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A Knowledge Economy Paradigm and its Consequences

Luc Soete

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United Nations University - Maastricht Economic and social Research and training centre on Innovation and Technology
Keizer Karelplein 19, 6211 TC Maastricht, The Netherlands
Tel: (31) (43) 350 6300, Fax: (31) (43) 350 6399, e-mail: info@merit.unu.edu, URL: http://www.merit.unu.edu

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Luc Soete

Abstract

During the 1980s and 1990s "Active labour" market reforms opened up labour markets in Europe, making them more flexible without putting in jeopardy the essence of the social security protection model. Countries that went furthest in such "active labour" market reforms such as the UK, the Scandinavian countries, and the Netherlands witnessed not just reductions in unemployment, but also impressive increases in employment participation rates, particularly among underrepresented groups in the labour market. The challenge today appears more or less similar, but this time with respect to knowledge. Interestingly, it is those EU Member States that have succeeded most in "activating" their labour markets and developing better functioning social welfare models that have performed best in terms of knowledge investments. This suggests, that success in boosting knowledge investment generates the public resources for the development of social welfare models capable of addressing rapid change, and in particular the global changes of the 21st Century.

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1. INTRODUCTION

From a traditional economic perspective the easiest way for policy makers to increase a country's welfare is to increase the supply of its input factors. The input factor, which offers most scope for easy and at first sight straightforward expansion, is of course labour. From the experiences in Scandinavian countries, the UK to the one in the Netherlands, it appears that an active labour market policy aimed at raising the employment activity level can indeed result in an immediate improvement in output growth performance. Given the gap between the activity level targets set in Lisbon and current employment levels in many EU countries, there are likely to be still much job-extensive growth opportunities in EU countries based on the further expansion of employment to underrepresented groups in the labour force: women, immigrants, 55+ citizens, students combining e.g. their study with part-time jobs, etc. The relatively high Dutch growth performance in the 90's e.g. was clearly associated with such a job-extensive growth process.

However, at some stage such labour expansion growth in a high-income setting will become confronted with decreasing returns: a decline in the willingness of those "voluntary non-active" in the labour force[1] to seek formal paid employment. Exchanging the various activities they are involved in outside of the formal wage income sphere – not just leisure or time spent on hobbies, but also social and voluntary work, care, household and community activities – will barely be influenced by specific incentive schemes and the active labour market policy tools put in place. Following Becker it can be argued that with the average rise in hour wage, the welfare value of leisure and voluntary "non-work" activities has also risen. In short, there are limits to raising activity levels as sustainable engines for growth in high-income societies. By which I am not implying that these levels are currently being reached in EU countries[2], rather that sustainable growth opportunities of such labour expensive growth are intrinsically limited, even more so when taking into consideration the rapidly ageing structure of Europe's population.

An even more straightforward economic argument holds with respect to the decreasing returns accompanying the accumulation of capital, the other traditional production input factor. For

[1] I am hence not referring to the unemployed.

[2] As Aiginger and Guger highlight: the average employment ratio of the continental European countries Germany, France, Belgium and Italy is well below that of the group of active labour market policy countries. See Karl Aiginger and Alois Guger, *The European Social Model. Difference to the USA and Changes Over Time*, (Vienna: WIFO, September 2005).

high-income countries, the only input factor, which promises long term sustainable output growth is ultimately knowledge accumulation. Knowledge accumulation in its various forms: embodied in more efficient capital goods, in human capital, in organisational methods, in new production techniques or products.

There is thus nothing peculiar about the priority given to and emphasis put on knowledge and innovation as engines for sustainable growth, both in the original and recently revised official Lisbon strategy declarations.[3] In the present short note, I draw the attention to five particular features of knowledge accumulation and innovation, that seem to have been insufficiently addressed in the practical (past and present) implementation plans of the Lisbon strategy.

First there is the quite fundamental way in which knowledge accumulation and innovation has changed over the last Century and is different today from what it was forty to twenty years ago. As a result, realising the welfare and efficiency gains resulting from knowledge accumulation and innovation is today more closely and intractably linked to the dynamism and windows of opportunity offered by individual countries' social model. Europe's social model (ESM) as represented by its German continental version[4] was first and foremost an industrial society model: a model very much in line with a process of technological accumulation characterized by incremental innovations.

As I argue under point 2, proposals for reform of the ESM, however defined, should need to take into account the changing nature of technological change as described in section 1. Ideally this might well involve recognizing more explicitly the emerging dual nature of the labour market. It is the "knowledge workers" segment of that labour market which seems today to lack dynamism in Europe, worse which appears today to undermine the financial sustainability of the ESM. Reform policies should in my view focus on that particular segment of the labour force.

My third point addresses more directly the policies designed to increase knowledge investments in Europe as formalized in the so-called Barcelona R&D targets. As I argue such R&D investment cost targets are somewhat odd. Better would be to focus more specifically on the

[3] European Commission, *Implementing the Community Lisbon Programme: Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: More Research and Innovation – Investing for Growth and Employment: A Common Approach* (Brussels: SEC, 2005).

[4] Europe's social model cannot be described in precise terms. It consists of rather different diversified models across Europe. Broadly speaking though one might consider two main models: one financed through general taxation (the "Beveridge system") and the other based on social security contributions (the "Bismarck system"). Denmark, Greece, Spain, Ireland, Iceland, Italy, Norway, Portugal, Finland, Sweden and the UK all belong more or less to the first system. The "Bismarck model" can be found in Belgium, Germany, France, Liechtenstein, Luxembourg, the Netherlands, Austria and Switzerland.

underlying 1% government expenditure target and what could be called the "*Lisbonisation*" of member country's fiscal policies: the relative amount of public investments in knowledge and innovation in the broadest sense, i.e. including e.g. education. There is a need here to recognize that apart from purely quantitative targets with respect to fiscal deficits aimed at economic stability, there is also a "quality" part in member states' budgets. The same holds by implication for the European budget. Even today, there seems to be no direct link between the Lisbon priority for "knowledge and innovation as engines of sustainable growth" measures and the "macroeconomic policies for growth and jobs" heading of the revised Lisbon strategy **(Table 1).** The latter are still written primarily from the perspective of economic stability and fiscal sustainability; no mention is made of the need for a "*Lisbonisation*" of fiscal policies.

But the national focus on the need for investments in knowledge accumulation will also need to recognize the underlying shifts in the nature of technological accumulation and innovation highlighted under point 1. The one I wish to pinpoint in my fourth point is the international dimension. Achieving technological international competitiveness might well, to paraphrase Paul Krugman, have become a dangerous European obsession, certainly when viewed against the global challenges and threats to national welfare.[5] The balance of sectors and areas where technological competitiveness is essential for maintaining European welfare (aerospace, information societies technologies, advance manufacturing, etc.) as opposed to sectors where global diffusion and access to knowledge is becoming much more crucial for Europe's long term welfare (energy saving, sustainable development and climate change, health and diseases, security) is shifting rapidly. Is it not time for a shift in the importance given by European policy makers to the strengthening of international intellectual property in favour of access to knowledge?

My final point addresses the growing bureaucracy surrounding the implementation of European knowledge investment programmes, as exemplified by the current FPs The "*Lisbonisation*" of the European budget should involve also a real quality improvement in the management of European research programmes. The increase in EC accountability and control rules has meant that many of these programmes no longer can count on the interest and support of many of Europe's best researchers, both in the private and academic sphere. Research is an area, which is particularly sensitive to bureaucratic rules and regulations "crowding out" the internal motivation of researchers.

[5] Paul Krugman, "Competitiveness: A dangerous obsession," *Foreign Affairs*, 73, 2 (1994).

