CENTRE for ECONOMIC PERFORMANCE

Boosting Innovation and Productivity Growth in Europe: The hope and the realities of the EU's 'Lisbon agenda'

- The United States has significantly higher productivity than the European average. US GDP per hour is over 15% higher than Europe's; and US GDP per capita is over 30% higher.
- From the end of the Second World War until the mid-1990s, Europe was catching up with US levels of productivity. But since then, US productivity growth has been faster than in Europe.
- In 2000, the European Union (EU) launched the 'Lisbon agenda'. This had the aim of making Europe 'the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth, with more and better jobs, greater social cohesion and respect for the environment'.
- Stimulating innovation was seen as a major route to reaching this goal. In particular, the EU set the 'Barcelona target' of increasing research and development (R&D) to 3% of GDP by 2010.
- The Lisbon agenda has not realised its objectives. A major reason for this is the failure of EU members to liberalise their product and labour markets.
- Although the numerical target for R&D makes little economic sense, the emphasis on innovation as a route to growth is sensible.
- The cost of patenting in Europe is about five times the cost of patenting in the United States. The suggested introduction of a 'Community patent' would lower this cost and make it easier for European firms to patent their innovations.
- The 'brain drain' from the EU to the United States – because of better research opportunities and higher wages – is still a significant phenomenon. The Lisbon agenda's aim of reversing this trend has not materialised.

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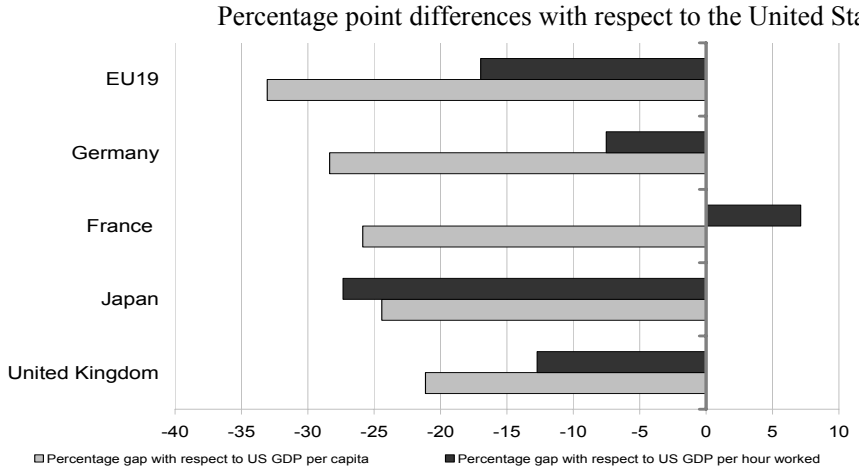
1. Introduction

Output per person is a third higher in the United States than in Europe (see Figure 1). About half of this advantage is because more Americans are in work than Europeans, and the Europeans who do have jobs work fewer hours per year. But even taking these into account, productivity as measured by GDP per hour is still 17% higher in the United States.

There is some variation in productivity across European countries. For example, French output per hour is actually higher than US productivity. But this may be a reflection of high wages causing a substitution of capital for less skilled labour. When this phenomenon is taken into account, even French 'residual' productivity is below that of the United States.

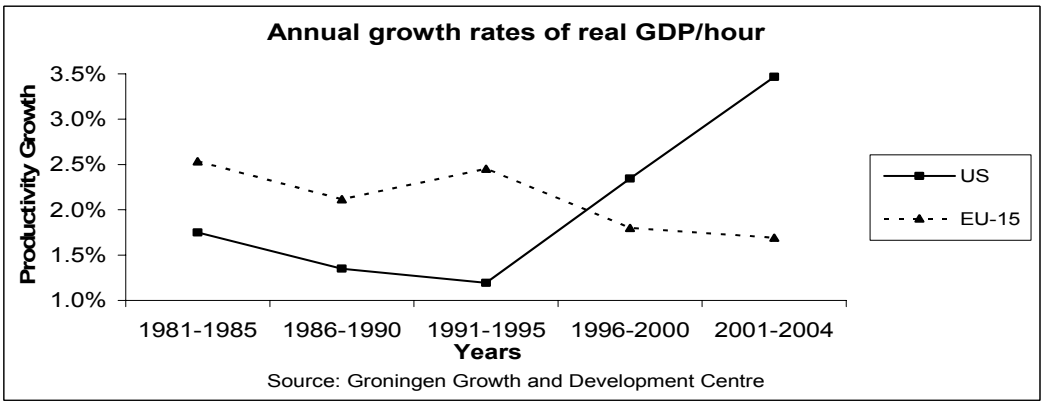
Until relatively recently, Europeans could take heart from the fact that although they were less productive, they had been narrowing the gap since 1945 and converging with the United States. But this is no longer the case: since 1995, the United States has seen an acceleration in productivity growth that has not been matched in Europe (see Figure 2). European output per hour growth has been on average about 1 percentage point lower than in the United States since 1995.

