From Lisbon 2000 to Horizon 2020:

Reflections on the demand for Non-Routine Skills and Entrepreneurial Qualifications[1]

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Introduction

What has characterized the innovation literature over the last twenty years or so has been the positive image which became associated with the concept. Just like the old Guinness advert, "Innovation is Good for You" appears the common feature of most innovation policy studies over the last decades. In the Guinness case though, this was actually correct. A pint of Guinness a day compares to an aspirin a day in the prevention of blood clots and the risk of heart attack. Unlike other beers, Guinness contains antioxidants like those found in red wine and dark chocolate[3]. In its wisdom, Guinness though decided to stop its "*good for you*" marketing campaign in Ireland which had primarily consisted of offering free beer to blood donors in blood donor clinics[4]. The company did not want to be identified with a health company. Maybe innovation scholars should do the same thing… The slogan "Innovation is Good for You" as it has been underlying many business and policy analyses remains surprising given the fact that at the micro-level, innovation failure rather than innovation success appears the most common feature of innovation studies.

At the macro-economic level too, and somewhat in the slipstream of the European Lisbon 2000 strategy, innovation has increasingly been accompanied with a positive aura, contributing or bringing about sheer naturally improvements in a country or region's (international) competitiveness. Again this is to some extent surprising given the historical tradition in the economic literature on the sometimes particularly destructive nature of new technologies and innovation processes: destructive in terms e.g. of employment and skills.

1. Technological progress, innovation and the generation of new wealth.

The subject of technology's impact on employment never failed to generate interest, if not outright animosity, over decades if not centuries. As I have argued with the late Chris Freeman (1982, 1987, 1994, 2010[5]) over a number of decades, the interest and fascination with the topic showed and still shows some remarkable cyclical variation: with each time though some new arguments being introduced to herald the emergence of mass unemployment.

Indeed since the beginning of the industrial revolution, (social) scientists have regularly expressed their strong fears that machines would abolish jobs. In the early 19th century Fulton's steam boat attracted the wrath of ferrymen, and the Luddites treated Jennies and looms as sworn enemies. In the 1940's Norbert Wiener[6], the father of cybernetics, forecast that computers would bring about a crisis worse than the Great Depression of the 1930s. In the 80's, the spectrum of

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[3] See Mann LB and JD Folts (April 2004). "Effects of ethanol and other constituents of alcoholic beverages on coronary heart disease: a review". *Pathophysiology* **10** (2): 105–12. doi:10.1016/j.pathophys.2003.10.011. PMID 15006416.

[4] Irish Times, 22 March 2010

[5] See amongst others Freeman, C., J. Clark & L. Soete (eds.), 1982, *Unemployment and Technical Innovation: a study of long waves and economic development*, Frances Pinter, London, UK; Freeman, C. & L. Soete, 1987, *Technical Change and Full Employment*, Basil Blackwell, London, UK and Freeman, C. & L. Soete, 1994, *Work for All or Mass Unemployment*, Pinter Publishers, London and New York, and most recently Freeman, C. & L. Soete, 2010, Building the Information Society for Us All, *African Journal of Science, Technology, Innovation and Development*, vol. 2, nr. 2, pp. 11-30.

[6] For those interested, Norbert Wiener's original letter to the Union of Automobile Workers worth reading is now also digitally available. See http://libcom.org/history/father-cybernetics-norbert-wieners-letter-uaw-president-walter-reuther.

mass unemployment became, at least in Europe, associated with microelectronics[7]. As a result the OECD launched in the 90's, the so-called Jobs Study (1994), which contained a specific section on technology, productivity and employment creation which I had the pleasure at the time of coordinating with many others (OECD, 1996 http://www.oecd.org/industry/industryandglobalisation/2759012.pdf). And over the last decade, the employment creation potential, or rather lack thereof in Europe, within the framework of the so-called new economy became a central concern in many debates about Europe's so-called Lisbon strategy, a subject again which I had the pleasure of been able to contribute to with many other European scholars[8].

