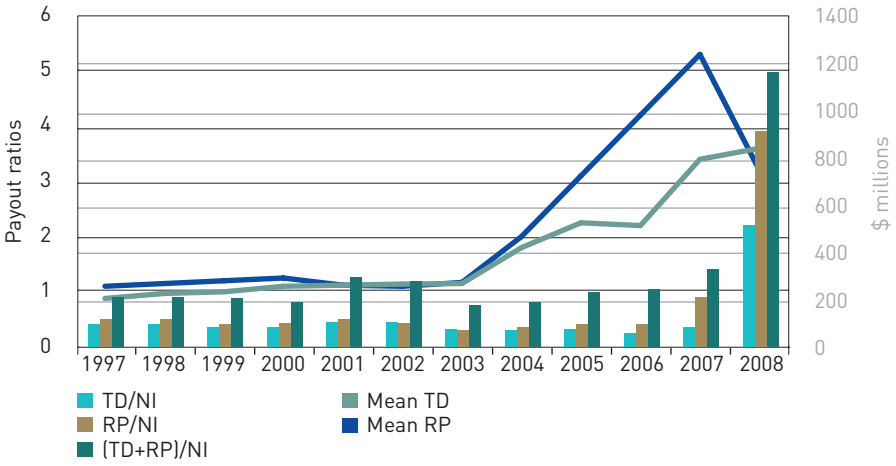
The financial difficulties facing firms trying to bring new technology to market have long been a focus for public policy. There is a broad consensus that the most problematic stage of the process is where public funding of science shows commercial promise, but has not yet reached the stage where most private capital is prepared to take a risk. Venture capital supposedly fills this gap and recently public money has been invested in private early stage VC funds, which now account for a significant component of early stage investment activity in Europe. These "hybrid" models present both a commercial and public policy challenge: continuing poor commercial performance has diminished private investors' interest in early stage VC and arguments of market failure as a reason for public intervention can also be questioned. The VC model of technology development is not entirely convincing and FINNOV suggests needs to be re-considered in the current economic context.

The governance of innovative firms is also prone to abuse. A basic notion of the market economy is that corporations should be run to "maximise shareholder value". It is questionable to what extent this ideal is ever achieved and it is especially problematic in small, high-risk companies. Top corporate executives are often rewarded with grants of stock-options that could reward speculation. The prime way in which executives can manipulate stock prices is through stock repurchases which became massive and systematic in the 2000s, at the expense of innovation and job creation. Such behaviour, which is no more than a transfer of funds from investors to management, clearly represents a risk to investors and deters their engagement with innovative industry. The allocation of resources to innovation by the market is then discouraged.

This behaviour is evident in *Figure 5*, compiled from US data, that shows the ratios of cash dividends (TD) and stock repurchases (RP) to net income (NI) and mean dividend payments and stock repurchases among Standard & Poor's (S&P) 500 companies from 1997-2008. It is evident that the return through stock repurchases (that benefit the holders of stock options) has increased over the period. Similar behaviour is prevalent in Europe. Some mechanism is required to ensure that this business model is not allowed to develop too far and so deter private investors in such companies.

From a social perspective there is an apparent need to find ways of linking capital markets more effectively to the real economy. The focus on growth needs to be reconsidered; there may be more or less desirable forms of growth. Conscious decisions are needed concerning what society is trying to achieve with innovation and growth and indicators developed that measure the achievement of these goals. Innovation in services often causes an improvement in quality rather than a decrease in costs and criteria for quality are hard to define in public services. Indicators such as the number of patients seen each hour by a doctor are not related to efficiency in any realistic way.

Figure 5 – Dividend payments, stock repurchases and income S&P 500, 1997-2008



Source: European FINNOV research project

Knowledge-intensive entrepreneurship and innovation for growth and social well-being

The European AEGIS project [3], presented to the meeting by Aggelos Tsakanikas from the National Technical University of Athens, aims to analyze knowledge-intensive entrepreneurship and related strategies and policies using a variety of disciplines and research methodologies. It emphasises the major role of knowledge, innovation systems, networks and institutions in fostering knowledge-intensive entrepreneurship. Its main messages regarding knowledge-intensive entrepreneurship are:

- *Systems*: Knowledge-intensive entrepreneurship is an inherently systemic policy issue that must be tackled from various angles simultaneously for long-term results. Single policy fixes will work for a short while, but will not change attitudes for the long haul.
- *Socio-economic incentives*: The simplistic view of the rugged individualist entrepreneur who takes uncalculated risks and single-handedly builds great companies is far from reality. Builders of knowledge intensive enterprises respond to economic and social incentives that can be influenced to a significant extent by policy.
- *Competence building*: The issue at hand – the building of new activities and new structures – invariably depends on achieving "new combinations" of capabilities and competence building.

(3) http://www.aegis-fp7.eu

- *Knowledge application*: Knowledge-intensive entrepreneurship is about the application of knowledge to new activities. Policies need to focus on application rather than on the creation of new knowledge.

Policies for the promotion of knowledge-intensive entrepreneurship should enable the creation and commercialisation of knowledge in various ways and forms: start-ups of new and small independent firms, spin-offs and spin-outs from universities, public laboratories and large established corporations, knowledge-intensive entrepreneurship within larger corporations and technological diversification. Supply-side and demand-side factors are both important to linking knowledge-intensive entrepreneurship to regional growth and can be affected by policy. Regions need both sets of factors to achieve high levels of economic growth. On the supply-side contexts rich in knowledge will tend to generate more entrepreneurial activities (knowledge spillover) and on the demand side, many factors, institutions, laws, traditions and culture shape the amount of region-specific entrepreneurship capital.

Dynamics of institutions and markets

Innovation is not only an economic factor, but is also an institutional process that functions at many levels. The institutional dimension of innovation is treated in the European DIME[4] Network of Excellence which is linking social scientists in Europe working on the economic and social consequences of increasing globalisation and the emergence of the knowledge economy. Within this network, innovation is construed as something that evolves from institutions at a local and national level and can follow different paths according to the local environment. If this construction is accepted, then the fostering of innovation and the knowledge economy will need to be matched by significant adaptation of institutions in a manner that is supportive of the process. To be able to propose appropriate change supposes that we understand how the institutions around innovation work. DIME studies these processes at micro, meso and macro level; macro studies concern the behaviour of regions and countries; meso studies address networks and sectors; micro studies address organisational matter such as the factors that affect the competitiveness of European firms in the global knowledge economy.

Underlying the methodology of DIME is a conviction that traditional, hierarchical mechanisms of regulation and co-ordination are giving way to more nuanced, multi-level governance. In this vision, the solution of collective problems is not achieved through hierarchical control, but by co-operation among various constituencies that can mobilise different components of knowledge. This type of co-ordination cannot be achieved solely through the design of society-wide incentives and rules. Because of the localised and tacit character of knowledge, and

(4) http://www.dime-eu.org

its embodiment in specific communities of practice, it is essential to take into account the spatial nature of knowledge generation and exchange activities as well as sectoral industrial structure and the configuration of organisations. There has been substantial research in these issues within various fields of the social sciences, but the value-added of DIME is the opportunity to develop means of integrating the conceptual, theoretical, and measurement tools employed by different social science communities in order to discover better means of integrating or mobilising existing knowledge as well as generating technological and organisational innovation. Reflecting this perception, DIME was established to bring together three communities engaged in studying innovation: evolutionary economics and innovation studies, institutional economics and regional science. Being a Network of Excellence, the activities are fluid and decentralised; the work programme is formulated on the basis of a yearly call for proposals and the coordinators of work programmes change regularly.

Bart Verspagen, from the Maastricht University, presented some examples of the work done within the DIME network at the three different levels; the first example, at the micro level, concerned the critical, but ambiguous, role of Intellectual Property Rights (IPR) in the knowledge society. Innovation is subject to spillovers; by this it is meant that the benefits of creative innovation are rarely fully appropriated by the inventing firm. This has consequences for public policy in innovation; public policy needs to assure that the benefits of innovation to the innovating firm are sufficient to encourage innovation. For some innovations, the costs of imitation are much less than development costs (pharmaceuticals is a good example), so that a mechanism to protect the innovator is needed. Protection in turn creates a dominant market position and restricts access to the innovation and exploitation of the benefits, thereby reducing social welfare below what it might otherwise have been if the innovation could be appropriated by others. Public policy must balance these considerations and it is not obvious how it is to be done. The work done within DIME can help policy-makers in this difficult task.

Recently the dominance of IPR within the knowledge economy has been challenged. Open source software for example is now common and apparently profitable. The creative industries are especially vulnerable to restrictive interpretations of IPR; with the introduction of e-books, the centuries-old gesture of lending a book to a friend is in jeopardy. The research of DIME in this field also seeks to understand if and how the current rules, norms and standards stimulate or hinder creativity and how they affect the appropriation of knowledge and value in the creative industries. Evidence-based policy-making requires empirical evidence on which to base analysis and proposals; there is strong demand for statistics on patents and other forms of protection of intellectual property; DIME also contributes to fill that gap.