Figure 1: Economic performance in Europe and Japan relative to the United States (GDP per person and per hour worked)



Note: Figures refer to 2004 using official OECD PPPs for 2004. EU19 refers to EU members that are also OECD members.
Source: OECD (http://ocde.p4.siteinternet.com/publications/doifiles/922005071G067.xls).

Figure 2: Labour productivity growth in Europe and in the United States (growth of GDP per hour worked)



How can the European Union (EU) improve its position relative to the United States? This policy analysis looks at the main driver of productivity growth: innovation.

In 2000, EU leaders committed to the objective of making Europe 'the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth, with more and better jobs, greater social cohesion and respect for the environment.' They drew up the 'Lisbon agenda' to achieve this goal by 2010. The central strategy was based on policies to encourage investment in knowledge:

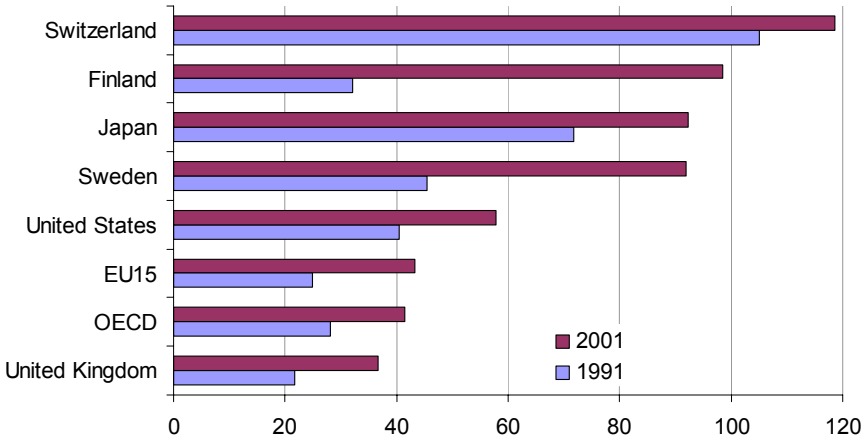
- making innovation a top policy priority – the so-called 'Barcelona target' for research and development (R&D) to increase to 3% of GDP;
- making Europe more attractive to talented researchers and removing obstacles to the mobility of European scientists;
- and improving the business climate through measures to reduce the administrative burden on business, improving the availability of risk capital and facilitating the rapid start-up of new enterprises. These measures include creating an efficient and integrated financial services sector; building network industries in telecoms, utilities and transport; continuing the liberalisation process; and completing the single market.

Six years on, progress has been poor. The reality is that Europe will not achieve the objectives for 2010, if at all. The creation of a single EU financial services sector and more generally of a single market for services has failed to materialise.

We start by benchmarking the EU innovation performance against that of its main competitors.

2. Europe's innovation performance

Figure 3: Patents per million population



Source: OECD Science, Technology and Industry Scoreboard, 2005

Figure 3 shows patents per million population as a measure of innovation output.[1] These data reveal that the EU as a whole lags behind Japan and the United States. Between 1991 and 2001, Finland and Sweden overtook Japan and the United States, but the UK is still lagging behind most of its competitors.