In short, the shift in the knowledge economy paradigm agenda has implications which go way beyond the traditional research and innovation policy agenda discussed by European member countries' respective ministers and administrations on research and innovation. A truly integrated Lisbon strategy will have to take more fully into account these implications as highlighted in the conclusions.

2. ON THE CHANGING NATURE OF TECHNOLOGICAL ACCUMULATION AND INNOVATION

2.1 From S&T to industrial R&D

Science and Technology has been the subject of public interest and support for centuries. The acceptance of a utilitarian argument for the public support of basic scientific research predates the Industrial Revolution itself.[6] Although government and university laboratories had existed earlier, it was only in the 1870s that the first specialised R&D laboratories were established in industry.[7] What became most distinctive about this form of industrial R&D was its scale, its scientific content and the extent of its professional specialisation. A much greater part of technological progress became now attributable to R&D work performed in specialised laboratories or pilot plants by full-time qualified staff. It is this sort of professional work, which is today recorded in official, internationally harmonized R&D statistics. Already in the early days of defining what was to become the OECD Frascati Manual definition of "R&D", it was obvious that it would not be possible to measure the part-time and amateur inventive work of typical 19th century research. The present industrial R&D statistics are therefore a reflection, and also a measure of, the professionalisation of R&D activities. And while the extent of specialisation should not be exaggerated – even today in many manufacturing firms the "technical" or "engineering" departments or "OR" sections contribute far more to the technical improvement of an existing process than the formal R&D department, more narrowly defined – the balance has significantly changed over the 20th Century with a gradual further specialisation of the R&D function. It is the emergence of this particular function, which can be most closely identified with the emergence and growth of the industrial society.

This industrial research "revolution" was, however, not just a question of change in scale. It also involved a fundamental change in the relationship between society on the one hand and

[6] The first clear and forceful advocacy of a national S&T policy based on public support for research was attributed by Freeman to Francis Bacon (1627). In *The New Atlantis*, he advocated the establishment of a major research institute ("Salomon's House") which would use the results of scientific expeditions and explorations all over the world to establish the "knowledge of causes, and secret motions of things". See C. Freeman, *The Economics of Industrial Innovation* (London: Penguin, 1974). See also for more detail C. Freeman and L. Soete, *The Economics of Industrial Innovation*, 3rd edition, (Cambridge MA: MIT Press, 1997), part IV of which gives a detailed overview of the historical development of public support for science, technology and innovation.

[7] See D. Mowery, "Industrial Research and Firm Size, Survival and Growth in American Manufacturing, 1921-46: An Assessment," *Journal of Economic History* (1983).

technology and science on the other. The expression "technology", with its connotation of a more formal and systematic body of learning, only came into general use when the techniques of production reached a stage of complexity where traditional methods no longer sufficed. The older, more primitive arts and crafts technologies continued to exist side by side with the new "technology". But the way in which more scientific techniques would be used in producing, distributing and transporting goods led to a shift in the ordering of industries alongside their "technology" intensity. Thus, typical for most Western industrial societies of the 20th Century, there were now high-technology intensive industries, having as major sectoral characteristic the heavy, own, sector-internal R&D investments and low-technology intensive, more craft techniques based industries, with very little own R&D efforts. And while in many policy debate, industrial dynamism became as a result somewhat naively associated with just the dominance in a country's industrial structure of the presence of high-technology intensive sectors, the more sophisticated sectoral studies on the particular features of inter-sectoral technology flows, from Pavitt to Malerba, brought back to the forefront many of the unmeasured, indirect sources of technical progress in the analysis.[8]

At the same time, the "science" and "technology" parts of research developed increasingly autonomously and with an increasing degree of independence from each other, certainly when compared to the early phases of the Industrial Revolution. The latter could be described as a period of "industrial enlightenment": a period of close and fruitful interactions between industrialists searching for a better scientific understanding of their technological inventions, and scientists keen on understanding the underlying scientific principles of those new industrial technologies.[9] Thus the further development of the steam engine influenced thermodynamics, whilst scientific knowledge of electricity and magnetism became the basis for the electrical engineering industry. The two bodies of knowledge were nevertheless generated by distinct professions in quite different ways and with largely independent traditions. The scientific community was concerned with discovery and with the publication of new knowledge in a form, which would meet the professional criteria of their fellow scientists. Application was ultimately of secondary importance or not even considered. For the engineer or technologist on the other hand, publication was of secondary or negligible importance. The first concern was with the practical application and the professional recognition, which came from the demonstration of a working device or design.

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[8] K. Pavitt, "Patterns of technical change: towards a taxonomy and a theory," *Research Policy*, 13, 6 (1984), pp. 343-73; F. Malerba, Ed, *Sectoral Systems of Innovation* (Cambridge: Cambridge University Press, 2004).

[9] J. Mokyr, *The Enlightened Economy: An Economic History of Britain 1700-1850,* Penguin New Economic History of Britain, forthcoming **2005.**

Elsewhere I have described the growing dichotomy between science and technology over the last two decades as a "Dutch knowledge disease" phenomenon – a process which has been set in motion in the 1970/80s and consisted of a dual "crowding out".[10] A "crowding out" of fundamental, basic research from private firms' R&D activities on the one hand and a process of "crowding out" of applied research from public, primarily academic university research. The first process found its most explicit expression in the reorganisation of R&D activities, from often autonomous laboratories directly under the responsibility of the Board of Directors in the 60's to more decentralized R&D activities integrated and fully part of separate business units. Today only firms in the pharmaceutical sector and a couple of large firms outside of this sector are still involved in the funding and carrying out of fundamental research (as reflected e.g. in the number of scientific publications authored by private firms). For most firms the increased complexity of science and technology has meant a greater focus on applied and development research and a more explicit reliance on external, university or other, often public, knowledge centres for more fundamental research input. Firms now "shop" on the world market for access to basic and fundamental research and choose the best locations to locate their R&D laboratories. In doing so they will not only hope to make their own, in-house R&D more efficient, but also look to the efficiency, quality, and dynamics of the external universities and public R&D institutions.

At the other end of the spectrum, public research investments in universities and other public research institutes became, in most advanced countries, increasingly subject to national public scrutiny over the 80's and 90's through systematic performance assessment and academic peer review. As a result, academic performance became even more explicitly the dominant incentive in public research institutes while applied, or more immediately relevant research, was second rated. As a result, in many countries, particularly in Europe, applied research became "crowded out" of the university environment.

These opposing "crowding out" trends in the nature of private and public research have to some extent accompanied the gradual shift in the economy from an industrial society to a more service based, immaterial economy, in which industrial production is no longer the prime recipient and carrier of technological improvement.

2.2. The emerging knowledge economy paradigm

[10] L. Soete, "The Lisbon Challenge: designing policies that activate," in R. Liddle and M. Rodrigues, Eds, *Economic Reform in Europe: Priorities for the Next Five Years* (London: Policy Network, 2004).

There has been over the last twenty years a major shift in the understanding of the relationships between research, innovation and socio-economic development.

First, economists have come to accept that knowledge accumulation might well be analysed, like the accumulation of any other capital good. In short that economic principles can be applied to the production and exchange of knowledge; and, that knowledge is intrinsically endogenous to the economic and the social system, not an external, "black box factor, only to be opened by scientists and engineers" in Christopher Freeman's celebrated words.[11] Hence, while knowledge has some specific features of its own, it can be produced and used in the production of other goods, even in the production of itself, like any other capital good that is used as an input in the production process. It also can be stored and will be subject to depreciation, when skills deteriorate or people no longer use particular knowledge and, in the extreme case, forget about it. It might even become obsolete, when new knowledge supersedes and renders it worthless; as in the case with leading-edge technologies.