The work of DIME addresses real and current controversial aspects of IPR. A strategy for innovation should seek to find the instruments that enhance the creation of value across the community and to ensure the most suitable structure for the

production of knowledge. It should balance classical IPR and alternatives; it should provide tailored incentives for different types of activity. The contribution to these questions provided by this research is valuable; its impact at the moment is mainly in the academic world, which is usual in a network where individual expression of researchers is more important than their consistency, but the effort should be made to bring the insights to the attention of policy-makers.

Innovation in environmental technologies is especially important because it determines the capacity to mitigate climate change and other environmental impacts. The work of DIME at the meso-level includes a programme on environmental innovation and sectoral systems of innovation. There is a wide range of overlapping policy instruments available to manage the environment and the different instruments have different implications. Environmental innovations are induced by environmental regulation and all other things being equal, effective and efficient innovation will improve the competitiveness of the firms undertaking them. The immediate objective of environmental regulation is to protect the environment in the short-term, but it is important to understand what the effects of these different instruments are on innovation and therefore on the technologies and practices available to manage environmental impacts and eventually on our long-term capacity to respond in the best possible way. DIME has investigated the difficulties of regulating one particular established technological trajectory (i.e. the internal combustion engine) with the intention to encourage alternatives. The research concluded that in many ways the present policy of voluntary measures to reduce CO_2 has lead to a focus on improving the existing technological trajectory, rather than shifting radically to new technologies. For example, the evolution of the patent portfolio of Renault and Peugeot from 1990 demonstrates that both firms of patents are linked to internal combustion including diesel engines. There is significant penetration of patents for alternatives, but the traditional technological trajectory is resisting well. One reason for this observed behaviour is that classical environmental regulation aimed at the source ignores the importance of demand-oriented policies and infrastructure support for alternatives as policy instruments for innovation. The research demonstrates the need for complementary policies to regulate impacts, whilst promoting demand and supporting investment in infrastructure.

At the macro level DIME's work on knowledge, regions, cohesion and policy tries to clarify how interactions at the micro and meso level will feed into the macro-relationship between knowledge and growth and beyond that into the development of the European Union in the global economy. There are three main themes: European competitiveness and the factors that affect it; regional cohesion and the effectiveness of European policy instruments (especially the structural funds); technology policy and traditional macroeconomic policies. The work departs from mainstream theories that see the economic system as having a fundamental tendency towards equilibrium, arguing that empirically we observe that this is not the case. It deploys agent-based modelling and simulation to explore the nature of economic fluctuations and the impact of policy choices.

Intangible assets and regional economic growth

There is some evidence that the external benefits (or spillover) of innovation are enhanced by geographical and social proximity; distance tends to decrease the frequency of interaction among the participants of innovation systems. Tacit knowledge is shared more easily between partners who share the same language, have common codes of communication, shared conventions, habits and norms. If this is so, then the promotion of innovative clusters should be a priority of regional development, but to achieve this aim, regional and local governments need an understanding of how innovations are initiated and disseminated locally and how they can influence these processes to obtain the greatest regional benefit. Many different institutions are involved including corporate actors (manufacturers, consultants, finance houses), government agencies, research institutes, universities.

Regional governments can to some extent influence the installation of relevant actors and can promote efficient interaction, learning and collaboration between them, but intervention has to be realistic. Effective intervention will need to recognise the comparative advantages that the region enjoys. The direction of effort will depend upon the competences and capabilities available and different approaches will be required in different circumstances; small regions will have a more restricted choice than large cities with universities, research institutes, diverse industry and finance houses.

The European IAREG [5] project deals with intangible assets and regional economic growth. It is intended to support the construction and implementation of innovation policies for regional development by providing insight into the spatial dimensions of innovation. The research analyses the factors that enhance or obstruct spillover and suggests how innovation may be encouraged using the instruments available to regional policy-makers. The work of the project includes empirical and theoretical analysis and has a clear intent to inform policy. As with COINVEST and other projects like INNODRIVE [6], the main analytical aim of the research is to investigate the role played by intangible assets in the generation of innovation and consequently economic growth. IAREG, though, places the emphasis on the regional level and spatial spillovers.

Rosina Moreno, from the University of Barcelona, presented the results of IAREG under three headings:

- how to promote human capital in order to impact on innovation and economic growth;
- how to generate knowledge within the ERA;
- how to increase knowledge flows within the regions of the EU.

(5) http://www.iareg.org/

(6) http://innodrive.org/

To achieve the first aim the project has developed new indicators for improving the measurement of intangible assets and then used these to analyse how knowledge, human and social capital and entrepreneurship interact to create growth. The results of the research show significant spatial variations in regional returns to human capital; this finding implies that the success of development policies based on stimulating the accumulation of human capital will depend on contingent factors such as the present state of development of the region as well as the existing stock of human capital.

Analysis of the relationship between indicators of human capital and growth undertaken in IAREG shows evidence that the social benefit of human capital exceeds the individual benefit; this public good character then provides the essential justification for public policy intervention to finance the accumulation of human capital. The impact varies across economies and even between regions within a country. There is a tendency for the economies with the lowest levels of productivity to benefit most from the accumulation of human capital. Investment in education in the less developed regions is a win-win policy, given that the objectives of efficiency and equity are simultaneously met. But IAREG also finds evidence that the effect of human capital on economic development is stronger in societies with higher levels of institutional trust; it is therefore important to ensure the trustworthiness of public institutions and people's perception of it, e.g. confidence in the legislature, officials, the police and the justice system.

There is a view in Europe that the quality of jobs is positively correlated to productivity at work; this is a comforting position because it suggests that the two objectives can be achieved simultaneously and that there is no policy conflict. The theoretical and empirical bases of this belief are both contentious. IAREG has studied the relationship in Spain, which is a country where in some ways the quality of work is poor, but where there has been rapid convergence since accession with the other large economies of the EU. The research of IAREG suggests that the relationship varies between sectors. In sectors that have high inputs of human capital there is a positive correlation between quality in work and productivity. In sectors with low human capital productivity has to be achieved at the expense of low levels of quality in work. This relationship is probably amplified by the effect of globalisation that brings low human capital sectors into fierce competition with similar sectors in countries that have weaker laws for labour protection. Employing new immigrants as a low-cost workforce with a low propensity to complain about working conditions may also be connected. The IAREG work therefore helps clarify the relationship between job quality and productivity (cf. IAREG report on *the spatial variations of the returns to human capital according to the regional characteristics and the interaction with social capital and the quality of work* and IAREG European policy brief: *Report on the role of human capital: The link with social capital and the quality of work*).

Public policies to create human capital run the risk of creating more supply than the market can absorb; "overeducated" workers are then found in jobs that could quite easily be done by less skilled people. The impact of labour market mismatch on regional economic growth has not received very much attention because of the difficulties of acquiring data, but IAREG has succeeded in providing insight into the effectiveness of matching in some European countries from 1981 to 2002. It appears that about half of workers are properly educated; over-education is high in Spain and Greece, at an intermediate level in France, Portugal and the United Kingdom, and low in Austria and Romania. The proportion of overeducated workers has increased in Greece, Romania, Spain and the United Kingdom while in Austria, France and Portugal it has fallen. The study also found a significant positive correlation between overeducation and regional economic performance. From a personal perspective overeducation is frustrating, but from a regional perspective, overeducated workers constitute an opportunity to benefit from the creation of more skilled jobs (cf. IAREG report on *Regional economic growth and human capital: the role of overeducation*).

Rosina Moreno drew some conclusions about to how to promote human capital in order to impact on innovation and economic growth, i.e.:

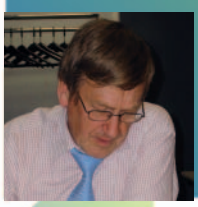
- the national level should be the major policy level for higher education and research policy: due to the national peculiarities of university systems;
- more autonomy to universities to enable them to internally strengthen certain strategic fields;
- regional governments should complement initiatives to strengthen research fields identified by the respective universities.

The second theme of the presentation addressed the question of how to improve the generation of knowledge within the ERA. In this respect, IAREG has examined the collaborative linkages among universities and firms, the impacts of the commercialisation of academic research and the role of intangible assets in the location of multi-national enterprises (MNEs). The research examined the extent to which MNEs were genuinely embedded in the region by analysing their strategies for human, network and organisational capital, which are important for creation of knowledge within the region and which contribute also to spillovers. The results show that academic commercialisation and academic networks are changing the nature of European universities, that the role of geography varies according to the nature of collaborations and that the network structure is crucial for knowledge transfer. The balance between commercialisation and basic research is being redrawn and policies to support collaboration activities need to take into account geographical and network specificities.