Today, following the rapid rise of the so-called BRICS and many other emerging countries, the technology-employment discussion focuses more than ever on the developed world. The old technology pessimist view which insisted on the fact that the worker-displacing technologies of the time - microelectronics, telecoms, etc. – were of a new, employment-devouring variety, an argument similar to Norbert Wiener's pessimism – are now extended to the global world, the employment-creation impact of the new technologies is now also displaced physically to other parts of the world. As a result there is no place left to hide, as the service sector 'hid' the workers displaced from manufacturing in earlier decades. Most of those services are, thanks to the digital technologies, now also internationally tradable. As a result, skilled white collar work is now also at risk. It is probably this fact which explains why the recent economic crisis circumstances have generated much gloomier predictions about future employment opportunities in developed countries, and a stronger sense of unease.

The implicit assumption behind the many historical pessimistic claims was that there would be a fixed amount of output to be produced. What was insufficiently taken into account was that technological progress generated first and foremost new wealth; the increased wealth led to higher effective demand, causing increased investment and labour hiring in order to satisfy this increased demand most typically through the production, distribution and sale of new products and/or services. In the short term, technical progress would hence destroy jobs but the increase in productivity and in disposable income would lead to increases in effective demand and so eventually also to the creation of new jobs. More accurately, given the various other factors that complicate this process, what technical progress does and has done throughout history is to raise total income. The traditional economists' argument would then consist of the fact that what people would need, with the exception of workaholics, would be income not jobs *per se*. While 'jobs' is often a shorthand name for 'income'; whether most people will effectively partake in enjoying parts of this higher total income – in terms of more/better jobs, or through redistribution schemes – depends on the economic framework and in particular the functioning of the labour market, not on technology.

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[7] see e.g. Clive Jenkins and Barrie Sherman's *Collapse of Work* published in 1979 predicting 5 to 6 million unemployed in the UK in 2000, today at 2.49 million.

[8] See amongts others Soete, L., 2000, Towards the digital economy: Scenarios for business, *Telematics and Informatics*, 17, 199-212; Soete, L. 2001, ICTS's knowledge work and employment: The challenges to Europe, *International Labour Review*, 140 (2), 143-163; Petit, P. & L. Soete (eds.), 2001, *Technology and the Future of European Employment*, Edward Elgar Publishing, Cheltenham, UK; and Soete, L. & B. ter Weel (eds.), 2005, *The Economics of the Digital Society*, Edward Elgar Publishing, Cheltenham, UK.

Particularly with respect to the uptake of new digital Information and Communication Technologies (ICTs) since the mid-nineties, both the evidence from OECD countries as well as from EU countries suggests that countries experiencing the greatest slowdown in productivity growth (often technology-driven) also experienced the strongest rise in unemployment. As a matter of fact, the evidence with respect to the very different uptake of ICTs between the EU member states belonging to the Eurozone, suggests that the differentiated use and innovation with respect to ICTs might well provide the most important "real economy" explanatory factor behind the euro-crisis in southern European countries. Today, the evidence as presented in the most recent European *Innovation Union Scoreboard 2013*[9] suggests that there is now a clear pattern of divergence in knowledge performance across European countries. The southern peripheral Eurozone countries diverge in their technologically driven internal growth dynamics with those in the centre and north. Paul Collier describes this process within Europe's eurozone area as one of the emergence of "submerging" economies[10]. Economies, which contrary to emerging economies are now characterized by economic and social decline. Decline which is closely linked to a process of "evaporation" of knowledge particularly associated with the unemployment of skilled youngsters. Currently high percentages of highly skilled youngsters in many Southern European Eurozone countries find themselves in particularly difficult position to find employment at the skill level at which they have been trained. Their skills are effectively being competed away by both competition from the other Eurozone countries and from emerging countries, while their formal labour costs are high because of the fiscal austerity imposed on their country. It is the hysteresis tragedy of high unemployment amongst skilled youngsters in Europe. To reduce the debate about the job creation versus job displacement features of the introduction of new technologies, just to the speed by which innovation is being introduced, would be to ignore the more fundamental question about the nature of technological progress and innovation.

