



i2010

- ★ INFORMATION SPACE.
- ★ INNOVATION & INVESTMENT.
- ★ INCLUSION.

dti

i2010 – RESPONDING TO THE CHALLENGE

September 2005

UK
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2005





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i2010 – responding to the challenge

Preface

The Department of Trade and Industry commissioned Indepen to write an independent briefing for the i2010 conference in September 2005 under the auspices of the UK Presidency of the European Union. The views expressed in this briefing are our own, and are designed to stimulate debate and focus attention on key enablers of greater and more productive use of Information and Communications Technology (ICT) to deliver sustained growth and more and better jobs in Europe.

The puzzle, given that ICT is more or less available to all globally, is why Europe as a whole has invested less in ICT and gained still less in terms of productivity and growth relative to other economies which have made more effective use of ICT.

We first set the context for considering this problem in terms of the Lisbon Strategy, then focus on the lessons from Europe's relatively poor economic performance over the past decade, and finally discuss key policy questions and priorities which we consider should be the focus of attention.

Context

The Lisbon Strategy, launched in 2000, outlined a series of reforms at national and European level which aimed to make the European Union "the most dynamic and competitive knowledge-based economy in the world" by 2010.

In November 2004 the High Level Group chaired by Wim Kok issued a wake up call:

"The Lisbon strategy is even more urgent today as the growth gap with North America and Asia has widened, while Europe must meet the combined challenges of low population growth and ageing."

The High Level Group made a strong recommendation focussed on the role ICT could play in meeting the Lisbon goals:

"In order to ensure future economic growth, the EU needs a comprehensive and holistic strategy to spur on the growth of the ICT sector and the diffusion of ICT in all parts of the economy."

The Mid-Term Review of the Lisbon Strategy sought to refocus priorities. The February 2005 Communication to the Spring European Council “Working together for growth and jobs – A new start for the Lisbon Strategy” proposed a new start for the Lisbon Strategy focussing on two principal tasks:

“delivering stronger, lasting growth and creating more and better jobs.”

This sharper focus reflected a conclusion that since the Lisbon Strategy was launched the policy agenda had become overloaded and sometimes had conflicting priorities. It also reflected a conclusion that renewed growth is the foundation of social justice and opportunity for all.

In June 2005 the Commission published a new strategic framework “i2010 – A European Information Society for growth and employment” which proposes three priorities for Europe’s information society and media policies:

- i. the completion of a **Single European Information Space** which promotes an open and competitive internal market for information society and media;
- ii. strengthening **Innovation and Investment** in ICT research to promote growth and more and better jobs;
- iii. achieving an **Inclusive European Information Society** that promotes growth and jobs in a manner that is consistent with sustainable development and that prioritises better public services and quality of life.

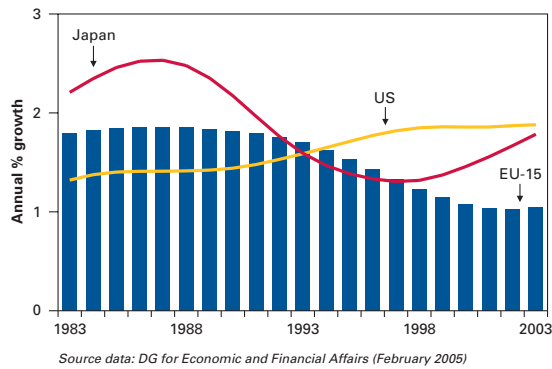
We report evidence that shows policies which inhibit the productive use of ICT are at the heart of Europe’s relative economic decline over the past decade. In contrast, during the previous 50 years Europe had demonstrated a capacity for rapid economic and social advancement. Policies that once worked are no longer working.

Given the scope for ICT – in the right policy environment – to make a substantial contribution to *“delivering stronger, lasting growth and creating more and better jobs”* we focus on the challenges and priorities for all relevant parties in relation to the i2010 Strategy and, therefore, more widely to the Lisbon Strategy.