MNEs contribute to the regional human capital through: local skills transfer programmes; educational partnership with universities and for ICT, by providing training. They increase the regional network capital and strengthen the local absorptive capacity by providing access to global knowledge and open international collaboration opportunities for partners from science or industry. In turn they benefit from inter-firm mobility in innovative regions and from the spatial and relational proximity to local universities, from which they can access both personnel and know-how. They participate in regional governance boards, sponsor cross-industry innovation initiatives and finance promising research or business ideas. Well adapted regional governance mechanisms that support knowledge creation (such as policy incentives, clustering and networking initiatives) contribute to embed the firm in the region (cf. IAREG *Report on the role of the university and its linkages in the creation of intangible assets and the role of multinationals*). The role of multinationals in generating new knowledge can be enhanced by: improving channels of communication with other regional actors; creating regional partnering organisations; providing public funds to academic-industry research consortia and supporting temporary personnel moves from academia to industry.

It is generally thought that local growth and spatial concentration of economic activities emanate from localised knowledge spillovers that reduce the marginal cost of making new knowledge. As these intangible assets are strongly localised, knowledge flows may be geographically constrained, leading to different regional growth paths. The research found that both the channels of knowledge diffusion and the absorption capacity are often specific to each region, depending on its sectoral specialisation, the intensity of its public research, the quality of the local knowledge transfer infrastructures and the characteristics of the local firms (cf. IAREG report on *Underlying mechanisms of knowledge diffusion*).

IAREG concluded that science-industry knowledge flows can be promoted by training in education for entrepreneurship that is addressed not only to students, but also to researchers. This should be complemented by financial, technical and informational support to diverse and complementary forms of interaction between science and industry. Businesses (mainly SMEs) benefit from access to the latest methods of knowledge management and innovations in organisational methods through seminars and the financing of specialised technical consultants. Lagging areas can be helped to reach a critical mass if they benefit from knowledge flows within and across a region. The focus of this effort should be on the medium sized regions that need an initial help to access to global knowledge flows. Spatial proximity is not a sufficient condition for knowledge-flow. Interpersonal relationships such as face to face contact and labour mobility, social proximity and the integration within local and global scientific networks are critical.



Social innovation and service-oriented economy

An important part of Europe 2020 strategy addresses social challenges. As noted by President Barroso, "The financial and economic crisis makes creativity and innovation in general and social innovation in particular even more important to foster sustainable growth, secure jobs and boost competitiveness". The papers in this session were directed to the concept of social innovation and how it could be realised.

Implicating society in defining needs for technology – experience of Brazil

The Science and Technology for Social Inclusion Secretariat (SECIS [7]) is one of four Secretariats within the Ministry of Science and Technology in Brazil On behalf of SECIS, Saulo Barretto shared with the meeting some of the Secretariat's work in social innovation and in particular how private, public and local knowledge has been brought together to solve intractable social problems. The Secretariat was created in 2002 with the tasks to disseminate and popularise science and to harness technology for social development. As part of its activities, SECIS operates a national network of vocational centres for technology and a national programme for digital inclusion (10,000 telecentres are planned for by the end of 2010). It implements policies to promote productive local clusters of SMEs and "social technologies".

Social Technologies are defined as "products, techniques and/or methodologies that are reapplicable, developed through a close interaction with a community and that represent effective solutions for social transformation". The concept of reapplication is important because it captures the extent to which a technology proven in specific circumstances can be adapted to local realities elsewhere.

An example of a social technology in agriculture is "Integrated and Sustainable Agroecological Production" (PAIS). The technique is agroecological because it does not require pesticide; it integrates the raising of animals (chicken) with the growing of vegetables and it is sustainable because the approach preserves soil quality, makes efficient use of water, promotes the community and creates new possibilities of commercialisation. Ten thousand schemes are planned by the end of 2010 and the approach has been transferred to Haiti as part of the support of the government of Brazil to that country.

(7) http://www.mct.gov.br/index.php/content/view/73413.html

There is a widespread prevalence of anaemia among young Brazilians in some areas and this has been addressed by another social technology. Imported equipment for measuring the level of haemoglobin in blood was too expensive to be practical on a large scale and attendance of young people at clinics is hard to realise. An alternative technique was designed using low cost, easy to use, robust and portable equipment. Three measurements are needed over twelve weeks; attendance is ensured by making the tests inside the schools during the lunch periods. Care is taken fully to involve families, the school director and teachers in order to enhance acceptability. A pilot study conducted at Ilha Bela in São Paulo State succeeded in reducing the rate of anaemia in schoolchildren from19.8% to 4.8%; a similar study in Santa Luzia do Itanhy (in Sergipe State) brought the incidence down from 24% to 4.6%. This year the approach will be transferred to other cities and to Mozambique.

An especially interesting initiative described by Saulo Barretto was the Open Knowledge Space (OKS) launched in May 2010, just a few days before the meeting. The OKS is implemented by the Network of Social Technologies, created in April 2005 to foster the dissemination and reapplication of technologies. The network is sponsored by several large companies and works through thematic meetings, newsletter, workshops and conferences. The Open Knowledge Space is an open environment to foster the dissemination of social technologies and their re-application; it combines something of the functionality of Facebook with the review process of Wikipedia. Descriptions of proven social technologies and working instructions are uploaded to the site and can be freely downloaded. Successful readaptations can then be uploaded; they are then reviewed by an expert panel and if found convincing are allowed to remain. By this process the adaptation of technologies to different circumstances can be documented and disseminated.

This Brazilian experiment reflects the idea that users can be effective in helping design socially applicable technologies that depend as much on their acceptability as they do on their technological merits. These ideas were echoed in the subsequent papers.

Social entrepreneurs as "lead users" for service innovation

Many of the targets set in Europe 2020 depend both on invigorating the productive economy and on delivering better services to people. There can be innovation in service delivery as well as in finance or manufacture. The ageing of society, migration, poverty, the rising demand for ethical and ecological goods and services all need solutions that enable inclusion or empower communities. These societal trends create new growth markets and significant business opportunities for service companies.

There are well-known precedents where "social entrepreneurs" have developed new business models to address social trends whilst simultaneously achieving commercial viability; the Grameen Bank for micro-credit and Fair-Trade products are examples, but effective ways to achieve service innovation are still underdeveloped. Social innovation does not generally originate from a single organisation; companies source knowledge from suppliers, customers, users and competitors. The European project SELUSI [8], presented by Marieke Huysentruyt, from the London School of Economics, and Ute Stephan, from the Katholieke Universiteit Leuven, explores the idea that the experience of social entrepreneurs is relevant to the delivery of a wide range of social services and that if the processes were better understood it could help in the delivery of the Europe 2020 targets.

The geographical scope of SELUSI in the first instance, covers UK, Sweden, Hungary, Romania, and Spain; within these countries, the project studies companies that want to generate social change, that generate their own revenues by selling services and have at least one employee. The first step is to characterise these companies in terms of: what they do; who runs them; what is specific about them in comparison to purely profit-maximizing firms or other market players and to determine whether they hold distinct knowledge that can boost service innovation in other sectors, both private and public. To this end, the project has compiled data on 581 social enterprises in Europe across the five countries. The sampling technique used to compile the data is respondent driven; each company studied is asked for referrals to other companies (snowball sampling). This approach is necessary because there is no register of social entrepreneurs; the population is hidden. The data is acquired by telephone interviews with founders of the enterprises after they have first completed an online questionnaire.

Table 1 shows how the activities of the identified companies beak down. The top five categories (75 % of the sample) are closely related to the priorities of Europe 2020 and several of the subsequent categories are also partially related.

(8) http://www.selusi.eu

Table 1 – Classification of companies

NPO* social sector classification for primary service	%
Social Services	**16.70**
Employment and Training	**14.88**
Environment	**14.52**
Education	**14.52**
Economic, social and community development	**14.34**
Culture, the arts and recreation	7.08
Health	6.90
Housing	2.72
Business associations	2.00
Law, advocacy and politics	1.63
Other	4.72
	100.00

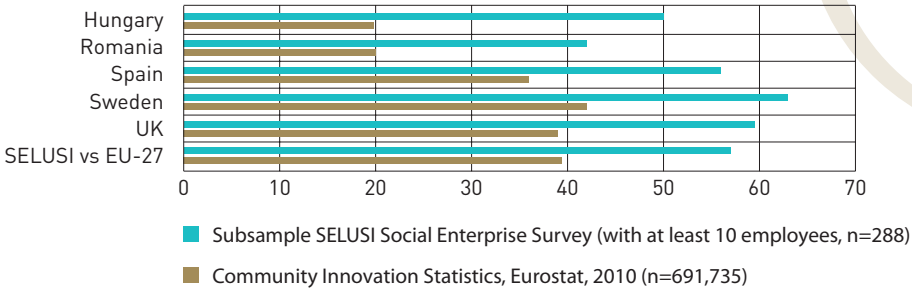
Source: European SELUSI research project
**Non-profit organizations (NPO)*

Of the 581 companies interviewed, 57 % claimed that at the time of founding of the enterprise the activity was in some sense new. This claimed innovation rate for social entrepreneurs compares favourably with that reported for traditional "for profit" companies. *Figure 6* shows the percentage of social enterprises in the SELUSI sample with more than ten employees that claim to have introduced "new-to-the-market" innovations in goods, services or processes; the reported performance is in all countries better than Eurostat statistics for conventional firms. There is considerable subjectivity in the measurement of innovation used for social entrepreneurs, but the results are still striking.