Indeed, could it be that at the broader societal level, innovation and the introduction of new technologies do not always represent a Schumpeterian process of "creative destruction", renewing society's dynamics and hence leading to higher levels of economic development and welfare – destroying a few incumbents to the benefit of many newcomers –, but rather represents now and then the exact opposite pattern: a process of what I have called in the 2011 Marie Jahoda lecture[11] at Sussex University "*destructive creation*". Innovation benefitting a few at the expense of many with as a result an opposite pattern of a long term reduction in overall welfare, productivity and ultimately employment growth.

A common feature to "*destructive creation*" innovation appears to be not just its short-termism and its easy, free rider nature, but particularly its dependency on networks whereby the regulatory framework governing the network provides sometimes the major source for innovation. And not surprisingly, the core reason why such patterns of "destructive creation" appear to have blossomed over the last ten to twenty years is also closely related to the advent of the ICTs. ICTs have allowed for a dramatic growth in opportunities for the fragmentation of service delivery: what has become known as the long tail of product and service delivery differentiation[12]. And there is little doubt that doing so ICT has had major growth and welfare

[9] See http://ec.europa.eu/enterprise/policies/innovation/files/ius-2013_en.pdf

[10] See http://www.social-europe.eu/2013/03/europes-submerging-economies/

[11] See Soete, L. (2012), "Maastricht reflections on innovation", *UNU-MERIT Working Paper* 2012-001

[12] See Anderson, C. (2006), *The Long Tail: Why the Future of Business Is Selling Less of More*, Hyperion Books.

increasing effects. It has allowed to satisfy consumers' wants practically along the full demand curve. As a result many consumers who before could not afford a whole range of services, can now consume those at much lower prices. New "versions" of services have emerged and have been behind the rapid growth of many new varieties of services.

However, in some areas, in particular networks services, the emergence of such service differentiation has also led to opportunities for cherry picking: for selecting those, on their own, most profitable segments of demand which were essential though for the "full" service delivery. As a result, many features of "universal service" delivery associated with the previous network service delivery have come under pressure. Their quality of delivery has become of lower quality or in the worst case has even become discontinued. In network services it has increasingly become expensive to be poor.

At the same time, existing network regulators were neither well-prepared nor informed about the many new digital opportunities. On the contrary deregulation and/or liberalisation led to new products or service delivery, inspired by the change in regulation, and exploiting more fully the new digital opportunities of product differentiation with in some cases negative societal externalities or even systemic failures.

Economists, and social scientists more generally, seem to have not been sufficiently forthcoming in highlighting the limits of innovation in sectors where forms of "destructive creation" appear much more common than usual forms of creative destruction. Colleagues in the Science and Technology Studies community, by contrast, did have a well-documented framework in which they explicitly looked at some of the possible negative externalities of technical inventions. Actually the Offices of Technology "Assessment" (and Forecasting) set up in the US and Europe in the sixties and seventies had been created with this purpose in mind. But over time these technology assessment analyses developed further outside of the economics profession, and innovation assessment never emerged[13].

A large literature on the economics of innovation highlighting cases of technological failure emerged in the late 80's inspired by Brian Arthur and Paul David's notion of the possibility of a long term "locking in" of society in technological inferior trajectories[14]. And similarly one also knows since the 80's and 90's that at the policy level there are numerous conflicts in the design

[13] As Paul David put it in a set of provocative comments which run in a very similar direction to those presented here, but more directed towards the "economics" innovation profession: "The optimum rate of innovation for an economy, or a social organization is a notion that rarely is discussed, except by implication which has left it poorly defined. Yet, unless this concept somehow was implemented and thereby operationally defined, how could one claim to judge whether the pace of innovation currently prevailing in a given branch of industry or sector of the economy was too slow, rather than just right or too fast? By contrast, the optimal rate of Harrod-neutral technical change and hence the optimal steady-state rate of labor productivity growth is nicely defined, at least for certain familiar classes of growth models; and, in the literature on the economics of R&D the question whether we have too much or too little (R&D) input into the processes of research and invention is frequently asked and answered empirically. Why should not excessive innovation be acknowledged to be just as much a possibility as is excessive investment in scientific research, or in industrial R&D?" (David, P. "Introductory comments on Innovation Incentives, Institutions and Economic Growth" in Lerner, J. and S. Stern (Eds), *The Rate and Direction of Inventive Activity Revisited*, Proceedings of a Conference held on September 30 - October 2, 2010, University of Chicago Press (forthcoming).p.3).