However, there are some fundamental differences with traditional industrial capital goods. First, and foremost, the production of knowledge will not take the form of a physical piece of equipment, but will be embedded in some specific blueprint form (a patent, an artefact, a design, a software program, a manuscript, a composition), in human beings or even in organisations. In each of these cases there will be so-called positive externalities: the knowledge embodied in such blueprints, people or organisations cannot be fully appropriated, it will with little cost to the knowledge creator flow away to other firms or to the public knowledge stock. Knowledge is from this perspective a non-rival good. Many people can share it without diminishing in any way the amount available to any one of them.

Second, the emergence of the cluster of new information and communication technologies (ICTs) has also had a direct impact on research, international knowledge access and innovation. ICTs are in the real sense of the word an information technology, the essence of which consists of the increased memorisation and storage, speed, manipulation and interpretation of data and information. In short, it is what has been characterized as the codification of knowledge. As a consequence, information technology makes codified knowledge, data and information much more accessible than before to all sectors and agents in the economy linked to information networks or with the knowledge how to access such networks. But ICTs have also had a direct impact on the R&D process itself. Research laboratories are today equipped with sophisticated ICT equipment allowing more precision, reliability and expanding dramatically the scope for research in many different scientific fields. The intensive use of sophisticated ICT instruments

in the process of R&D is one of the major factors contributing to the increase in the efficiency in research over the last decades.

At the same time, the increased potential for international codification and transferability of knowledge linked to the use of ICTs, implies that knowledge, including economic knowledge becomes to some extent globally available. While the local capacities to use or have the competence to access such knowledge will vary widely, the access potential is there. ICT, in other words, brings to the forefront the enormous potential for catching-up, based upon cost advantages and economic transparency of (dis-) advantages, while stressing at the same time the crucial tacit and other competence elements in the capacity to access international codified knowledge. For technologically leading countries or firms, this implies increasing erosion of monopoly rents associated with innovation and shortening of product life cycles. Research efforts may not be profitable anymore in this setting, from the perspective of a single firm. The ability of each economic actor to innovate single-handedly in such a global setting is becoming more risky, and stresses the role of strong technology clusters and government investment in knowledge.

Third, the perception of the nature of innovation processes has changed significantly over the last decade. In Paul David and Dominique Foray's beautiful narrative historical analogy, innovation capability is today seen less in terms of the ability to discover new technological principles, but in terms of the ability to exploit systematically the effects produced by new combinations and use of pieces in the existing stock of knowledge.[12] This new model, closely associated with the emergence of numerous knowledge "service" activities, implies to some extent more routine use of a technological base allowing for innovation without the need for leaps in technology, a process which has sometimes been referred to as "innovation without research". It requires systematic access to the state-of-the-art technologies; each industry must introduce procedures for the dissemination of information regarding the stock of technologies available, so that individual innovators can draw upon the work of other innovators. As David and Foray highlight, this mode of knowledge generation – based on the recombination and re-use of known practices – raises also much more information-search problems and must confront the problems of the impediments to accessing the existing stock of information that are created by intellectual property right laws.

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[11] Freeman, *The Economics*.

[12] P. David and D. Foray, "An introduction to economy of the knowledge society," *International Social Science Journal*, 54, 171 (2002), pp. 9-23.

The new concept of a "science, technology and innovation system" is, in other words, shifting towards a more complex, socially distributed structure of knowledge production activities, involving a much greater diversity of organizations. The old system reviewed above under a), was, by contrast, based on a simple dichotomy between knowledge generation (R&D laboratories and universities) and production and consumption activities where the motivation for acting was not to acquire new knowledge but rather to produce or use effective outputs. The collapse (or partial collapse) of this dichotomy leads to a proliferation of new places having the explicit goal of producing knowledge and undertaking deliberate research activities, which may not be readily observable but nevertheless essential to sustain innovative activities in a global environment.

To summarize, traditional R&D-based technological progress which is still very much dominant in many industrial sectors ranging from the chemical and pharmaceutical industries to motor vehicles, semiconductors and electronic consumer goods has been characterized by the ability to organise technological improvements along clear agreed-upon criteria and a continuous ability to evaluate progress. At the same time a crucial part of the engineering research consisted, as Richard Nelson put it, "of the ability to hold in place": to replicate at a larger industrial scale and to imitate experiments carried out in the research laboratory environment. As a result it involved first and foremost a cumulative process of technological progress: a continuous learning from natural and deliberate experiments.

The more recent mode of technological progress described above and more associated with the knowledge paradigm and the service economy, with as extreme form the attempts at ICT-based efficiency improvements in e.g. the financial and insurance sectors, the wholesale and retail sectors, health, education, government services, business management and administration, is much more based on flexibility and confronted with intrinsic difficulties in replication. Learning from previous experiences or from other sectors is difficult and sometimes even misleading. Evaluation is difficult because of changing external environments: over time, among sectors, across locations. It will often be impossible to separate out specific context variables from real causes and effects. Technological progress will in other words be much more of the trial and error base yet without as in the life sciences providing "hard" data, which can be scientifically analysed and interpreted. The result is that technological progress will be less predictable, more uncertain and ultimately more closely associated with entrepreneurial risk taking. Attempts at reducing such risks might involve, as Von Hippel has argued, a much greater importance given to users, already in the research process itself.[13]

[13] E. Von Hippel, *Democratizing Innovation*, (Cambridge MA; MIT Press, 2004).

This shift as I will argue in the next section has major implications for the functioning of the ESM, as typified in the German version of that model. The German social model was to some extent the "ideal" type of social industrial model (with Japan) with strong incentives for firms to invest in the internal learning and upgrading of their work force, a close and privileged interaction between firms and higher education establishments (dual learning systems) and specialized industrial R&D and engineering departments, guaranteeing a continuous improvement in production and organisational efficiency. It resulted in continuous improvements in the international competitiveness (unit labour costs) of German production as reflected in German trade surpluses, still the case today. It also explains the high expectations of economists in the 80's of the German (and Japanese) "*Standort*" likely to take over US industrial technology dominance.

Compared to the new mode of technological progress, the previous advantages of this social model are now quickly turning into disadvantages primarily associated with major emerging inflexibilities, which are to some extent at loggerheads with the newly required flexibility in the new knowledge paradigm.

3. THE KNOWLEDGE PARADIGM AND THE EUROPEAN SOCIAL MODEL

The organisational and social challenges associated with the emerging new knowledge paradigm described above and also closely associated with the service economy and the "e-conomy", have, and maybe somewhat paradoxically given the original emphasis on e-Europe in Lisbon, not really been addressed in the discussions leading up to the Lisbon summit. Most of the discussions focused on the technological aspects of knowledge creation and development, the lagging position of the EU vis-à-vis the US, the need for a European research area and better coordination of member states research policies, the shortages of scientists and engineers, etc. The challenges of the emerging knowledge paradigm for the social models in European members states (MS) were barely addressed.

Yet it is clear that in a knowledge-driven society as described above there are likely to be many institutional, social and cultural bottlenecks to entrepreneurial risk taking, trial and error innovation and the ensuing creative destruction, which touch directly on the functioning of the ESM. To some extent the Lisbon declaration was not only an expression of a political desire to strive for a Europe belonging to the world's most knowledge-intensive regions in ten years, but also that this was to happen within the context of a strengthened, 'activated' social Europe that would have an eye for past social achievements. The question that was *not* addressed was how activating labour markets would enhance the shift towards the new knowledge paradigm.