Social entrepreneurship has proven robust to the financial crisis. Between November 2008 and November 2009, the social entrepreneurs in the SELUSI sample on average grew their revenues by 10 %, their profits by 4 % and their assets by 12 %. Social performance, as tracked in their main social performance indicator, was generally "better" than the previous year. The number of employees, volunteers and owners working in the companies was stable through the crisis.

The SELUSI project intends also to launch action-research projects that will experiment with different modes of engaging social entrepreneurs in processes of service innovation led by conventional businesses; a project with a Belgian cable operator is currently underway.

Figure 6 – Percentage of enterprises introducing "new-to-the-market" innovations in goods, services or processes



Source: European SELUSI research project

SELUSI is still at an early stage, but Marieke Huysentruyt drew several preliminary conclusions:

- preliminary empirical findings suggest that social enterprises have distinctive insight into the opportunities for a more socially inclusive, sustainable and green economy;
- cross-country variations can indicate what helps social entrepreneurs succeed;
- the experience of social enterprises can help mainstream businesses in the service sector;
- the SELUSI group of companies may offer an interesting opportunity to test or evaluate policy options at various levels of government, but especially at EU level where the large size and multi-national coverage of the sample would be useful.

The close relationship of the activities of the social entrepreneurs with the aims of Europe 2020 is striking, particularly because, since Lisbon, the EU has sharpened its focus on the ability of the private sector to deliver social services. Together with the apparent high levels of innovation these findings support the idea that the processes adopted by social entrepreneurs could find wider application within Europe 2020. Understanding the dynamics of social innovation is important in achieving the high-level goals of Europe 2020. In turn the processes of social innovation deserve support from policy at European, national and regional levels.

Public-private innovation networks in the service economy

Social innovation is in some respects more complex than technical innovation or changes in business practice, because it involves many actors with different characteristics. Public and private sectors and users, or their representatives in charities and other NGOs, are likely to be involved. The European project SERVPPIN [9] is studying the contribution of public and private services to growth and welfare and the particular role of public-private innovation networks. The project was presented by Luis Rubalcaba, from the Universidad de Alcalá.

The service economy is expanding in most countries of the world, but at different speeds. In the United States, services represent nearly 80 % of value added and employment, while in many European economies (United Kingdom, Netherlands, Luxembourg, Sweden, France, Denmark and Belgium) they already exceed 70 %. The service sector has proved to be an important contributor to organisational innovation. *Table 2* shows that organisational innovation increases progressively with the size of enterprises and that the service sector is generally more innovative than manufacture in this respect.

Table 2 – Reported organisational innovation by company size and sector

	Small	Medium	Large
Manufacturing	50 %	61 %	72 %
Services	58 %	66 %	75 %
Transport and communication	57 %	59 %	77 %
Financial intermediation	65 %	78 %	83 %
Technical business services	66 %	76 %	81 %

Source: European SERVPPIN research project

The prime concern of SERVPPIN is with the interaction of public and private services. Private services are almost all offered as market services while public services are generally not. Deregulation and liberalisation in conjunction with the emergence of new ways of organisation and cooperation between private and public agents (like public private partnerships) have

(9) http://www.servppin.com/

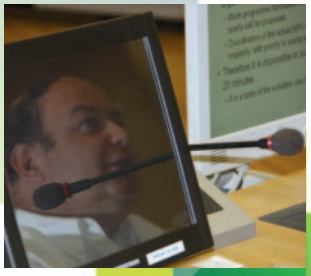
increased the participation of private actors in the provision of public services. Mixed services are services that are offered as private, public or combination; they are found mainly in education and health. In 2005, market, public and mixed services generate respectively, 36.4 %, 6.7 % and 24.9 % of total employment in the EU, but the manner in which services are provided differs greatly among countries.

To understand better the different models or patterns across EU nations a cluster analysis was made of twenty-six countries (twenty-two in Europe plus the United States, Australia, Korea and Japan) and six variables (market, public and mixed shares in total employment in the year 2005 and their respective annual growth rates in the period 1995-2005). There is a compelling similarity in the clusters selected and the different social or welfare state models: Mediterranean, Continental, Oriental, Anglo-Saxon, Nordic and Central and Eastern European Countries.

SERVPPIN also seeks to develop a self-contained economic theory of innovation for the service industries and to construct theoretical models for the operation of networks for innovation. It has formulated a multi-agent framework of analysis for services in health care that allows explicit consideration of the preferences of policy-makers, service providers and end-users, and that helps understand how conflicts between these preferences and the resolution of these conflicts affects the innovation process. The network model of interaction has been applied in several case studies of social innovation.

Luis Rubalcaba concluded that innovation networks offer a means of going beyond the traditional view of R&D and innovation programmes, but cautioned that rigid programmes are not good for networking and that to promote a certain type of network is risky. Innovation and networking takes time and the heterogeneity in networks, countries and sectors must be recognised and managed.

Public-private networks provide a huge opportunity to improve innovation in services, both economic and social innovation, but the service economy imposes new challenges to policy-makers. There is a need to apply new services-oriented policy performance criteria within existing community policies and to develop policies that address specific problems arising from topics such as innovation and R&D, regional localisation, quality, employment, qualifications and statistics. Intra-sectoral variations as well as country and regional differences should also be taken into account when designing policy interventions in the service economy.




FINNOVI

Innovation and globalisation

Globalisation requires that Europe innovates, but affects the context in which that innovation is conceived and implemented. Globalisation affects the way firms compete; it affects the way knowledge is generated, disseminated and used.

European firms in a global economy

Implicit in the strategy for Europe 2020 is that EU Member States will be competitive on world markets, but nations do not produce, do not trade and do not compete; it is firms that produce, trade and compete. Firm-level analysis is therefore essential to good policy. Understanding the interaction between globalisation and the European economy requires reliable detailed analysis of how firms are coping with this challenging environment and in particular how they are reorganising their international activities in the internal market and outside Europe. The European EFIGE project ([10]), introduced by Gianmarco Ottaviano and Carlo Altomonte, from the Bocconi University and BRUEGEL think thank, provides this insight. The results from the project show that globalisation does not only cause structural adjustment between sectors but also creates winners and losers within the same sector.

Currently there is little harmonised statistical information on European firms; the enrichment of existing data through the creation of a representative firm-level database on the international activities of European manufacturing firms is a first priority of EFIGE and the basis for its subsequent analysis. The database is constructed through a survey, compiling both qualitative and quantitative information on more than 150 items related to the operations of international firms falling into seven groups: size and productivity; organisation; geographical scope; skills and tasks; innovation; financial constraints; the impact of the euro. To ensure the statistical representativeness of the collected data the sample contains around 3,000 firms for Germany, France, Italy and Spain, slightly fewer for the UK and 500 firms for smaller countries (Austria and Hungary), i.e. a total of 15,000 valid questionnaires. The survey was conducted using CATI (Computer Assisted Telephone Interview) and CAWI (Computer Assisted Web Interview); it was completed at the end of May 2010.

Analysis of this data casts light on several questions of interest to policy:

- what are the features of European firms that successfully compete in international markets? To what extent do they contribute to productivity and employment?

(10) http://www.efige.org/

- why are some countries more successful in international trade and FDI than others?
- does the Single Market and the euro foster productivity and employment through a wider participation of firms in cross-border business?
- what are the gains and the adjustments involved in reducing barriers to trade and foreign direct investment? What policies can best maximise gains and smooth adjustments?

The impact of the euro on trade within the euro zone is below expectations; the current consensus estimate of the impact on trade within the euro area is less than five percent. This aggregate figure might mask important micro-economic gains. For example, the euro may have increased the availability of differentiated varieties of both final and intermediate products; it may have helped new exporters to enter euro-area markets and may have assisted existing exporters to increase the number of products exported and the number of destinations. EFIGE's analysis, performed with existing firm-level data sets before the completion of the new survey, lends credence to these views; the euro appears to have created a small positive differential effect on trade through an increase in the number of products exported and a larger positive differential effect on the average value of exports per product and per firm.