[14] See amongst others Arthur, B. (1989), "Competing Technologies, Increasing Returns and Lock-in by Historical Events," Economic Journal, 99, pp. 106-131; David, P. (1985), " Clio and the Economics of QWERTY", The American Economic Review, May, Vol. 75, No. 2, Papers and Proceedings, pp. 332-337, and David, P. (2001) "Path Dependence, Its Critics and the Quest for 'Historical Economics", in Garrouste, P. and S. Ionnides (Eds.), Evolution and\Path Dependence

of innovation policy between innovation support and the speed of diffusion as highlighted by amongst others Paul David and Paul Stoneman[15].

Here though, I would like to look more closely at the way innovation in consumer goods[16] might have led our societies to a long term conspicuous consumption path of innovation led "destructive creation" growth. In most modern growth models, the decision to invest in research and development is driven by the prospect of monopoly profits on the incremental value that new vintages provide. In short, and as expected innovation goes hand-in-hand with value creation. Yet one can also imagine exactly the opposite pattern: a process in which innovation destroys the usage value of the existing stock of durable goods to such an extent that as a result it induces consumers to repeat their purchase more rapidly. Emilio Calvano[17] from Igier - Bocconi University developed a formal model illustrating the widespread nature of such a phenomenon. Let me briefly quote from his paper: "*By allowing innovation to affect the value of the existing stock of durable goods, we highlight the role of destruction rather than creation in driving innovative activity. The formal analysis shows that destructive creation unambiguously leads to higher profits whatever the innovation costs. On second thought this shouldn't come as a surprise. If the "problem" from a profit maximizing perspective, is the durability of the output then it follows that any (cheap enough) mechanism that reduces or eliminates it would put the monopolist in a stronger position (i.e. 'closer' to the rental outcome). The power to "wreck" the value of old versions of a product ends up serving much the same purpose and hence the profit restoral.*" Of course, this destruction of others' monopolies may happen to the destructive creator later, but the point is that there is no mechanism to take into account the optimal timing of innovations in regard to the destruction costs of all sorts of affected capital.

The analysis presented by Calvano highlights the fact that the phenomenon of "*destructive creation*", as described above, is rather widespread. Easy and cheap ways in which existing usage value can be destroyed is through e.g. product design and restrictive aftermarket practices, and in the extreme case through so-called "*planned obsolescence*" limiting on purpose the life span of particular consumer goods[18]. Probably the most widespread case is new product design in e.g. fashion clothing or shoes[19] destroying existing output, but there are many other forms and sorts of restrictive aftermarket practices which can be found in many ICT related sectors such as software writers limiting backward compatibility, or electronic goods manufacturers ceasing to supply essential after-sales services or spare parts for older products. Not to mention smart phones, mobiles, iPods or iPads. It is actually surprising in how many areas processes of "*destructive creation*" exist that hinder prolonged usage and induce customers to migrate continuously to newer models.

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[15] See David, P. (forthcoming as in foornote 8) and Stoneman, P. (2001), *The Economics of Technological Diffusion*, Wiley-Blackwell.