Economists such as Giles Saint-Paul have analysed the relationship between labour market institutions, and in particular the costs of hiring and dismissing employees, and the development of innovations from a purely theoretical perspective.[14] Hiring and firing costs are in many ways the most explicit manifestation of the industrial employment "security" embedded in European continental social welfare states – the Bismarck model. They have led to stability in labour relations and have represented a useful incentive for employers and employees alike to invest in human capital. However, in terms of the new knowledge paradigm and in particular the accompanying process of "creative destruction" which might accompany the development of new activities – whether concerned with new product, process or organisational innovations – this model will raise dramatically the costs with which "destruction" can be realized. Thus as shown in Saint-Paul's model, the US, with lower firing costs, will eventually gain a competitive

[14] G. Saint-Paul, "Employment protection, international specialisation and innovation,", *European Economic Review*, 46, (2002), pp. 375-95.

advantage in the introduction of new, innovative products and process developments onto the market, while continental Europe will become specialized in technology-following activities, based on secondary, less radical improvement innovations.

In other words, the dynamics of innovation, of entrepreneurship, of creative destruction thrives better in an environment providing higher rewards for creativity and curiosity than in an environment putting a higher premium on the security of employment, internal learning and efficiency improvements in the production of existing products. Viewed from this perspective, the gap between Europe, and in particular continental Europe, and the United States in terms of innovative capacity, efficiency, and wealth creation may look like the price Europe had to pay for not wanting to give up the social securities and achievements associated with its social model. Many of the proposals on "activating the labour market" with by now popular concepts like "empowerment" and "employability" appear to go hand in hand with innovation and growth dynamics, others though do not. Some European countries such as the UK and Denmark appear to have been more successful in reducing dismissing costs than others, and appear to have benefited much more from the knowledge paradigm in terms of growth dynamics.

The central question, which must be raised within this context is whether the social security model developed at the time of the industrial society is not increasingly inappropriate for the large majority of what could be described as "knowledge workers": workers who are likely to be less physically (but by contrast possibly more mentally) worn out by work than the old type of blue collar, industrial workers. The short working hours, the early retirement schemes, the longer holidays might well appear to knowledge workers less of a social achievement; work not really representing a "disutility" but more an essential motivating activity, providing even a meaning to life.

There is in other words, I would argue a need for a fundamental rethinking of the universality of social security systems in European countries social welfare systems. That rethinking should recognize explicitly the emerging duality in the labour force between work involving "*labour*", i.e. a physical or mental wearing out activity, and work involving "*pleasure*", i.e. activities providing primarily self-satisfaction in terms of recognition, realisation and creativity. Workers involved in the first sort of activity will consider the social achievements, including employment security, a relatively short working life and short weekly working hours, as important social achievements and intrinsically associated with their quality of life, which they will not be prepared to give up. Workers involved in the second sort of activity, have been given these similar social rights by extension because of labour law universality principles. At the same time such an automatic extension of social rights appears by and large inappropriate and could

be considered to be behind the lack of dynamism of knowledge workers in Europe. Furthermore, the full application of the social model to the growing proportion of knowledge workers undermines the sustainability of the social model itself. In short, when work involves significant positive externalities as in the case of knowledge work, it appears particularly inappropriate to apply social “security” guarantees to employment aimed first and foremost at reducing the negative externalities of physical work.

4. INCREASING KNOWLEDGE INVESTMENTS IN EUROPE

Whereas the recent spring summit of EU Heads of State and Government put the Lisbon goal into a longer term and less formal objective, the knowledge investment targets set at the Barcelona European Council meeting in 2002, remain a major policy priority for EU MS. As agreed in Barcelona, research, development and innovation investments in the EU will have to be increased to 3 % of GDP by 2010, up from the 1.9 % of GDP in 2000. The innovation part of those expenditures is difficult to measure so most countries have focused on the R&D expenditures part. An increase in the level of business R&D funding has been called upon rising from its current level of 56 % to two-thirds of total R&D investment, a proportion currently achieved in the US and in some European countries. Public investment in R&D and innovation should amount by 2010 1% of GDP.

The Barcelona R&D and innovation investment objectives arose from the recognition that strengthening Europe's private R&D and innovation systems appeared essential in realising the Lisbon strategic goal. The assumption behind this was that domestic private R&D would be a crucial driving force for a competitive and dynamic knowledge-based economy. The impression of a clear Lisbon failure is also closely associated with the failure in improving in any sense over the last five years the private R&D intensity in most member countries.[15] Notwithstanding the political importance of setting such a long-term knowledge investment target, as an economic meaningful policy target, the 3% objective is somewhat of an odd target.

First and foremost it is an investment cost target. Equally important, if not more so, is the question what the results – in terms of efficiency and effectiveness – of such investments will be. Firms are not interested in increasing R&D expenditures just for the sake of it but because they expect that the new or improved production processes, technology concepts, or new products responding to market needs emerging from these activities, will improve their

[15] As the recent Commission report notices somewhat schizophrenically: "The 3% objective and the follow-up Action Plan for more investment in research have had a mobilising effect on Member States. Nearly all have set targets, which – if met – would bring research investment in the EU to 2.6% of GDP by 2010. However, instead of rising, EU research intensity is more or less stagnant. In most Member States, increases in public and private research investment and the range and ambition of policy initiatives fall far short of what their national targets, let alone the EU target, would require. Private investment is particularly low. At the same time, European innovation performance has not increased enough." (European Commission, Implementing the

efficiency and hence their long term competitiveness. Furthermore, these same basic economic rules apply of course also to the increasingly costly R&D process itself: if at all possible, firms will try to license such technologies, or alternatively outsource at least part of the most expensive or risky knowledge investments. In the current international environment, firms are continuingly being pressed to increase the efficiency of their internal R&D by rationalising, reducing the risks by outsourcing R&D to separate small high-tech companies which operate at arms length but can be taken over, once successful. All these features, characteristic of the new knowledge paradigm and which from an economic growth and competitiveness perspective appear essential, are not captured in a 3% R&D objective.[16]

Second, as a policy target decomposed in a dominant private industry target (2%) and a relatively weak public sector target (1%), the 3% objective does not appear a very credible policy target: the main investment efforts needed to achieve it are with the private sector, something most governments have at best some indirect influence over, whereas the weaker public sector target is itself subject to the fiscal policy constraints (the other 3% target) under the Growth and Stability Pact.

Conceptually the decomposition of the 3% Barcelona objective in a double R&D effort of the private sector for every single public R&D effort appears again odd and not based on a careful reflection of the different roles of each of those sectors in knowledge investments in different MS. It appears based on the current US private versus public decomposition of R&D expenditures, ignoring thus the quite fundamental differences between the US and European countries' business profits and income tax regime and the implications thereof for private and public parties in the funding of research and development (and higher education and training). It also ignores the dominance of publicly funded military research carried out in private firms in the US, and the much more diversified picture in Europe (significant in the UK, France, Sweden, of low importance in Germany, Italy).

Particularly the differences in income taxation regimes appear at first sight important: in countries which progressive taxing regimes such as the Scandinavian countries, The Netherlands or Belgium, there is a natural expectation with private investors (businesses and

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Community Lisbon Programme: More Research and Innovation - Investing for Growth and Employment: A Common Approach, SEC 2005).

[16] One may also notice e.g. that corporate funding in the US dropped by nearly $8 billion in 2002, or 3.9%, the largest single year decline since the 1950s.

individuals) to assume that governments will take on a stronger role with respect to investments in public research infrastructure and higher education in particular.[17]

Third, and from the small, open economy perspective characteristic of many European MS (19 out of 25), but also the case for the larger MS, the question must be raised whether any national domestic knowledge investment target, has any real economic significance. With increased globalisation, the relevant R&D which will act as driving force in any European country[18] is much more likely to come from abroad; at the same time domestic R&D activities might have little impact on the domestic economy in which such R&D activities happen to be located[19]. Although many enterprises recognise the increased importance of investing in R&D, they do so only to the extent that they can exploit results effectively within their (often international) organizational borders and expect sufficient returns to balance the risks inherent in such investment. Here too, the same argument holds: firms will do so no longer from a domestic but from a global perspective.