The underlying problem: Europe’s productivity slowdown and persistently high unemployment

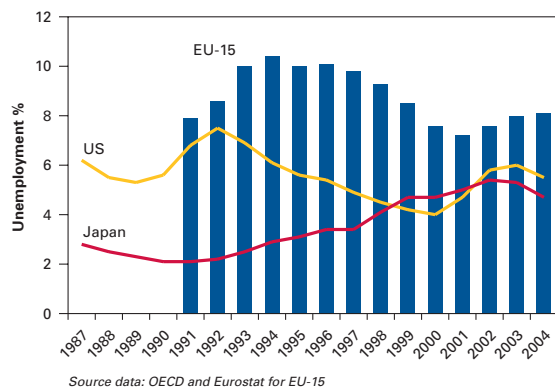
While productivity – the amount of output per unit of input – is not the only thing a business or an economy has to worry about, in the long run it is what determines living standards, the competitive advantage of companies, and the wealth of nations. After 50 years of catching up with the US, European productivity growth has slowed and is now falling behind.

European labour productivity growth has fallen behind



Labour market outcomes have also been poor, with high and persistent unemployment in some countries.

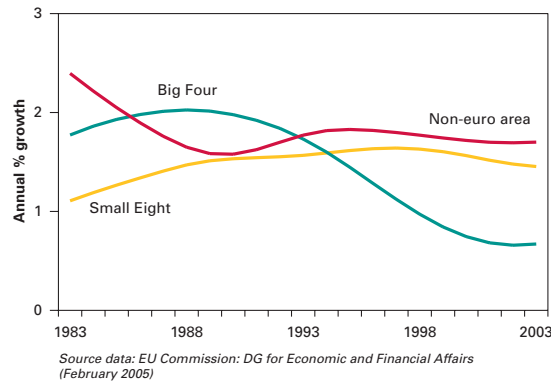
European unemployment remains high



Within Europe productivity performance is diverging

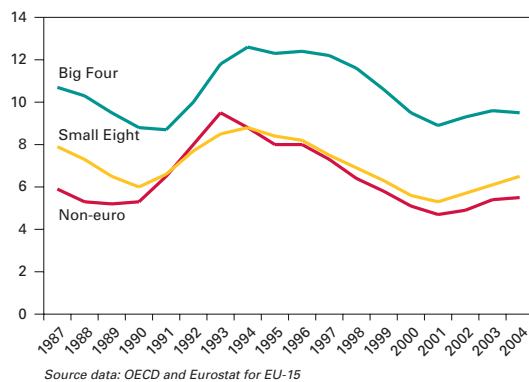
Within Europe productivity performance converged in the first half of the 1990s and diverged in the second half. The European Commission (EC) has analysed three groupings of EU-15 countries: the four large euro area countries France, Germany, Italy and Spain; the eight small euro area countries; and the non-euro area countries Sweden, Denmark and the UK. The slowdown in productivity for Europe as a whole in the mid-1990s resulted from the performance of the four large euro area countries.

Diverse labour productivity growth per person employed in EU-15



Central and Eastern European (CEE) accession countries have had substantially higher productivity growth than the EU-15 during the period post-1995, and are anticipated to continue to grow at roughly double the rate of the EU-15 over the next five years. However, for the EU as a whole, the direct impact is modest in the near term, since CEE countries currently account for less than 4% of total EU GDP.