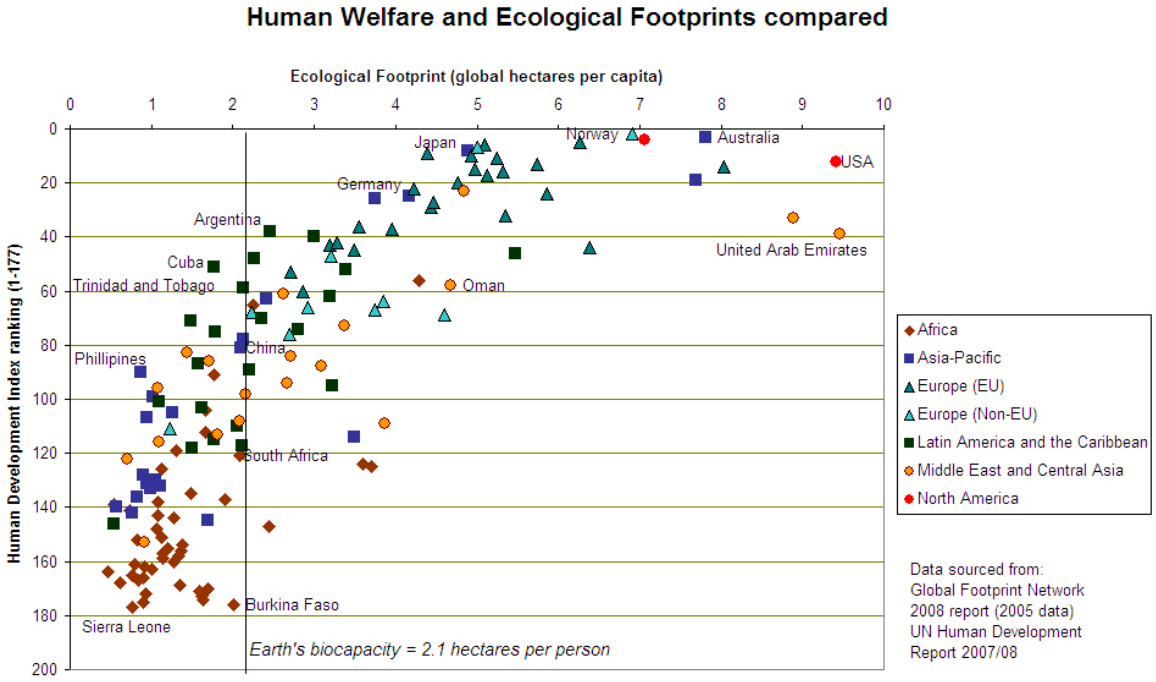
[16] In the Jahoda lecture (Soete. L. (2012), op.cit.), I also looked at financial innovations and instititional innoavtions such as the euro as typical cases of destructive creation innovation.

[17] Calvano, E. (2010) "Destructive Creation", *SSE/EFI Working Paper Series in Economics and Finance*, No 653, December.

[18] See e.g. the legal case brought against Apple in 2003 with respect to the planned obsolescence of the battery life of the batteries in the iPod.

[19] The Imelda Marco sydrome as Paul David put it: "The near pathological impulse to push the rate of innovation to be ever-faster needs a medical psychiatric designation, and I propose to refer to it as the innovation fetish's "Imelda Marco syndrome" – in memory of a famous instance of the uncontrollable, obsessive accumulation of more and more pairs of women' shoes (another, richly documented fetish object)." See David, P. "Introductory comments on Innovation Incentives, Institutions and Economic Growth" in Lerner, J. and S. Stern (Eds), op.cit.

Elsewhere, I have argued how this "*conspicuous innovation"* consumption growth path which in its environmental impact and ecological footprint will be unsustainable in the developed world and increasingly so in the rapidly emerging country world, and warrants ultimately a shift in the process of research and innovation.



Source: http://en.wikipedia.org/wiki/File:Human_Development_vs_Ecological_Footprint.jpg

In many ways and as highlighted in the Calvano model, the focus of industrial research and innovation has been on continuous quality improvements of existing and new consumer goods, enlarging continuously the demand for such quality improved or new consumer goods. It formed the basis of the growth model as it emerged over the post-war period in the US, Europe and Japan which generated its own infinite demand for more material consumer goods: a continuous growth path of rising income with increasing consumer goods' production *and* consumption[20]. The continuously rising industrial R&D efforts in high income countries appeared to match perfectly the continuously rising incomes of the citizens of those countries leading to a continuous enlargement of their consumption basket with new, better designed or better performing products. The initial demand for such quality improvements often arose from extreme professional, sometimes military use circumstances, but thanks to the media – which typically would emphasize the prestige image of such professional use using symbol figures such as sport athletes or movie actors – the average, non-professional consumer could easily become convinced that he or she was also in need of new goods with such technologically sophisticated professional quality characteristics even though those characteristics might ultimately add only marginally to one's utility.