The tougher competition associated with enhanced transparency and lower transaction costs following the introduction of the euro might also be expected to have reduced margins and prices across the euro zone. EFIGE indeed found that the volatility of export prices has fallen, mainly as a result of the removal of exchange rate volatility. Export prices are lower inside than outside the euro zone, because of the pricing strategies of both incumbent and new exporters. Exporters from the zone have narrowed the dispersion of their export prices to other markets in the zone relative to markets outside, mainly as a consequence of reduced price discrimination within the zone by incumbent exporters.

Overall, EFIGE determined that the common currency has affected both product variety and export prices, but the additional microeconomic gains of the euro seem to have been channelled more through price compression than through enhanced product variety (cf. EFIGE report *Of markets, products and prices: the effects of the euro on European firms*).

The first analysis on the new data set was presented to the Brussels meeting. It describes exports and foreign direct investment by European firms. The preliminary findings confirm the "happy few" phenomenon (cf. BRUEGEL report *The happy few: the internationalisation of European firms*); the firms involved in international activities are few, large and more productive than other firms. They account for the bulk of aggregate exports and foreign direct investment. In *Table 3*, for each country the columns report the contributions to the total export of the top 1%, 5% and 10% exporters. Such insights are

not observable at an aggregate level, but only when information is collected from individual firms. The new analysis reveals that firm size distribution is a key factor explaining different international performance of firms across European countries and it will develop ideas about how this finding should inform the design of the policy.

Table 3 – Share of exports for top exporters in 2003, total manufacturing

Country	top 1 %	top 5 %	top 10 %
Germany	59	81	90
France	44	73	84
United Kingdom	42	69	80
Italy	32	59	72

Source: European EFIGE research project

The EFIGE project has substantial policy relevance. The international competitiveness of Europe is generally disappointing, but performance varies markedly across countries. If the factors governing outperformance could be better understood then the possibility is created to bring others up to the same level and to raise the general competitiveness of the community.

Universities, science and innovation in a globalised world

The European project SCIFI-GLOW ([11]) looks in an integrated way at the triangle of higher education, research and innovation; in particular it examines how the organisation of the "knowledge sector" influences the behaviour of firms and markets in a globalised world. From the academic side, universities and research institutes need to understand the relationship between their internal organisation, their market environment and their performance. The same is true for firms, but with the additional dimension of their international trade. The changing conditions of trade have important consequences for European social aims, given the impact of globalisation in raising income inequality and uncertainty and thereby undermining social inclusion and cohesion. SCIFI-GLOW brings together researchers interested primarily in the knowledge economy and those who study the effect of globalisation in terms of trade flows, the organisation of firms and product and labour market outcomes.

(11) http://scifiglow.cepr.org/

Mathias Dewatripont, from the Université Libre de Bruxelles and CEPR, introduced two examples of the work of SCIFI-GLOW on the evolution of the knowledge sector in the global economy. The first concerned the impact of university funding and organisation on their productivity and the second discussed international changes in scientific performance as measured by citations.

With increasing globalisation has come increasing scrutiny of the differences in the performance of countries' universities. Such performance differences are thought to be especially important for innovation in science, technology, and the industries that depend upon them. SCIFI-GLOW created several measures of autonomy, governance, and competition for research funding for both European and US universities. The US has the highest performance (measured by the sum of Shanghai ratings) and the next nearest country, the UK, has only one quarter as many. Much of this is because the US is large; Canada and the UK do slightly better than the US on a per-person basis. A US sized Europe can be artificially created by adding up the countries of continental Europe that have the highest sums of rankings until their population is equal to that of the US This procedure generates a sum of Shanghai rankings that is equal to 62% of the US total. Analysis of the relationship between performance and the hypothesised independent variables (autonomy, governance, competition) showed that university autonomy and competition are positively correlated with university output, both in Europe and for public universities in the US The correlations are merely suggestive; they do not prove causality.

Causality was addressed by examining the impact of "exogenous shocks" to funding in US universities. Unpredictable increases in funding uncorrelated to other factors can occur in US funding. When a state university receive such a positive funding shock the consequence in terms of incremental output is greater if they are more autonomous and greater if they face more competition from private research universities. It also transpires that during periods when competition for federal research funding has been strongest, universities have produced more patents when they receive an exogenous funding shock, suggesting again that competition stimulates research skills (cf. SCIFI-GLOW report on *The governance and performance of research universities: Evidence from Europe and the US*).

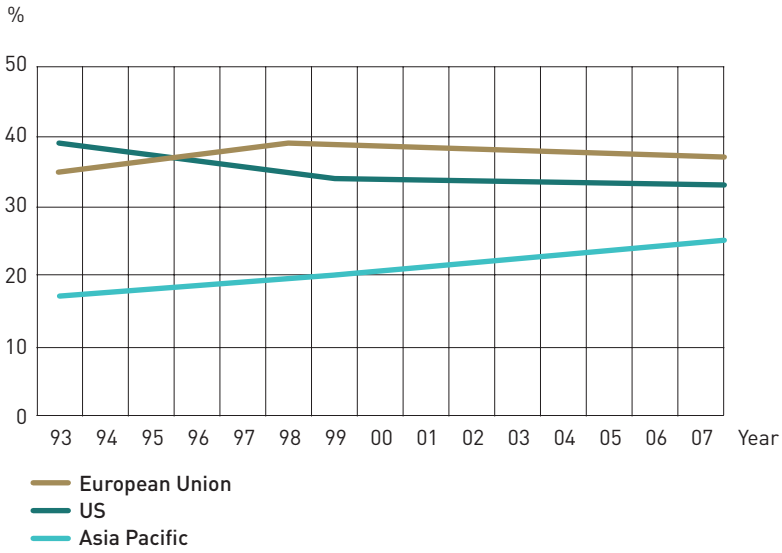
The implications for the EU are that growth in advanced countries or regions benefits from well performing universities and that their performance is determined by a combination of funding, autonomy, and competition for grants. Best practice in Europe is the equal of the US, but it is localised and needs to be more widely transferred, recognizing that there may be more than one model for achieving a good combination of autonomy and competition – Switzerland and the UK both do well in international comparisons with different models of funding and governance. The EU, in comparison with the US, also suffers from a university funding deficit: US universities have total funding of around 3.3% of GDP, but in the EU this is 1.3%. The high funding rate in the US is largely

from student fees; this model is not sympathetic to the poor; it does not promote inclusiveness and it may not be acceptable in much of Europe.

The second example chosen by Mathias Dewatripont was a comparison of the scientific performance of the US and the EU15. *Figure 7* shows how the geography of science is changing. The US continues to lose share in scientific publications; since 1994, the EU has surpassed the US as the largest block, but the rise of Asia Pacific has been remarkable and is mainly from China. Science is moving towards a multi-polar world.

The SCIFI-GLOW project has investigated this trend in detail. Scientific performance is identified with the number of citations received by published articles. Eight thousand academic or professional journals indexed by Thomson Scientific were included in the study; providing a large sample of almost eight million articles published in the period 1998-2007, receiving approximately sixty-five million citations.

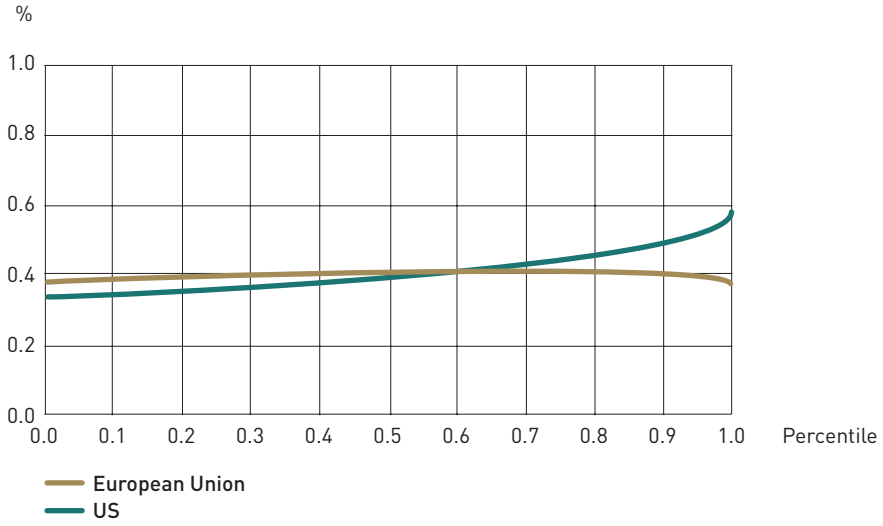
Figure 7 – A changing geography of science
(percent of science publications, all fields)



Source: European SCIFI-GLOW project and Thomson Reuters National Science Indicators

In fifteen disciplines, as well as in science as a whole, the EU share of total publications is greater than that of the US In contrast, the average citation rate in the US is greater than in the EU in every one of the twenty two fields. In the seven fields where the share of articles is greater in the US (Molecular Biology and Genetics; Immunology; Neuroscience and Behaviour; Psychology and Psychiatry; Economics and Business; Social Sciences, General, and Multidisciplinary), the initial gap between the US and the EU shares widens towards the more cited articles. In all other cases (except agricultural sciences) the US surpasses the EU at some point towards the high end of the curve. *Figure 8* shows as an example the data for all sciences combined; if all publications are considered then the EU has about 37 % and the US 33 %. If the publications are ranked by citations then the share of the US exceeds that of the EU at around the 50 % percentile; at the 95 % and 99 % percentiles the difference is substantial.