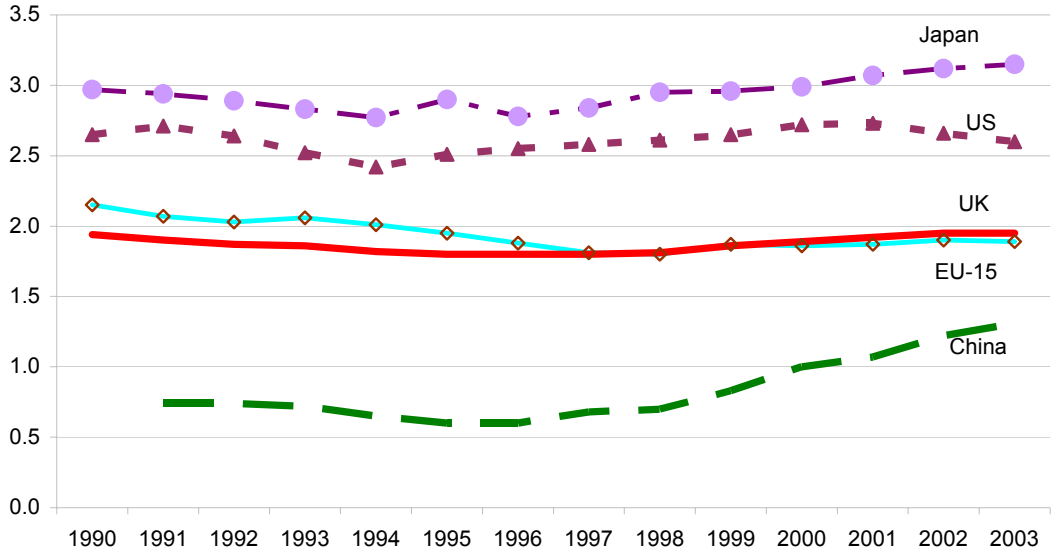
[1] The figures reported refer to 'triadic patent families', defined as patents taken at the European Patent Office, the Japanese Patent Office and the US Patent and Trademark office to protect the same invention. This patent-based indicator has higher international comparability, comprises mainly patents of high value and nets out home advantage bias.

Of course, Figure 3 might be giving a biased picture of the innovation activity in a country. While patenting is an indicator of the output of innovation, not all innovations are patented and the importance of patents differs across industries so that the patenting figures might be biased by industry distributions within countries.

Figure 4 looks at R&D and shows that the picture does not change dramatically: the EU is lagging behind Japan and the United States, with a ratio of R&D to GDP that has never gone past 2% let alone got anywhere close to the 3% target. The data also indicate that China is rapidly catching up with the rest of the world and in particular with the EU.

The picture does not improve when we consider a broader measure of investment in knowledge to include investment in software and higher education as well as R&D expenditure.

Figure 4: R&D expenditure



Source: OECD Science, Technology and Industry Scoreboard, 2005

This evidence suggests that in terms of investment in R&D, Europe is still lagging behind the United States while China is quickly catching up, and that the Lisbon agenda seems to have made little difference for Europe's innovation performance.

3. Market failure and the rationale for innovation policies

Nobody seems to be taking political ownership of the reforms needed to achieve the targets and so in 2005, the governance model underlying the Lisbon agenda was changed (following only partly the guidelines of the Kok Report, 2004) to let each EU member follow its own 'national reform programme'.

Before discussing the possible policy measures that could be taken by the EU to improve Europe's innovation performance, we need to look at the rationale for any innovation policy. We consider this under five categories:

- financial market reform and innovation;
- intellectual property rights;
- foreign direct investment and knowledge spillovers;
- the role of a strong science base;
- and product market reform

Financial market reform and innovation

There are two kinds of market failure that underlie a lack of investment in innovation.[2]

The first relates to the fact that the returns to investment in knowledge and innovation cannot be fully appropriated by innovating firms as knowledge is a public good that can 'spill over' to others.[3] This leads firms to 'under-invest' in innovation and a general level of investment below what would be the socially optimal level. To solve this problem, policy-makers can adopt various measures, such as a system of intellectual property rights, subsidies and R&D tax credits.

The second market failure arises when firms undertaking investment in innovation need to find external funding sources. Innovation is a highly uncertain activity with big differences in the information available to inventors compared to investors. Therefore, external capital will only be available at a large cost and financial markets are unlikely to supply the correct amount of liquidity for R&D especially for small and start-up firms in R&D-intensive and high technology sectors. More generally, the presence of an efficient financial services sector might facilitate the growth of better firms after their start-up phase.