In short, the 3% knowledge investment target seems not only odd from an analytical economic perspective, it makes also little sense within a global knowledge world in which private R&D has become by and large a mobile production factor, with firms locating such activities where the local conditions appear optimal. Among the most important factors in this regard is a sufficient supply of highly qualified human resources and in particular in science and engineering, the availability of a strong public research base flexible and open to interactions with the private sector, and a local environment characterized by a dynamic entrepreneurship culture particularly with respect to potential suppliers and users. These appear to some extent the crucial "attractor" factors, which domestic policy makers should address.

As argued in the next section national policy goals will often be misleading in this area. Whereas innovation and technological developments even in the new knowledge paradigm might need a strong R&D production system (both public and private) and sophisticated human

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[17] This explains amongst others why the "tuition debate" is strongly resisted by the population at large in most continental European countries with progressive income tax regimes, even if it is widely accepted that most of the current systems of free or cheap higher education are effectively resulting in subsidies from the poor to the rich.

[18] See e.g. the results obtained by Griffith et al. on the importance of US R&D for British firms' research: R. Griffith, R. Harrison and John Van Reenen, *How Special is the Special Relationship? Using the Impact of US R&D Spillovers on UK Firms as a Test of Technology Sourcing*, Discussion Papers dp0659 (London: Centre for Economic Performance, LSE, 2004).

[19] To highlight that such argument isn't purely theoretical, an example: Flanders with IMEC has a top research facility in semiconductors, including clean room facilities. However, it has no national production anymore. Flemish policy makers are of course requesting from private partners with IMEC proof of national/regional spill-over effects when applying for public R&D support. Yet, for most of the private partners of IMEC the spill-overs (at least in terms of blue-collar labour) are likely to accrue elsewhere in the world where they have their production facilities.

skills, they ultimately depend on the national or local ability to utilize new knowledge produced elsewhere and to combine it with the available domestic stock of knowledge. Most European countries are not just dependent on foreign R&D activities; they are also unlikely to be able to capture all the benefits of their R&D investments domestically. The absorptive capacity of domestic actors with regard to new knowledge, produced in the country or elsewhere, their capacity to create linkages with foreign R&D actors, should be equally key elements of attention in addition to the "3% target" as an expense target.

A possibly more interesting knowledge and innovation investment target might well consist of a combination of R&D and innovation expenditures with (higher) education expenditures, both public and private.[20] Combining the 3% Barcelona R&D&I/GDP target with the OECD's 6% education/GDP target would probably give much more leeway to individual member countries to adjust the knowledge investments targets to their own situation, taking more fully into consideration the size of the country, its industrial structure and its attractiveness to foreign investment. At the same time, the amalgamation of both public and private funding would offer member countries the freedom to design their own knowledge investment boosting policies: through public funds or through the design of appropriate incentive schemes to raise more private funds. Finally, the broadening of the knowledge and innovation concept to include more systematically education would also enable member countries to address particular weaknesses of their education systems as an integral part of their knowledge and innovation investment Lisbon strategy[21].

[20] The Dutch Innovation Platform, chaired by the Dutch PM recently proposed such a new investment target called KIQ: the knowledge investment quote.

[21] In the Appendix an extract is presented of my contribution to the British PM's submission to the EU Hampton Court summit in October 2005 (see http://www.number-10.gov.uk/output/Page8382.asp)

5. STRENGTHENING EUROPE'S TECHNOLOGICAL COMPETITIVENESS: A DANGEROUS OBSESSION?

The national and European focus on the need for investments in knowledge accumulation within its own EU borders, as exemplified by the Barcelona targets described above, is not just at odds with the global decision making about knowledge investments of multinational firms, it appears also to ignore the increasingly global nature of long term sustainable problems likely to affect directly the future welfare of the EU and its MS.

The European framework programmes were designed at a time when strengthening the international competitiveness of particular European high-tech firms and sectors was considered essential for Europe's long term welfare. It led to the strengthening of a number of industrial firms/sectors some of which became successful at the world level, others that failed dramatically. Today most EU research programmes benefit as much firms of European or foreign origin, as long as they are located in Europe. The same holds for universities and other public research institutes. Elsewhere, I have pointed to the inherent knowledge "diversion" and European "cocooning" implications of such a European research networking strategy.[22]

At the same time, the broadening of research priorities areas to include both local as well as global long term issues raises increasingly questions about the European territorial nature of the research being carried out and funded through the FPs. In many research areas, European welfare will in the long term be directly influenced not by the development of local knowledge through the FPs, its international commercial exploitation and intellectual appropriation, but by global access to such knowledge, the development of joint global standards and the rapid world-wide diffusion of such new technologies to other, non-EU countries. One may think of energy saving technologies, research on sustainable development and climate change, health and the spreading of diseases, food safety, security, social sciences and humanities, etc. In all these areas, the limitation of the funding of research to academic, public and private research institutes located in Europe appears contrary to the need for global solutions to safeguard in the long term European welfare.

[22] L. Soete, "Technology Policy and the international trading system: where do we stand?," in H. Siebert, ed, *Towards a New Global Framework for High Technology Competition* (Tübingen: J.C.B. Mohr, 1997).

Somewhat at the opposite spectrum of such trends, the global multinational enterprises have been successful in pressurizing both the EU and the US to strengthen world-wide, the intellectual property regime within which knowledge can now effectively be traded world wide such as the TRIPS agreement under the WTO and the various so-called TRIPS+ bilateral trade agreements enforced by the US. This new international IP regime being more or less imposed worldwide by the EU and the US raises many questions about global welfare and access to knowledge particularly for emerging and developing countries. The current IP regime has actually become greatly skewed in favour of protecting private knowledge goods, without taking into account the social costs incurred. As Richard Nelson put it recently: "...while patents are the primary incentive for profit-motivated invention in some key technologies, they are actually causing harm in other areas, including some 'high-tech' industries involved primarily in R&D". [23] In areas such as drugs, bio prospecting and software, questions can be raised whether alternative research funding systems providing less negative externalities for consumers world wide and in particular in developing countries than the current patent system, might not be more appropriate.[24]

In short, is it not time for a completely different approach in the European Union to knowledge appropriation recognizing much more the global nature of knowledge accumulation and the importance of access to knowledge for most emerging and developing economies? From the perspective of what Europe could contribute to world wide welfare it might, I would submit, contain a vision with much more political appeal to European citizens than the somewhat Eurocentric perspective of Lisbon.

[23] See UNU-INTECH, Experts Urge Reform of International Patent System, At Eve of WIPO Assembly, September 26th, 2005.

[24] See e.g. the proposal for a Medical Innovation Prize Fund in the US (HR417), whereby patents would be kept in place until the new drug registration, but then freely copied by generic competitors. As a result the developer of the drug would not control the market, but there would be competitive valuation of the medicine whereby each new drug competes with other new drugs for prize money. The most important changes in the IP paradigm are: the budget for innovation is fixed, the incremental cost to innovators of using the new innovation is zero, and there are no economic incentives to restrict access to the newest technologies.