Differences in unemployment persist



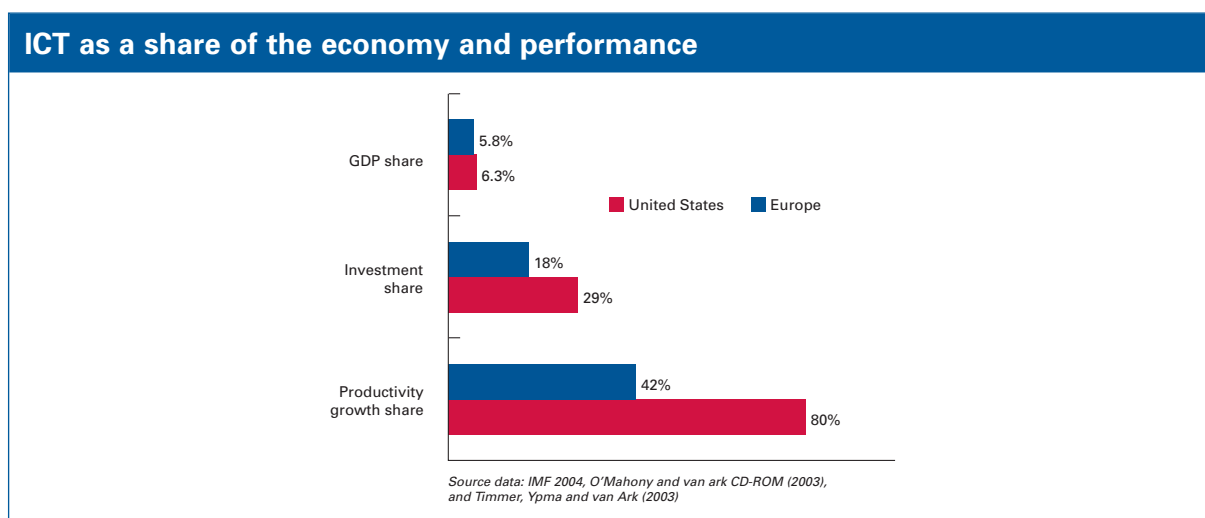
While average European unemployment has been higher than that in the US and Japan for over a decade, eight European countries had lower unemployment than the US in 2004. However, the four largest euro area countries have had persistently high unemployment over the past 15 years. The structural nature of this problem means that renewed growth alone is unlikely to provide a solution.

Given the widely different experience in relation to unemployment in Europe, there would appear to be policy lessons to be learnt from within Europe in addressing the unemployment problem. We return to this point later as it is closely linked to achieving productivity and growth from ICT use.

ICT is key to closing Europe's productivity gap

During the period 1996-2000 ICT contributed almost three times as much to annual growth in US labour productivity than was the case in Europe (1.85% points in the US versus 0.67% points in Europe). As a share of overall productivity growth, ICT contributed 42% in the EU-15 and 80% in the US. Within the EU, the productivity convergence of CEE accession states has in part been driven by ICT.

As the following figure shows, the higher productivity growth in the US which is attributable to ICT was achieved even though the ICT sector itself comprises a similar share of GDP to that in Europe. However, the share of ICT investment as a share of overall private investment was approximately 50% higher in the US than in Europe. Business invests more in ICT in the US, and it gains a larger productivity payoff per unit of investment.



The use of ICT matters most

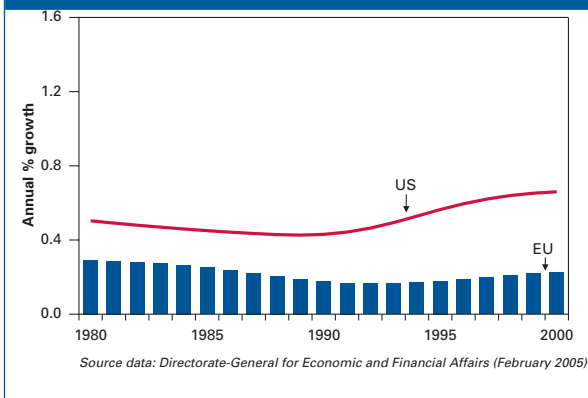
ICT is having a disproportionate impact in terms of investment and productivity growth relative to the size of the sector – particularly in the US. This reflects the fact that ICT is diffusing throughout the economy, and offers high returns where the policy environment allows complementary investments in organisational change to be implemented successfully.

This is a pattern seen with other so called “general purpose” technologies such as steam (and rail) and electricity, where wide ranging impacts on the economy and society resulted even though the sectors themselves did not form a large part of the economy.

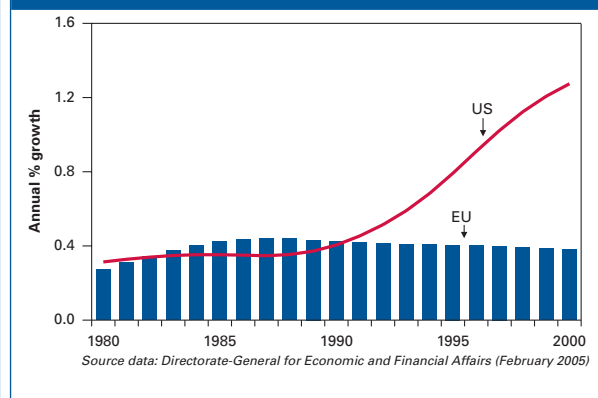
The following figure shows the payoff from ICT in terms of ICT-production and ICT-use.