[20] See also Pasinetti, L. (1981), Structural Change and Economic Growth: a Theoretical essay on the dynamics of the wealth of nations, Cambridge University Press.

In a certain way the highest income groups in society, the "*tip*" of the income pyramid, acted often as first, try-out group in society, contributing happily to the innovation monopoly rents of the innovating firm. So a continuous circle of research was set in motion centring on the search for new qualitative features[21] to be added to existing goods. As highlighted above in Calvano's model this "*professional-use driven*" innovation circle has been the main source for extracting innovation rents out of consumer goods – ranging from consumer electronics, sport goods, shoe wear, household equipment, computers, mobile telephony, medical diagnostics, sleeping comfort, and so on – with a "too long" *physical* life time.

As is obvious from this example of "destructive creation" as well as from the others not discussed here[22], ultimately the likely impact on employment and job creation will be more like the mirror picture of the one associated with traditional, Schumpeterian process of creative destruction innovation, as described above. Now, the process of short term job creation associated with the process of destructive creation will be ultimately unsustainable, and have a long term negative impact on long term job creation and long term welfare.

2. Global employment creation and local job destruction

The current trend towards the globalization of research and innovation has led to a multiplication of world class knowledge centres across the world going way beyond the "old" developed countries triad (US-Japan-EU). Due to large investments in higher education and research, favourable demographic dynamics, the outsourcing of manufacturing activities but also increasingly of product development from OECD countries, new hotspots of innovation have emerged in most emerging countries. It affects at different levels the old Triad firms' private R&D world dominance: thus Korean firms have caught up with Japan and are now leading the world in many high-tech manufacturing sectors, just like Chinese firms have been catching up with European ones in many mature industries such as motor vehicles, chemistry or electronics. Large parts of high tech components of many mass consumer products are now not only manufactured but also designed in China and India. It is of course true that this global shift appears up to now still mainly concerned with the D of R&D, i.e. the somewhat more routinized segments of Development which do not need to be tightly integrated or co-located with other, more fundamental research capacities but also benefit from agglomeration effects. The less routinized and most science based segments of inventive activity appeared up to now to remain concentrated in the US, Japan and the EU – what counts here is the proximity to leading edge academic research, the advantages of co-location with other firms and thick local markets for specialized inputs, services and human capital, so-called knowledge agglomeration externalities.

Emerging countries have shown a remarkable capacity in moving upstream in the value chain, from outsourcing of manufacturing activities to autonomous process technology development, to product development, design, and applied research. Together with a national targeted technology policy, a growing number of Asian countries have successfully and aggressively pursued the goal

[21] One may think of audio and sound, vision and clarity, miniaturization and mobility, weight and shock/water resistance, feeling and ergonomiticity, etc.

[22] Such as "financial" innovations and the "euro"as institutional innovation discussed in more detail in Soete, L. (2012), op.cit.

of a rapid increase in the scientific quality of their universities, using both monetary and non-monetary incentives as well as institutional reforms. Furthermore, and contrary to the US, Europe or Japan, the economic crisis has affected less governments' fiscal positions in emerging countries, rather the contrary. There is hence no reason to assume that the knowledge catching-up efforts of those countries would in the future be limited to the D-types of activities mentioned above. More likely is the opposite assumption: that is that participation in these D-types of activities will ultimately have spill-over effects in the sense of building local capacities to expand further and move also in basic research, possibly even magnified by some of the new approaches to innovation which are leading to the development of global, open networks of activity. From this perspective, countries, old and new, Asian, American or European, with the potential to compete for global knowledge hubs in certain fields will be characterized by the fact that they have pockets of academic excellence; that they have strong educational programs; that they can fund major programs to create research infrastructures and attract leading academic researchers; that they have already strong entrepreneurial activities that respond to market incentives; and that they can benefit from sophisticated users.