6. IMPROVING THE "QUALITY" OF THE EC'S MANAGEMENT OF KNOWLEDGE INVESTMENTS

The new EU budget foresees a doubling of the annual monies to be spent on research, technology and development in Europe over the period 2007-2013. The so-called 7th Framework Programme will contain improvements in the way these funds will be administered in the future by the EC. However, in view of the bureaucratic overregulation and inflexibility with respect to the current 6th FP, ranging from the rules for submission, the enforced European networking, the costs of project management, severe questions can be raised about the current effectiveness of many of the R&D support programs. At this moment, many research groups in the EU both in the private and public/university sector have made public statements about their dissatisfaction with the over-bureaucratic nature of the management of such projects and withdrawn from active participation in such projects.[25]

Compared to other job careers, research and development careers are much more dependent on "internal" motivation factors. The driving force for the scientist or researcher is ultimately his or her contribution to knowledge whereby the actual income or salary does not play an essential role. As knowledge workers par excellence, work satisfaction is primarily obtained through a successful outcome of the research, the personal reputation gained and the freedom and local conditions and facilities to carry out research driven by curiosity. An overemphasis on contract research and with it external monitoring, the introduction of various accountability and control systems will undermine such motivation. It might also lead to strategic behaviour, and to decreased risk taking and innovation. The EC's FPs seem to have insufficiently taken into accounts these personal side effects of research and research careers. Here too it is, I would argue, time for a radical rethinking of the implementation of EC's R&D support programmes.

[25] See e.g. the petition signed by more than 5000 European scientists claiming in the words of the initiator, leading Belgian scientist Bart De Strooper, researcher in Alzheimer's Disease at the Flanders Interuniversitary Institute for Biotechnology and professor at the K.U.Leuven; "the way money is currently being spent by the EC is the best possible argument against increasing its budget". At http://ultr23.vub.ac.be/petition/

7. CONCLUSIONS

The new Lisbon strategy "Integrated Guidelines for Growth and Jobs" consists of 24 guidelines brought together under five broad headlines (see Table 1). Reflecting the reformulation of the political priorities of the Lisbon strategy after the mid term review (July 2005) under three headlines ("knowledge and innovation – engines of sustainable growth"; "making Europe a more attractive place to invest and to work"; "more and better jobs") the different guidelines appear, I would argue, still poorly integrated. In this paper the focus has been on the first of these political priorities: knowledge and innovation. Europe's failure to achieve significant progress under this heading over the last five years has as much to do with the interaction between knowledge and innovation and the four other broad guidelines considered in Table 1. The knowledge society which has emerged in Europe is, as has been argued here, indeed not an exogenous one, external to Europe's macroeconomic policy, competition policy or social model, but fully endogenous to those other areas of economic policy.

In this sense the five areas discussed in this paper highlight different aspects of the lack of integration of the knowledge and innovation Lisbon priority within the other areas of the Lisbon strategy. They suggest a number of straightforward recommendations:

First, there is the need for what has been called here the "*Lisbonisation*" of macroeconomic policies and in particular Member States' fiscal policies. None of the 6 first guidelines in Table 1 refers to the need to restructure fiscal budgets at the national (or European level) in the direction of knowledge and innovation investments. Worse, the six macroeconomic policy headlines listed appear not even to recognize knowledge and innovation as engines of sustainable growth. Yet it is clear that if a more or less simultaneous alignment between member countries could take place in such a "*Lisbonisation*", quality strategy of public funding, significant growth externalities at the EU level would be realised.

Recommendation 1: Introduce alongside the Growth and Stability Pact quantitative public deficit target, a Lisbon Strategy qualitative fiscal spending target.

Second, and focusing on the second headline in Table 1, the Lisbon strategy interpretation of "knowledge and innovation as engines of sustainable growth" represents still, I would argue,

and despite brave attempts of the Commission to prove the contrary[26], a very segmented policy approach, addressing first and foremost the traditional R&D and innovation member countries and EC policy constituencies.[27] The proposed guidelines and the further detailed proposals from the Commission are from this perspective more reminiscent of the old industrial R&D model than of the emerging knowledge economy paradigm model described in section 1.[28] The only shift in attention paid is with respect to potential regulatory barriers to research and innovation, reflecting the broadening of vision no longer to limit support policies to just R&D but also to include now more systematically innovation, raising new competition policy issues. However, no attention is paid to interactions with Europe's social model, or with education policy buried as guideline 23 under the "more and better jobs" headline in Table 1. The result of this relatively narrow focus is that the proposed integrated guidelines are anything but integrated and convey an impression of "over-structure" with target setting on a multitude of particular aspects of knowledge and innovation which are by and large outside of the control of policy makers.

Recommendation 2: Broaden the scope of knowledge and innovation investments as engines of sustainable growth to include human capital investments.[29] Bring in at the same time more flexibility in what member countries can do to improve the efficiency of such knowledge investments.

Third, given the increasingly global nature of the social, economic, environmental, demographic problems Europe is currently, and in the future likely to be confronted with, a unilateral focus on the strengthening of knowledge and innovation activities carried out within Europe with the aim of improving European competitiveness reflects increasingly, I would argue, a rather out-dated "Eurocentric" approach. It certainly does not do justice to the much broader societal and global impact, knowledge accumulation is having on European citizen's welfare. In a growing number of research fields, European welfare will in the long term be directly influenced not so much by the development of local knowledge, its international commercial exploitation and intellectual appropriation, but by global access to such knowledge, the development of joint global standards and the rapid world-wide diffusion of such new technologies to other, non-EU countries. While the shift from the old to the new Lisbon strategy sounds at least less "Eurocentric", the question remains whether it is not time for a different approach in the

[26] As in the case of the recent Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on More Research and Innovation - Investing for Growth and Employment: A Common Approach (EC, 2005).
[27] These range from the Science, Technology or Research ministries and the various advisory committees to the Trade and Industry, Economic Affairs or Innovation ministries and their various advisory committees. Within the EC it are primarily the DG Research and DG Enterprise constituencies.
[28] See European Commission, Communication (2005), see endnote 2.

European Union to knowledge appropriation recognizing more explicitly the global nature of knowledge accumulation? It would represent a vision, I would suggest, with more potential political appeal to European citizens than the old Eurocentric perspective of Lisbon.

Recommendation 3: The "European" research area should be opened up: not just to outside participation and international collaboration but should effectively become an area of world-wide access to knowledge. The focus on a strengthening of intellectual property in an age of the knowledge economy paradigm can quickly become a dangerous obsession and ultimately be counterproductive, hampering innovation, knowledge access and social welfare.

Fourth, there is a need for a fundamental rethinking of the universality principles of social security systems as they were developed in Europe last Century, in a variety of ways, in broad synergy with the emerging industrial society. Such a rethinking should recognize the duality in the labour force between work involving "*labour*", i.e. a physical or mental wearing out activity, and work involving "*pleasure*", i.e. activities providing primarily self-satisfaction in terms of recognition, realisation and creativity. As I argued in section 2 of this paper, workers involved in the first sort of activity are likely to consider the past social achievements of the European social model as important achievements intrinsically associated with their quality of life. They will consider any change of those conditions as a clear deterioration in their quality of life and reject it. Workers, involved in the second sort of activity, call them knowledge workers, are not so much in need of social measures aimed at reducing negative externalities of physical work. Their work involves primarily positive externalities. Obviously they also will appreciate social "security" guarantees to their employment, but these will rather be used as substitute rather than as complement for own life long learning efforts and investments. Effectively, knowledge workers are "free riding" on social "security" guarantees designed in another industrial age and aimed at a different category of workers. The automatic extension of social rights to knowledge workers appears from this perspective not only unjustified, undermining the financial sustainability of the European social model, but could well also explain the lack of dynamism of knowledge workers in Europe.