Intellectual property rights

Beside the market failures related to the public good nature of knowledge, further market failures arise from the fact that the costs of producing innovation are usually 'fixed' and 'sunk'. This implies that firms will be willing to innovate as long as the potential market for their innovations is sufficiently large to cover their fixed costs; and second, when reproduction costs are a minimal fraction of the original sunk costs (sometimes zero), prices could fall significantly, again making it hard to recover the fixed innovation costs.

Property rights that last for a limited period of time, such as those guaranteed by patents, give an innovating firm a temporary monopoly in the use of the knowledge it has created and make it possible to control the terms on which others can subsequently use the knowledge. This will allow innovating firms to recoup the costs of the investment the firm made.

If the costs of protecting a new innovation (for example, if the administrative costs of patenting are very high), the transactions costs of developing an innovation will also be inflated. This is likely to make it more costly for firms to innovate and will therefore inhibit the rate of development of new ideas.

Foreign direct investment and knowledge spillovers

Knowledge as a public good with potential spillovers is the rationale behind intellectual property protection and subsidies for investments in innovations that will potentially lead to high spillovers. University research that creates basic knowledge is a leading example of this. But research shows that spillovers are also generated from private firms' R&D[4] and that firms can therefore benefit from the presence of more innovative and more productive firms.

But which firms are more innovative and more productive? There is now widespread evidence that multinationals are both more innovative and more productive. This is the rationale for policies to

[2] See Hall (2005) for a thorough discussion of these issues.
[3] A 'public good' is one that is 'non-rival' and 'non-excludable'. Non-rival (in use) means that a good can be consumed without limiting the consumption of the same good by others. Non-excludability implies that the owner cannot (easily) prevent others from 'free-riding' or consuming the good without paying for it.
[4] For example, Bloom et al (2005).

attract foreign multinationals, which are more productive and more innovative than the average domestic firm.[5]

But policies aimed at attracting foreign firms might not be the best strategy to reach the desired outcome for at least two reasons.

First, empirical evidence shows that relative to domestic firms, multinationals are better at protecting their innovations and at preventing knowledge from spilling over their boundaries, through, for example, human resource strategies aimed at minimising worker turnover (Cassiman and Veugelers, 2002). This suggests that domestic firms with access to international technology could be valid alternatives for the diffusion of know-how to the local economy.

Second, domestic firms will be able to benefit fully from knowledge spillovers from foreign multinationals only if they have built sufficient 'absorptive capacity'. If local firms lack this absorptive capacity, the potential benefits from the presence of foreign firms might be minimal.

The role of a strong science base

The spillovers argument is less plausible in a globalised world. In principle, Europe could 'free ride' on the innovations created by the United States and other leading countries. But knowledge is still 'local' and does not flow immediately across national boundaries. Furthermore, countries that do more R&D and have a strong science base can more easily understand and adopt leading edge innovations. This 'absorptive capacity' is a reason for promoting a strong science base even in the presence of international knowledge spillovers.

Product market reform

Econometric evidence shows that an increase in competitive pressure leads firms to innovate more.[6] Thus, a market free from barriers to entry and other regulations where *ex ante* competition is high is likely to be associated with an increased rate of innovation.

At the same time, one of the factors likely to affect a firm's investment behaviour is the potential profitability of an innovation: one solution is to give innovators some *ex post* monopoly power on their innovations (for example, through patents).

A second possibility is the existence of a sizeable market where firms can sell their new products and exploit larger returns to scale will guarantee firms larger expected profits from their innovation activity[7] and give them a larger probability of recouping the sunk costs of their investment. This will lead to a higher rate of innovation.

4. EU innovation policies

Many aspects of innovation policies – such as tax incentives – fall within the remit of individual EU members. Here, while it has no direct influence, the EU *could* have a role in spreading information about best practices based on careful evaluation. In other areas, the EU has a direct influence through its own control of the budget and policies. But the already relatively small EU budget has not been modified nor increased to help in achieving the Lisbon goals.

In this section, we discuss for each of the market failures described above the role that the EU could play in determining the policy outcomes.