Figure 8 – Shares of publications by percentile



Source: European SCIFI-GLOW project

This strong performance of the US scientific community at the upper tail of the citation distribution is intuitively coherent with the findings described earlier for university performance generally: the strong competition among the top public and private universities and the incentives used to attract good scientists from all over the world and to extract the most from them.

The US continues to attract the majority of foreign brains as students and as scholars. With a high stay-rate, foreign scientists contribute substantially to the US science and technology.

The rise of Asian science will strongly influence the future of scientific research and the locus of activity. Despite the rise in local scientific capacity, the absolute outflow of students from China has not diminished. The rate of return of scientists to China is low but rising. International cooperation networks change only gradually and are heavily correlated with human capital flows. This suggests that a multi-polar science world is in the making, with a strong and virtuous US-China nexus; Europe will need to find policies to cope.

Mathias Dewatripont proposed measures to strengthen the position of the EU in this changing world. Policies should support engagement in globalisation through collaboration in global networks; they should seek to attract foreign talents and let them circulate with the ERA; they should promote openness at borders to encourage students and scholars from outside the EU and should allow circulation within the EU to allow specialisation in hot spots and effective diffusion of results. Policies should support sending scientific talents abroad and should stay connected with them afterwards. In short, the ERA policy agenda should be accelerated, with a focus on external openness, intra-EU mobility and excellence.

The place of Europe in global networks of innovation

The European project INGINEUS [12] reveals yet another layer of the global R&D system through its analysis of global innovation networks and their relevance to the EU. Globalisation and the rapid growth of some emerging economies in the world will have a radical effect on the competitiveness and strategies of European Union firms, industries and regions. Global sourcing and assembly have been practised for many years and are now standard; at first decisions were governed principally by manufacturing efficiency. Multinational firms outsourced parts of production processes to manufacturers in Asia and other low-cost locations around the globe, while retaining the most knowledge intensive assets at home. This is no longer the case.

Multi-nationals now look for locations where the right mix of local competences allows them to tap into local value chains. This possibility is not limited to advanced economies, but increasingly attractive options are available in developing countries that position themselves as attractive knowledge-intensive locations. INGINEUS studies the determinants of this process and analyses its implications both for the EU and its emerging partner countries in the developing world; it focuses particularly on the evolution of global

(12) http://ingineus.eu

production networks (GPNs) into global innovation networks (GINs) and the impact that this new process of global capitalism has on knowledge intensive activities in the EU. The changing emphasis is important for the EU; 20 % of the R&D done by the top EU R&D companies is now performed outside EU. Inward R&D related FDI has increased in Europe since 2007; some Chinese and Indian firms are now top R&D investors in Europe. These shifts have to be understood by policy-makers and incorporated into policy design. The challenge for EU is to attract and retain knowledge intensive activities, but the changes also offer opportunities to tap into new pools of knowledge worldwide. The critical conclusion is that Europe 2020 strategy must be set in a global context when basing growth on knowledge.

INGINEUS has collected statistical data on inward R&D investments by non-EU firms and completed a literature review of institutional aspects of global innovation networks. A survey has been initiated of firms in selected EU countries and three case studies are underway. Cristina Chaminade, from the Lund University, who presented INGINEUS, shared with the meeting some of the early insights about how and why GINs are formed and where Europe stands in this new field.

GINs are deepening and are moving upstream from development to research. In February 2009, the Danish company Novozymes that is a specialist in enzymes for biofuel production agreed with Chinese companies to develop commercial scale ethanol production from agricultural waste and to position themselves as world leaders in second-generation bioethanol by 2015. A central element of this strategy is Novozymes' R&D centre in the Zhongguancun Science Park in Beijing.

Ericsson has established R&D centres in several major Chinese cities, including Beijing, Guangzhou, Shanghai, Nanjing, Qingdao and Chengdu. Qualcomm Incorporated, a developer of advanced wireless technologies, products and services has recently established an R&D centre in Shanghai. Autoliv has also opened an R&D centre in Shanghai. These are all examples, and there are many more, of the rapidly developing practice of off-shoring innovation networks.

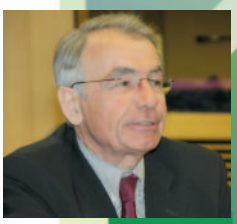
It is not a one-way street. Some developing countries are including European centres in their innovation networks. Tooltech, an Indian engineering company specialising in automotive 3D modelling, has located a daughter company in Munich that deals with CAD and simulation, offering design and production solutions to European automobile companies. At the same time the company can benefit from exposure to the high skill levels of the German car industry and adapt its own products to European mandatory standards. The important incentives for emerging economies to locate innovation centres in Europe appear to be access to strategic knowledge and markets and access to knowledge infrastructure and services. Location incentives for R&D

activities and access to physical infrastructure and production facilities appear to be less critical determinants of location.

The financial crisis has induced two distinct strategies for the management of innovation networks by European firms. One is to increase the outsourcing, especially in China; this is presumably to reduce personnel costs and to take advantage of the crisis to impose structural change that might otherwise have been difficult – it has been the main strategy. The other choice is to concentrate innovation in Europe, presumably to reduce logistic and management costs – this is less common.

For the future, China and other emerging markets will be important contributors to innovation. Europe must shape its policies to create a vital global hub in knowledge-intensive activities that is attractive to the most specialised and innovative companies across the world; a hub that is widely and strongly integrated with sources of knowledge from outside the continent. To achieve this ambitious goal Europe must stimulate inward and outward mobility of highly skilled workers. There is still in Europe a deficit of knowledge in some specific areas that needs to be filled by imported skills; immigration laws are not generally open enough to make Europe an attractive location and the rewards can be less than elsewhere.

The capacity of companies in Europe to generate and absorb knowledge must also be addressed. The ability of a company to absorb knowledge depends in the first instance on its own knowledge-base. A broad policy to enhance the knowledge capability of firms in Europe should strengthen the relationship of the financial sector to innovation; should focus on ensuring that the 3% target for R&D is met with good research; should strengthen the autonomy of universities and provide them with more generous funding. These actions are necessary if the European environment for innovation is to succeed.



Impacts and forward looking of the Innovation Union

The final session addressed the future using insights from economic modelling and foresight studies.

Evaluation of research in Europe

One objective of the Europe 2020 strategy is to improve the competitiveness of European countries through the promotion of knowledge intensive activities. A commitment to allocate 3 % of GDP to R&D is an important element of the strategy. The evaluation of R&D policies is difficult; quantifications of the impact of R&D expenditure on economic performance at a firm or sectoral level are available, but there are few assessments at national level or for the EU. The link between R&D and economic performance is not only difficult to capture, but is changing. The knowledge spillovers between Member States are increasing and the service activities linked to R&D are becoming more prominent; the importance of intangible capital is modifying the link between R&D and innovation. DEMETER [13] is a European project which builds a system of tools based on applied modelling that can be used for the ex ante evaluation of research and innovation policies at sectoral and European level; it was introduced to the meeting by Paul Zagamé, from the Ecole Centrale de Paris and Sorbonne University.

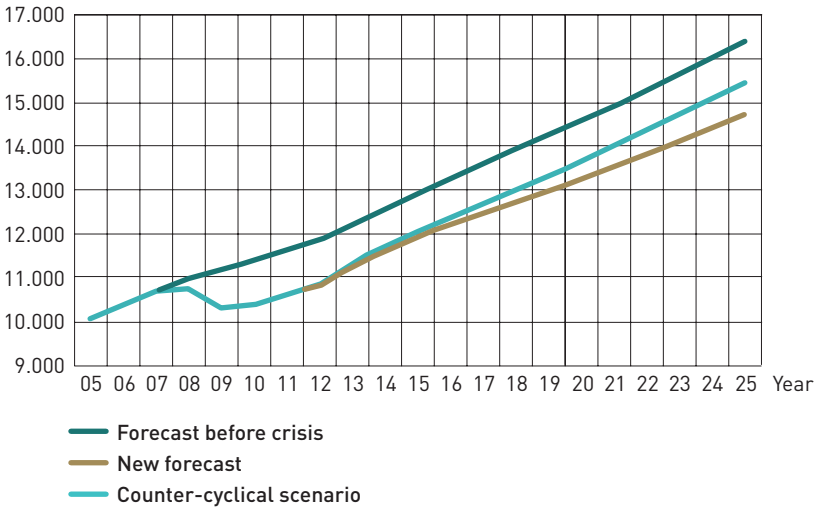
The most significant policy question concerning R&D at present is whether and how it should be modified during this time of financial and economic crisis. The majority view is that R&D effort should be reduced because of the general stress on state budgets and the reduced demand in the economy. On another reading, a counter-cyclical research policy could be a way of restoring the economy and achieving the pre-crisis growth targets through efficiency improvements stemming from innovation; it is also an advantage that the opportunity cost of R&D policies is lower during the crisis.