Clearly, research and innovation policies in the developed world will need to take more fully into account the changing global knowledge framework within which global firms operate today. The worldwide risks of the professional-use driven innovation strategy described above as focusing on the "tip" of the income pyramid and associated with "*destructive creation*" (see above under section 1) have increased significantly for existing global multinational corporations. While the world market for new innovative goods appears at first sight gigantic and without any doubt sufficient to recoup investments relatively quickly, the huge research, development, prototype and global marketing costs, coupled with the new, emerging international players means that the length of time that a company can enjoy an innovation rents has been diminishing very rapidly. Hence, despite the growing high income classes in the large emerging BRIC economies, the new generation of goods being sold to such high income classes in those countries is insufficient in actual earning opportunities to fund both the shift towards mass production and the development of the next technology generation of the good in question. Having developed incredibly sophisticated technologically new goods, many global firms from the old Triad are encountering global sales problems over a much contracted product life cycle with increased competition and rapidly over-saturated markets.

At the same time, and focusing now more in detail on Europe, innovation (and research) policies have been too narrowly focused on industrial innovation and paid insufficiently attention to the wide variety of other, non/manufacturing sectors, each with their specific needs for innovation, some local, some global, some private, some public, but each much more significant in terms of job creation. The striking fact remains that while services represent the largest part of value added and employment in most European domestic economies, their contribution to international technology services trade, has remained only a fraction of the corresponding high/tech trade in manufacturing and agricultural products. For some technology services this is intrinsically linked to the nature of their activity. For many other services, though, information and communication technologies have provided new opportunities for the trading of intermediary services of crucial importance to innovation (financial services, education and training, social services, etc.).

The rapid increases highlighted in the location of global firms' R&D activities in India and China is potentially a win-win situation for those companies: greater efficiency in innovation together with the ability to serve a large and growing market. Business leaders are probably best placed to shed some light on such trends. Already in 2007, Moncef Slaoui, the head of R&D at GSK stated "Within five to ten years we will be moving from 'made in China' to 'discovered in China'" implying that while many European firms do have already today manufacturing facilities in China in many high tech sectors, it can be expected at relatively short notice that China will develop new drugs increasingly itself. However, in 2011 e.g. GSK had 300 employees employed in R&D in China, of the 13,000 globally of which 70% is located in the US and UK. The rhetoric appears sometimes far from reality.

In short, the job creation aspects of research and innovation can no longer be dissociated from the global market opportunities of the possible new growth opportunities. This creates a substantial gap with the geographical nature of national policy making in this area. Within the context of "multi-national" Europe e.g., the concepts of a European Research Area and the subsequent Framework Programs have contributed to an increase in the intra-European internationalization of research. Most technology trade in Europe is today of an intra-EU nature, concentrated in a couple of industries, pointing towards research specialization in Europe. It might actually explain why private R&D has not really increased in the EU over the last ten to fifteen years: the opportunities for specialization and the reaping of scale economies in research for both European and foreign (US and Japanese) firms located in Europe were so significant that none of those firms felt inclined of actually enlarging their research base. They rather focused on reducing and rationalizing their often overlapping small scale R&D activities throughout the EU. The efficiency improvements in carrying out R&D within the large EU27 market were such that the "R&D" diversion dimension overtook any R&D "creation" effects. For private firms the ERA represented first and foremost an R&D single market, allowing for a significant increase in intra-European technology trade, rather than any increase in private R&D investments in the EU.

The relevant question appears today how pressures of world-wide globalization, and the trend towards international, global research specialization, will further affect those remaining private R&D investments in Europe? If these pressures operate in a similar fashion to the ERA R&D single market impact on private R&D investments in Europe and trends in technology trade, research specialization and intra-EU collaboration, Europe might well adjust downwards in the research and knowledge specialization of its overall economy, with the associated employment and income implications.