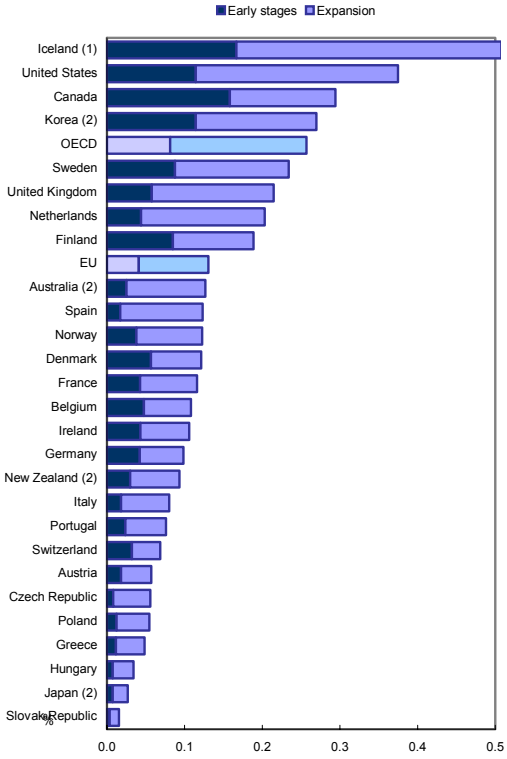
[5] See, for example, Criscuolo and Martin, 2005, and Criscuolo et al, 2005).
[6] For example, Blundell et al (1999) and Aghion et al (2005).
[7] For a recent study of the role of market size for innovation, see Acemoglu and Linn (2004).

Financial market reforms and innovation

The EU has an important role in the financing of R&D through the development of a EU-wide financial services sector with a more liberalised banking system and venture capital market. As Figure 5 shows, the EU is lagging far behind the United States in the size of its venture capital market, both for early stages and expansion financing.[8]

Venture capital investment is a major source of funding for new technology-based firms and is a key factor in promoting the development of radical innovations, as it can provide the necessary funding for the risky and uncertain innovation process especially for younger firms. This might be important for catching up with the United States, since efficient European firms find it much harder to grow quickly than their US counterparts.

Figure 5: Investment in venture capital as a percentage of GDP 2000-2003



Source: OECD, STI scoreboard 2005

Policy-makers have a range of activities that can stimulate the venture capital and private equity markets: from providing loans, guarantees and subsidies for private funds to tax relief programmes and regulatory activities such as creating viable investment vehicles.

The role of the EU can be twofold. First, it can guarantee and oversee the removal of legal barriers standing in the way of private investment through the development of a EU-wide financial services sector with a more liberalised banking system and venture capital market.

[8] Early stages venture capital includes seed capital, which is provided to research, assess and develop an initial concept; and start-up financing, which is provided for product development and initial marketing. Expansion venture capital provides funding for the growth and expansion of a company to finance increased production capacity, market or product development and/or to provide additional working capital.

Second, it can help to create a network among EU member to encourage venture capital funds to invest in innovative small businesses.

As of now, the EU seems to have been less successful in guaranteeing the provision of a single EU financial market than in spreading information about good practice. Indeed, in 1998, the European Commission adopted 'action plans' aiming to create a pan-European venture capital market.

For example, the 'risk capital action plan' includes initiatives such as regulatory changes, entrepreneurship promotion, development of a business angel network; and the 'seed capital programme' consists of refunding up to 50% of a private venture capital fund's operating costs. The EU also provides support for the European Venture Capital Association and the promotion of venture capital and private equity investing and spreading knowledge of the principles of such activities among European entrepreneurs and investors.

Creating an efficient intellectual property system

Because of the public nature of knowledge, innovators need some degree of intellectual property protection to reap the benefits of commercialising their inventions. According to a recent study (European Patent Office, 2005), the cost of registering patents across the EU varies between €37,500 and €57,000 in the EU, which is as much as five times the cost of patenting in the United States.

Therefore, proposals to institute a single 'Community patent', which will be less costly and less bureaucratic should be welcomed,[9] as according to figures attributed to EU officials, the Community patent would reduce that cost by around 60% to €22-23,000 (see comment by Grazyna Piesiewicz in Meller, 2006), mainly by reducing the registration and translation costs of patenting.