Figure 9 shows forecasts from DEMETER of economic growth before (line 1) and after (line 2) the crisis. It is evident that the crisis causes output to fall in the short-term, but there are also long-term effects; the impact of the crisis, as measured by the shortfall from the pre-crisis path, increases over time because of the reduced effort in R&D and the consequent deficit in innovation and efficiency; the GDP gap (8.7 % in 2010) increases up to 2025.

The evolution of employment, shown in *Figure 10*, is somewhat similar, but more muted; the employment gap is half filled by 2015 because the lowering of wages during the crisis allows a growth richer in employment during economic recovery.

(13) http://www.demeter-project.eu

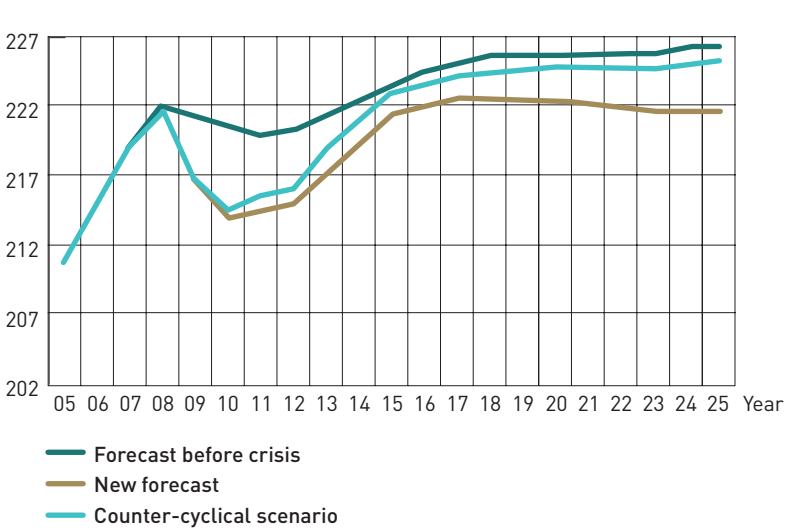
Figure 9 – Evolution of GDP in pre- and post-crisis forecast scenarios



Source: European DEMETER project

DEMETER has constructed a new post-crisis scenario with a countercyclical R&D policy reaching the 2020 target of 3%. The additional R&D is financed mainly by private sector, the contribution from which reaches 2% in 2020. The results are shown in the lines 3 of *Figures 9 and 10*. The simulation suggests that the counter-cyclical policy is successful; 43% of the GDP gap is filled in 2025 and GDP growth in the new scenario is faster than before the crisis, allowing convergence with the pre-crisis scenario in a remote future. With the counter-cyclical policy the employment gap is almost filled in 2015 and again the impact on employment is less than on output for the same reason as before; the fall in wages stimulates employment. For this reason, the major drivers for GDP in the new scenario are first exports and secondly final consumption; this is the reverse of the pre-crisis predictions.

Figure 10 – Evolution of GDP with counter-cyclical research policy



Source: European DEMETER project

It is useful for EU policy-makers to consider what the impact might be of increasing funding through the Framework Programme. The is a small share of total European R&D; it came to about 0.054 % of EU GDP in 2009 and can increase under the 7th EU research framework programme (FP7) to 0.076 % by 2013. But the programme has strong positive externalities through spillovers, network effects and transfer of best practice. Within DEMETER a simulation was made of doubling expenditure in FP8; doubling the funding would raise expenditure under the programme to 0.15 % of GDP by 2020. It was estimated that the consequential impact on total R&D effort would be an increase of 0.18 % of GDP. The simulation indicated that this increase in R&D effort would cause a 1.2 % higher level of GDP in 2020 and create 1.1 million jobs (0.5 %).

Foresight to align research and innovation with policy needs

The aim of the European FARHORIZON ([14]) project is to use foresight techniques to align research with longer-term policy needs in Europe and the range of policy and regulatory competences enjoyed by the European institutions. Luke Georghiou, from the University of Manchester, presented the project, explaining that it starts from the position that research in Europe as a part of a wider ecosystem embracing innovation and other policy domains and many actors within them. The integration, coordination and resource allocation envisaged in the ERA concept are only likely to be achieved via engagement in Grand Challenges and other mission-oriented joint programming. For this to happen, the essential prerequisite is a common vision among key actors and a commitment to joint implementation. Foresight approaches may be used to build such a vision and can help translate broadly desirable socio-economic goals to concrete proposals for action, including recommendation on realignment of the research system.

Managing the knowledge economy can be envisaged as managing four flows of assets: people; finance; services and knowledge. It is essential to have the right skills and talents, to retain the best graduates from our education system and to achieve a critical mass in labour markets for creative people. Finance is needed along the innovation chain through support from banks for growth companies, seed capital, venture funding and enabling investment in infrastructure (physical and intangible). Infrastructure and associated services for innovation include incubators, science parks, digital connectivity, business support and access to equipment for testing. The last flow is the flow of knowledge and ideas from universities, business, research organisations and users. The translation of goals to reality must recognise and deal with all these considerations in an integrated, focused and plausible manner.

The methodology centres on success scenarios; these are credible and coherent pictures of the future that incorporate a vision of success. They set ambitious targets for all stakeholders and merge different expectations in a coalition to advocate for the vision. The desirable future is compared to the ability of the research and innovation ecosystem in the area to deliver and a roadmap for change is constructed, identifying the actions needed to make the vision real. To be effective the process needs to engage people who are in a position to influence policy and strategy. Four pilot domains have been selected: agriculture and adaptation to climate change; innovation policy; the future of education in the context of demographic change and breakthrough applications of nanotechnology.

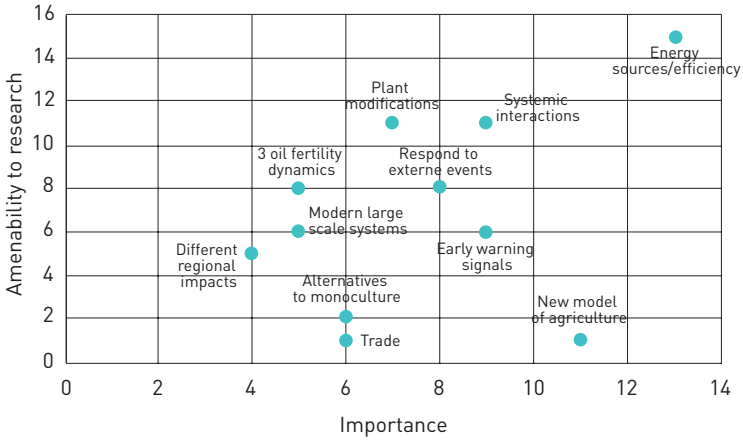
The first application was to research on the adaptation of agriculture to climate change. This is overseen by the Standing Committee on Agricultural

(14) http://farhorizon.portals.mbs.ac.uk/

Research (SCAR) and is one of the best coordinated research areas in Europe. A workshop was conducted with twent-five experts including representatives from SCAR, the Commission and Member States with the aim of identifying breakthrough technologies which could have a major impact upon the capacity of European agriculture to adapt to climate change in agriculture and then defining the research and innovation strategies needed to develop and make use of such technologies.

A principal tool for reaching consensus is the chart shown in *Figure 11* that shows the trade-offs between the importance of various topics and how amenable they are to research. A topic scoring highly on both counts would normally be a priority for research.

Figure 11 – Importance vs amenability to research



Source: European FARHORIZON project

In this case the success scenario encompassed technological and social change up to 2050 and was reported as a historical account looking back from that date:

"Nitrogen fixing in grasses was key breakthrough in the early 2020s. Opposition to genetically modified approaches was dissipated when some key concerns of opponents were alleviated by creation of low risk plants (e.g. without the ability to spread pollen). ... Much of the plant molecular biology of last decades of 20th century had remained in research silos until an integrated approach to the adaptation challenge unleashed its interdisciplinary potential" ... "Traditional knowledge and old practices proved an important take-off point."