Recommendation 4: The interaction between the knowledge economy paradigm and the European social model (or the various versions of it in member countries) has barely been studied. A closer study of the various interactions between knowledge work and physical work will have to imply recognition of a more segmented social model. How this can be implemented

[29] Thus the 3% Barcelona target should be replaced with a more appropriate 9% knowledge investment target, consisting as argued in section 3 of both R&D, innovation and education expenditures.

and what the social consequences are should be a central policy concern in all member countries and the subject of exchanges of experiences.

The Lisbon initiative five years ago was a unique attempt to deal with what could be considered an institutional failure in the formation of the European Union. Up to Lisbon there were really only two areas were in institutional terms European power was clearly dominant over national member countries power: competition policy and monetary policy in the case of the euro zone countries. Competition policy has, one could argue, an internal dynamics leading to a continuous broadening of its influence: an enlargement of the sphere of the working of market forces, a further harmonisation of rules such as the services directive or the European patent proposals. While this is likely to bring about a general efficiency enhancing effect across the EU, it has not contributed in any direct sense to knowledge accumulation or innovation improvement within the EU. On the contrary, in areas of research and innovation, competition policy has created growing legal uncertainty in member countries with respect to their own R&D and innovation support policies, explaining the recent Commission efforts in developing a new State Aid Action Plan. Monetary policy on the other hand as implemented by the European Central Bank has put priority on addressing the regional diversity in the union in growth and inflation pressures. Here too there is a sheer natural broadening of the influence of monetary policy over domestic member countries' fiscal policies. In principle the Growth and Stability Pact provides Europe with an instrument with which it can determine in purely quantitative terms member countries' fiscal policies. But here too, there is no inherent incentive to promote knowledge and innovation as engines of sustainable growth.

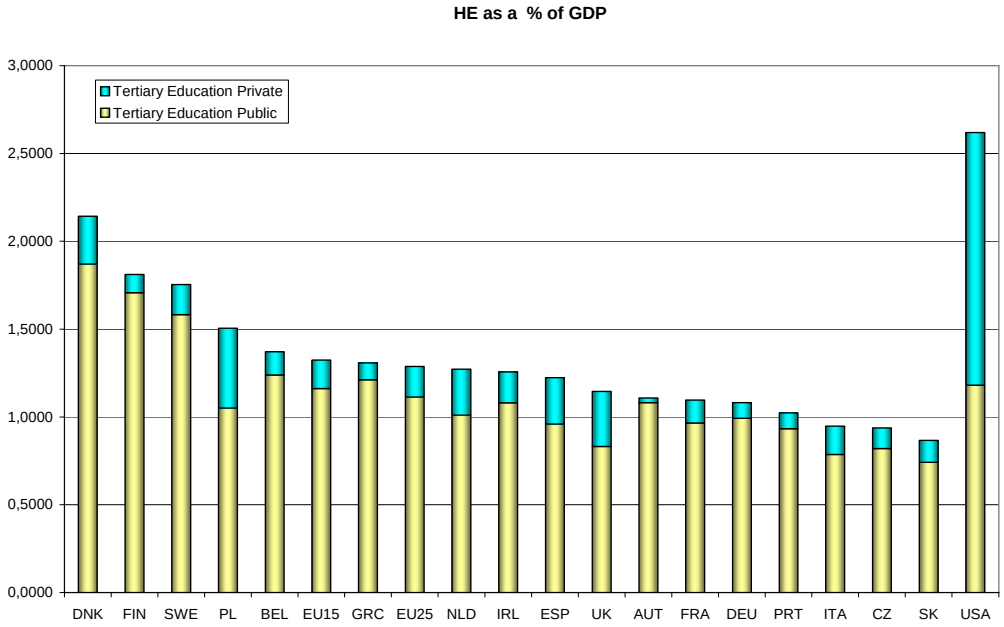
Not surprisingly, the new Lisbon area of knowledge and innovation capacity building in Europe was by and large dependent on member countries' efforts and willingness to give domestic priority to knowledge accumulation in all its facets, including innovation and knowledge diffusion, education and training. This is an area where, contrary to the two areas described above, there is no European power over and above member countries. Furthermore, the relevant policy areas involve a wide spectrum of relevant policy fields ranging from research to education policy, with sometimes little, sometimes growing European involvement (as in the case of the proposed European Research Council). From this perspective it is actually not surprising that little progress has been achieved in bringing forward the Lisbon strategy.

The revised Lisbon strategy following the mid term review offers undoubtedly new opportunities to revitalize knowledge and innovation capacity building in Europe. As it stands though, and as I have argued here, there are a number of structural weaknesses which will have to be urgently addressed, if Lisbon is to live up to its promises.

APPENDIX

The diagnosis anno 2005[30]

The EU spends currently 1.2% of its GDP on HE, the US more than double that figure: roughly 2.6% of its GDP. At the same time the EU has more or less the same number of HE establishments, around 4000.



Not surprisingly, the large majority of European universities find themselves in a, sometimes dramatically, under-funded position, with poor teaching and research facilities and a continuous emigration of their biggest talents. In short: knowledge investment in human capital does not have any of the growth features we had promised our citizens it would have.

In financial terms our public knowledge investment efforts are actually broadly comparable to those of the US. But they are scattered over a multitude of public research and higher education institutions across the EU.

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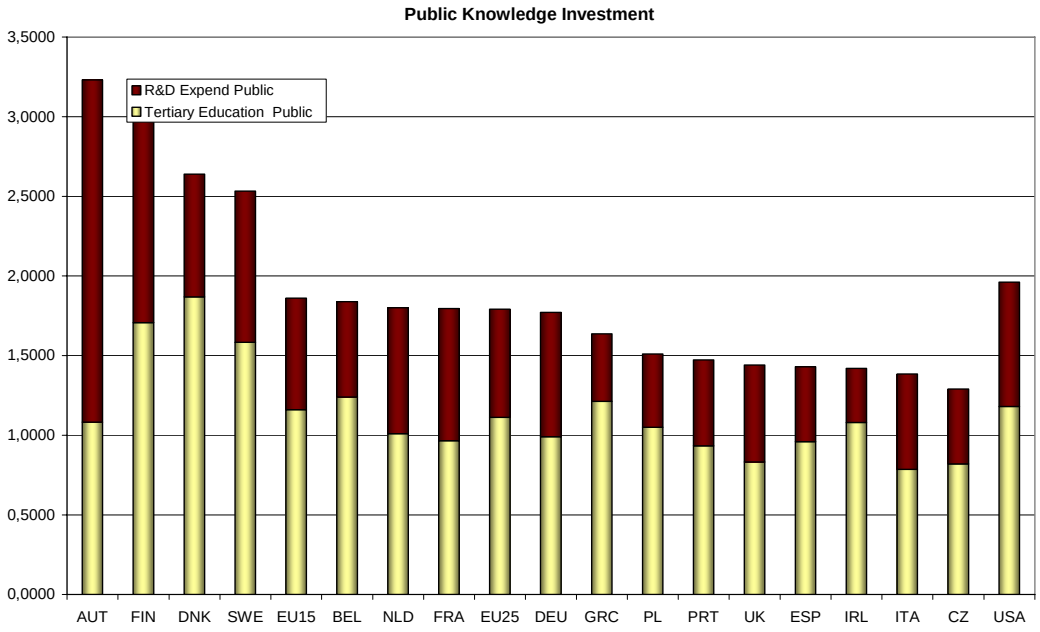
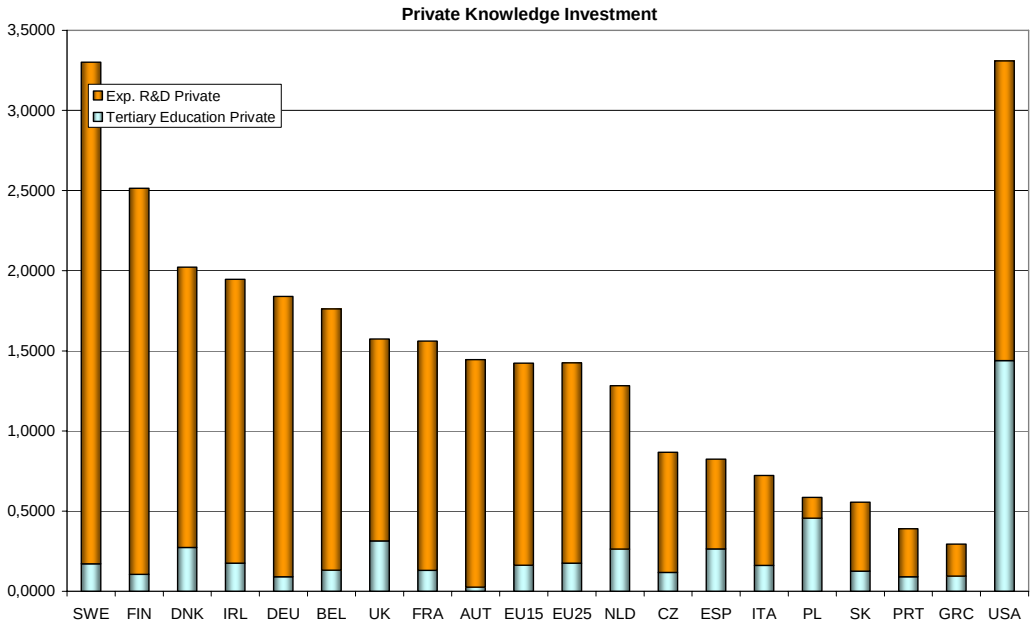
[30] This is an extract from my submission to the British PM for the EU summit in Hampton Court, October 26th, 2005. See Soete, L, Activating Knowledge (http://www.number-10.gov.uk/output/Page8382.asp).