Conclusions

In line with was mentioned above, it is noteworthy to observe that most policies aimed at coping with the internationalisation of research and innovation have up to now been primarily supply-based. Again within the multi-level governance context of Europe this is of course not surprising: after all since the Lisbon Treaty, research and innovation became a shared responsibility between the national Member States (MS) and the European Commission (EC). Thus, alongside the design and implementation of intra-European research policies over the last forty years or so, such European policies have gradually opened up aiming increasingly also at

the internationalisation of research and innovation. One my think here of European policies aimed at fostering scientific exchange and collaboration with other OECD countries as well the emerging countries such as China, India, Brazil and South Africa; the opening up of the EU FP research support schemes to foreign, non-EU participation; the easing on the access of foreign scientists and engineers to EU and MS labour markets; the active participation in common large scale research infrastructures; the boosting of European and foreign researchers' geographic mobility within the EU; etc.

At first sight, this gradual opening up of European research policies to the outside world over the last decade might well be considered as a perfect example of the implementation of a sequential strategic policy with respect to research and innovation: first, the focus of MS' research policy was national, then it became gradually European in focus and today it appears increasingly global. The notion of a European Research Area, as it took form and became probably the most successful "add-on" to the Lisbon 2000 summit agenda, was indeed based on a strong believe in the particular relevance of scale as basis for European integration, whether it concerned the production of steel, semi-conductors, the sector which had probably been at the centre of most of the European FPs over the last Century, or research tout court. Of course, it was an argument which had already become gradually eroded by the turn of the Century; the international knowledge diffusion and world-wide mobility of researchers becoming the norm in many scientific fields in the mid to late 90's. And also at the industrial level, the growing competition from Asian countries such as China with even bigger scale advantages than the US, started to challenge the European integration focus on scale. Similarly, in the case of services, Europe appeared confronted with major difficulties in reaping scale gains of harmonisation and integration. The consensus agreement on a revised but still limited services directive was only achieved in 2006. In many service sectors, most strongly characterized by increasing return, network scale advantages associated with service delivery, reaping European scale advantage appeared always difficult, if not impossible, in the context of 27 MS with differences not just in regulatory regimes but also in languages, cultures, tastes and habits.

But what was not really sufficiently analysed were the employment and job implications of all this. It might be argued that back in 2000, the Lisbon strategy was not clearly formulated. A better way could well have been: how much of the social achievements of the European model is Europe prepared to give up to keep up with the United States, let alone develop Europe into one of the most prosperous and dynamic regions in the world? Or alternatively: which elements of the European social model are sacred and which elements are worth paying a dynamic growth price for?[23].

Many of the proposals on "activating the labour market" with the by now popular concepts like "empowerment" and "employability" appear to go hand in hand with innovation and growth dynamics, others though do not. And some European countries such as the UK and Denmark outside, and Germany (Hartz 4) inside the Eurozone, appear to have been much more successful in reducing dismissing costs than others, and appear to have benefited from it much more in terms of growth dynamics. The central question is ultimately whether the social security model

[23] As the late Wim Duisenberg, the previous chairman of the European Central Bank, once stated: "*maybe we should accept that Europe will always face a growth and productivity gap with the US simply because of existing differences in Europe in language, culture, and customs. As long as we value maintaining those, we will get joy out of our lagging behind the US.*"

developed at the time of the industrial society is still appropriate for the large majority of what can only be described as “knowledge workers” who are likely to be less physically (and by contrast possibly more mentally) worn out by work than the old type of blue collar, industrial workers. The short working hours, or early retirement schemes 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 a need for a rethought of the universality of the social security systems in Europe, recognizing explicitly that depending on the kind of work citizens get involved, social achievements including employment security, a relatively short working life and short weekly working hours are important social achievements and elements of the quality of life, which should not be given up, and the case of non-routine skills and entrepreneurial qualifications where the opposite is likely to hold. It is in other words urgent time to broaden the discussions on science, technology and innovation policy to include social innovation.