The second example addressed the question of giving innovation a central role in European policy with the Europe 2020 strategy including the Innovation Union and the Strategy for European Research and Innovation. The workshop

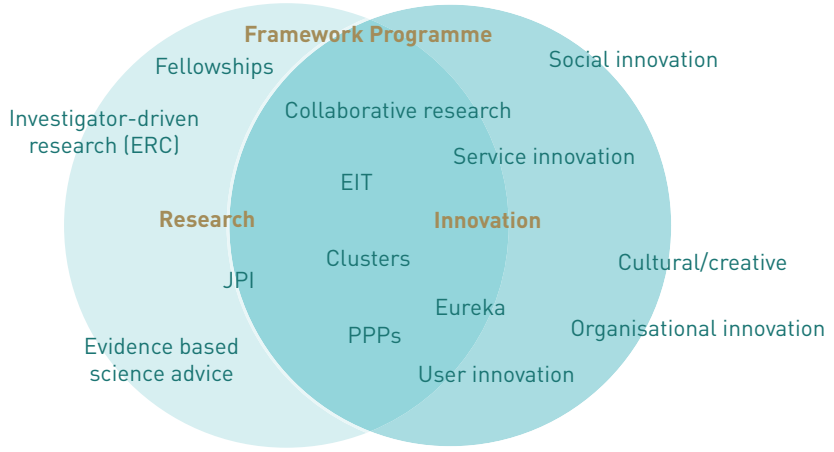
comprised twenty-seven senior actors in European research and innovation policy from the Commission, Member States and other agencies. The aim was to build a vision of success as to how European institutions can build shared responsibility for innovation. Policy priorities that came out of the workshop included specific actions to:

- link Grand Challenges to creation of lead markets;
- improve procurement processes for innovation and attitudes to procurement;
- reinforce and better link existing innovation policy instruments;
- empower public administrators to be more risk-taking and take initiative;
- ensure coherence and clarity in EU strategy and approach to Research and Innovation policies;
- develop new instruments such as social challenge innovation platforms, EU-wide clusters and specialisation.

These specific actions have to be conceived within a full picture of the research and innovation universe, represented schematically in *Figure 12*. Much of the debate around innovation policy is focused on the central area of this diagram; the right hand side in particular receives less attention than it merits.

FARHORIZON is still at an early stage, but initial reactions from participants have been positive and it appears to have given a good impetus to the use of foresight techniques in European policy.

Figure 12 – The European research and innovation universe



Source: European FARHORIZON project (adapted)

Conclusions

The conference demonstrated fully the richness and relevance of the framework programme, theme socio-economic sciences, to critical aspects of strategy and policy for innovation. Results from research confirmed the central position of innovation in ensuring a confident and successful future for Europe.

The conference brought home how successful innovation depends on multiple actors, both horizontally along the chain from research to commercialisation and vertically through levels of governance from the EU through national and regional governments. Integration of these actors into a coherent deployment needs institutional adaptation; the Research and Innovation Partnerships will be an essential element. The insights from research into the details of the interactions among actors will be useful in guiding implementation.

Finance is still a constraint, both the absolute volumes and the efficacy of its application. Vehicles for funding the conversion of the results of research into technologies ready for commercialisation are still weak; venture capital is insufficient and often not prepared to accept the upstream risks.

Globalisation affects every stage of innovation. Europe must be prepared to meet the challenges of new competitors not only in products, but in the generation and application of knowledge; but it should also be prepared to benefit from the capacity in these fields of emerging markets, by incorporating them into innovation networks and providing an attractive working environment for the world's best researchers.

The ERA policy agenda should be accelerated, with a focus on external openness, intra-EU mobility and excellence.

Acknowledgements

This publication contains the results of the European conference entitled "*Europe 2020 strategy: Innovation insights from European research in socio-economic sciences*" that was held in Brussels at the European Commission on 1 June 2010. This conference attracted more than 150 stakeholders from the academic and research community, from governmental and non governmental organisations, from the public and the private sectors.

All the speakers quoted in this publication have to be thanked for the quality of their speeches and presentations which give a good flavour of what the Socio-economic sciences and Humanities theme (SSH) of the seventh Framework Programme (FP7) is funding mostly under the activities entitled "Growth, employment and competitiveness in a knowledge society" and "Foresight".

We show regards for the following speakers coming from the academic community: Aggelos Tsakanikas from the National Technical University of Athens (AEGIS project), Bart Verspagen from the Maastricht University (DIME project), Rosina Moreno from the Universitat Barcelona (IAREG project), Jonathan Haskel from the Imperial College London (COINVEST project), Marieke Huysentruyt from the London School of Economics and Ute Stephan from the Katholieke Universiteit Leuven (SELUSI project), Luis Rubalcaba from the Universidad de Alcalá (SERVPPIN project), Mariana Mazzucato from the Open University (FINNOV project), Gianmarco Ottaviano and Carlo Altomonte from the Bocconi University and BRUEGEL (EFIGE project), Mathias Dewatripont from the Université Libre de Bruxelles and CEPR (SCIFI-GLOW project), Cristina Chaminade from the Lund University and Alireza Naghavi from the Fondazione Eni Enrico Mattei (INGINEUS project); Paul Zagamé from ERASME (DEMETER project) and Luke Georghiou from the University of Manchester (FARHORIZON project).

Thank you very much to Juan Tomas Hernani from the Spanish Secretary General for Innovation for presenting the EU presidency views and to Saulo Barretto for sharing the Brazilian experience in the implication of society in defining technological needs.

Many thanks to the European Commission colleagues that chaired and introduced the sessions and for the animation of the discussion. Particular thanks to Anneli Pauli for her intervention on behalf of Máire Geoghegan-Quinn, Commissioner in charge of Research and Innovation; to Jean-Michel Baer and Pierre Valette from DG Research that initiated and supported this event; to Agnès Hubert from the Bureau of European Policy Advisers for chairing the session on social innovation.

This report has been drafted by Nigel Lucas and supervised by Domenico Rossetti di Valdalbero who organised this conference.

Seventh research framework programme (FP7)

Theme Socio-economic Sciences and Humanities (SSH)

Projects in the field of innovation and knowledge economy

Project's acronym and number of the grand agreement	Title of the project
AEGIS (225134)	Advancing knowledge-intensive entrepreneurship and innovation for growth and social well-being in Europe
COINVEST (217512)	Competitiveness, innovation and intangible investment in Europe
DEMETER (217397)	Development of methods and tools for evaluation of research
EERQI (217549)	European educational research quality indicators
EFIGE (225551)	European firms in a global economy: internal policies for external competitiveness
EFP (244895)	European Foresight Platform – Supporting forward looking decision making
FARHORIZON (225662)	Use of foresight to align research with longer term policy needs in Europe
FINESS (217266)	Financial systems, efficiency and stimulation of sustainable growth
FINNOV (217466)	Finance, innovation and growth: changing patterns and policy implications
FRIDA (225546)	Fostering innovation and development through anchors and networks
GLOBINN (217296)	The changing nature of internationalization of innovation in Europe: impact on firms and the implications for innovation policy in the EU
GRASP (244725)	Growth and sustainability policies for Europe
IAREG (216813)	Intangible assets and regional economic growth
IKNOW (225695)	Interconnecting knowledge for the early identification of issues, events and developments (e.g. wild cards and associated weak signals) shaping and shaking the future of science, technology and innovation in the European Research Area
INDICSER (244709)	Indicators for evaluating international performance in service sectors
INFU (225229)	Innovation futures in Europe: a foresight exercise on emerging patterns of innovation. Visions, scenarios and implications for policy and practice
INGINEUS (225368)	Impact of networks, globalisation, and their interaction with EU strategies
INNODRIVE (214576)	Intangible capital and innovations: drivers of growth and location in the EU
INNOS&T (217299)	Innovative S&T indicators combining patent data and surveys: empirical models and policy analyses

Project's acronym and number of the grand agreement	Title of the project
MONFISPOL (225149)	Modelling and implementation of optimal fiscal and monetary policy algorithms in multi-country econometric models
PEGGED (217559)	Politics, economics and global governance: the European dimensions
SCIFI-GLOW (217436)	Science, innovation, firms and markets in a globalized world
SELUSI (217622)	Social entrepreneurs as "lead users" for service innovation
SERVICEGAP (244552)	The impact of service sector innovation and internationalisation on growth and productivity
SERVPPIN (217247)	The contribution of public and private services to European growth and welfare, and the role of public-private innovation networks
SESTI (225369)	Scanning for emerging science and technology issues
VICO (217485)	Financing entrepreneurial ventures in Europe: impact on innovation, employment growth, and competitiveness
WALGING (244597)	Work and life quality in new and growing jobs
WIOD (225281)	World input-output database: construction and applications
WORKABLE (244909)	Making capabilities work

European Commission

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Innovation is a key component of the Europe 2020 strategy. The theme Socio-economic Sciences and Humanities (SSH) of the Seventh Research Framework Programme (FP7) supports several initiatives dealing with a better understanding of the knowledge-based economy. This publication addresses in particular the issues of intangible investments, the role of finance to push innovation, the importance of entrepreneurship, the dynamics of institutions and markets, regional economic growth, social innovation, social entrepreneurs, the service economy, the internationalisation of firms and the globalisation of knowledge, global innovation networks and the R&D and innovation perspectives.

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