But it is the dramatic difference with the US in our private funding investments in knowledge which is actually most striking. Only Sweden attracts a similar amount of private funds into knowledge investment. In the EU as a whole, including my own country, we fail to convince our firms and our citizens to invest in knowledge.

It is a failure which is first and foremost a failure to "activate", to open up higher education to private funding.



In the UK we have moved ahead in this discussion, by enabling universities to charge tuition fees and giving them more freedom to compete with each other.

Obviously such reforms in university funding will have to take into account the differences in MS in income taxation, it is after all a MS competence, but it is one, I submit to you of the utmost importance to the whole of Europe.

We do have to address the reform of our HE system as an absolute priority if we want Europe to able to compete in the knowledge based society of the 21st Century.

The EC too has a role to play, even though education is the competence of individual MS.
But indirectly (according to Art. 149 of the Treaty of Amsterdam), the Community has the possibility to "contribute to the development of quality education by encouraging cooperation between Member States**"**, through various actions. In short, the Community has a complementary role to play: to add a European dimension to education, to help to develop quality education and to encourage life-long learning.

I expect the Commission to help define an EU policy framework supporting European universities in adapting to the new context of increased competition and globalisation in higher education and training. I look forward to the Commission's forthcoming *Action Plan on University-based Research* which will be presented before the end of the year.

We will need the support of all stakeholders: at national and at European level if we are to succeed in responding to the challenges confronting European universities.

At the level of research, the situation is probably as challenging. Again a comparison with the US is illustrative.

Of total US university research, 60% is coming from so-called federal agencies: the NIH, the NSF, the DoE, the DoD and NASA to name the most important ones[31]. However, 95% of those federal funds are spent in no more than 200 universities out of the US total of 3300. This has brought about a concentration and scale of research which is incomparable with what we have in Europe today. It has led to research excellence in a limited number of knowledge "gravity centres" capable of attracting the best researchers world wide and with sufficient resources to invest in the best, ideal research facilities research excellence thrives on.

The diagnosis I'm presenting here is not new. Actually we know all this for a long time. We launched at the Lisbon summit, now already five years ago, the concept of a "European Research Area" and the current 6th FP pays special attention to European networking and excellence.

But if we look midway at the hard facts, we can only notice that all these efforts for greater European coordination in research have at best led to what I would call "research *saupoudrage*": allocating an albeit limited amount of research funds over a very broad scattered field of research institutions. An old slogan some of you might remember from the old French '68 students revolt "*Culture is like jam, the less you have the more you spread it*" seems particularly applicable to EU research funding.

In short, the diagnosis is hard and clear: while we have kept up with the US in investing public resources in knowledge, both in higher education and research, we have dramatically failed to convince the private sector and our citizens to invest in knowledge, in our own long term future. As a result, we have not reaped the benefits in Europe of knowledge-led growth.

[31] With another 6 to 7% from business, 7% from individual states and the rest from own funds (own endowments, large foundations, etc.)

Whether it is in the form of the delivery of highly skilled youngsters from universities, professional or technical high schools, or in the form of research output, knowledge in Europe has, in other words, remained in Europe unused, unexploited, in short: ***passive***.

A policy of "*activating knowledge*" should aim at activating competencies, risk taking and readiness to innovate. It should be directed towards the activation of the many forms of unexploited knowledge.

While the figures presented here were limited to research and higher education, my claim is that there are many of such forms of unexploited knowledge, covering the full spectrum of knowledge creation, application and diffusion. They address many different actors in very different ways in each of our member states: not just universities and research institutions, but also financial institutions in general and not just venture capital providers; private firms in manufacturing as well as services; and last but not least European citizens as entrepreneurs, as employee or employer.

Table 1: LISBON STRATEGY

THE INTEGRATED GUIDELINES FOR GROWTH AND JOBS

Macroeconomic policies for growth and jobs

1. To secure economic stability for sustainable growth;
2. To safeguard economic and fiscal sustainability as a basis for increased employment;
3. To promote a growth-and employment-orientated and efficient allocation of resources;
4. To ensure that wage developments contribute to macroeconomic stability and growth;
5. To promote greater coherence between macroeconomic, structural and employment policies;
6. To contribute to a dynamic and well-functioning EMU.

Knowledge and innovation –engines of sustainable growth

7. To increase and improve investment in R&D, in particular by private business;
8. To facilitate all forms of innovation;
9. To facilitate the spread and effective use of ICT and build a fully inclusive information society;
10. To strengthen the competitive advantages of its industrial base;
11. To encourage the sustainable use of resources and strengthen the synergies between environmental protection and growth.

Making Europe a more attractive place to invest and work

12. To extend and deepen the Internal Market;
13. To ensure open and competitive markets inside and outside Europe and to reap the benefits of globalisation;
14. To create a more competitive business environment and encourage private initiative through better regulation;
15. To promote a more entrepreneurial culture and create a supportive environment for SMEs;
16. To expand and improve European infrastructure and complete priority cross-border projects;

More and better jobs

17. To implement employment policies aimed at achieving full employment, improving quality and productivity at work, and strengthening social and territorial cohesion;
18. To promote a lifecycle approach to work;
19. To ensure inclusive labour markets, enhance work attractiveness and make work pay for job-seekers, including disadvantaged people, and the inactive;
20. To improve matching of labour market needs;
21. To promote flexibility combined with employment security and reduce labour market segmentation, having due regard to the role of the social partners;
22. To ensure employment-friendly labour cost developments and wage-setting mechanisms
23. To expand and improve investment in human capital;
24. To adapt education and training systems in response to new competence requirements.

Source: Council of the European Union, 10667/05 and 10205/05

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