Improving the science base

What of the Lisbon agenda's strategy for competing for the best brains in the world? One of the biggest threats to Europe's leadership as a knowledge-based economy is the anticipated shortage of highly qualified R&D staff.[10]

Although the mobility of EU researchers across EU members has improved, the movement of non-EU nationals across EU members is still an issue. Indeed, the United States seems still to be the preferred destination for migrant scientists. The trend is for an increase in economic migration to the EU, but there are still problems of brain drain from the EU in favour of the United States (see Hanson, 2003) because of better access to leading technologies, work quality and higher wages.

South East Asian countries, such as Korea, Taiwan, Singapore and more recently China, have successfully managed to increase return migration of their scientists back from the United States. This allows the transfer of knowledge and research practices back to the home country.

The EU could follow a similar strategy to spur both immigration from non-EU scientist and return migration of EU scientists by developing centres of excellence for scientific research; improving the amount and use of research funding in the EU and foster the creation of networks between centres of excellence and between centres of excellence and industry. The Sapir (2003) report called for the creation of an independent European agency for science and research modelled on the US National Science Foundation to guarantee more transparency and competition in assigning research funding.

[9] A Community patent would give inventors the possibility of applying for a single patent legally valid throughout the EU. This would mean a substantial reduction in patenting costs (for example, translation and filing costs); a single procedure to protect inventions throughout the EU territory and the establishment of a single centralised system of litigation. But the creation of a Community patent system is still in a deadlock 13 years after it was first proposed to EU decision-makers (see Buck, 2006 for details).

[10] A much quoted figure is that 'for the EU to meet the goal set at the 2002 Barcelona summit of increasing R&D spending as a share of GDP to 3% by 2010, the EU will have to add 700,000 new researchers to the workforce.' (Gago Report, 2004).

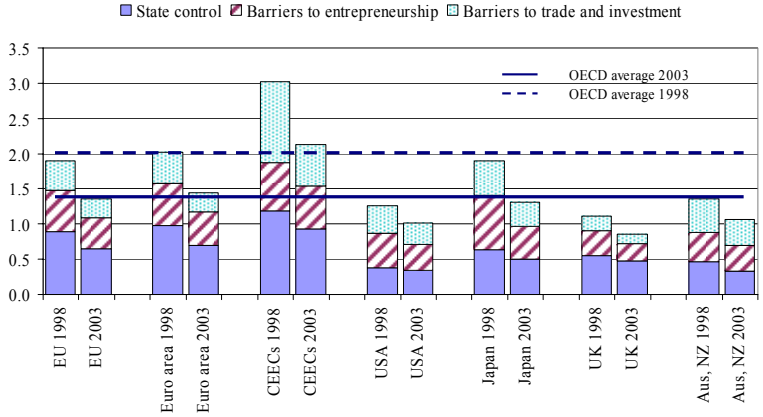
Product market reform and competition

An EU policy of lowering product market regulation and of completion of the single market might spur firms' investment in innovation through increasing competition and market size. As Figure 6 shows, the level of regulatory burden on firms in the EU decreased between 1998 and 2003, but it is still higher than that faced by firms in the United States.

Having an European single market might also guarantee the existence of a sizeable market where firms can sell their new products and exploit larger returns to scale.

The EU could also improve product market competition and increase market size by implementing the Services Directive.

Figure 6: Cross country comparison of product market regulation



Source: OECD

5. Conclusions

The reality does not really reflect the hopes of the Lisbon agenda's very ambitious programme. Certain goals, such as the R&D target of 3%, will not be achieved by 2010 and the gap between leading (Nordic) and laggard (southern European) countries in innovation performance seems to have increased during the last five years.

The EU should carry on pushing forward policies that lower product and labour market regulation as these will have positive effects on innovation through multiple channels. The creation of a liberalised financial sector, a single European market and a Community patent will also contribute to making Europe more innovative.

Europe needs to increase the amount and quality of the research funding it sponsors, possibly by modifying the priorities of its current EU budget to reflect the Lisbon vision and spurring competition and best practice among research institutions in EU members.

In general, it seems that the goals of the Lisbon agenda have been lacking a coherent strategy. The open coordination method and best practices have not been enough of a driving force. There needs to be more rigorous and efficient delivery and strict evaluation of what countries have achieved.

For further information

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