Contribution to total change in labour productivity growth per hour from ICT

ICT-producing manufacturing



Intensive ICT-using private services



In terms of the overall difference in productivity growth attributed to ICT in the US and Europe, the use of ICT – shown in the right hand chart – dominates and now accounts for two-thirds of the overall difference. The differences in contributions from both the production and use of ICT are not due to differences in the size of the ICT sector, which is roughly the same in the US and Europe.

ICT production has had a significant impact on overall growth in some European countries, in particular Ireland and Finland where ICT is a significant part of the economy. ICT has also made a strong contribution in CEE accession countries in ICT-producing industries and in the ICT-using manufacturing sector. This has reflected foreign direct investment and strategic alliances between foreign and national firms, particularly in Hungary. However, for Europe as a whole, improved productivity must come from more effective use of ICT and not ICT production. Key aspects of ICT production are subject to global economies of scale and the sector cannot be expected to be large in all countries.

With some exceptions, in particular telecommunications access networks, ICT is predominantly traded and the innovations that drive ICT use are therefore available to everyone. This being so, differences in the adoption and use of ICT must be substantially down to domestic circumstances. The main driver of the relative European productivity slowdown post-1995 therefore has little to do with international competitiveness of the traded sector.

As the OECD (2004) noted, having a large ICT sector is neither necessary, nor sufficient, to achieve high productivity growth:

“Several countries ... that are characterised by high ICT investment and use, as well as high ... productivity growth, do not have a large ICT sector. In addition, one or two countries that do have a large ICT sector have not been among the high growth countries of the 1990s.”

There is no inherent reason why all countries in Europe should not benefit fully from the use of ICT, provided the policy environment is right.

Reform in Europe

Reform is critical to European success in achieving the Lisbon goals in the medium term and to ensuring that the i2010 Strategy makes an effective contribution to the Lisbon Strategy. However, reform must be focussed on the key enablers of more effective use of ICT.

Economic flexibility – the capacity for “creative destruction” – is perhaps the key enabling factor in relation to the effective use of ICT, and should provide a unifying theme in relation to policy issues relating to information space, innovation and investment, and an inclusive information society.

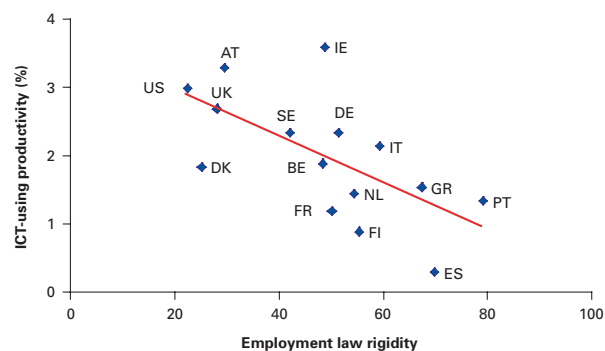
Economic flexibility is key to effective use of ICT

ICT is not a bolt-on. The productive and profitable use of ICT requires changes in the organisation, management and the location of activities. Change will involve the entry and exit of firms, the hiring and firing of labour, and the need for more general purpose skills.

To use a term coined by economist Joseph Schumpeter the productive and profitable use of ICT requires “creative destruction”. Fundamental change is required to benefit fully from ICT, and greater investment in ICT capital and skills alone in the current European environment would deliver poor returns.

Evidence for this comes from experience with previous general purpose technologies such as steam and electricity which required fundamental changes to the organisation and location of economic activity to generate their full benefit. In relation to ICT, differences in the payoff within Europe and between Europe and other regions post-1995 points to a premium on economic flexibility. The US – with its more flexible economy – has invested more in ICT and gained more in terms of productivity per dollar invested in ICT than Europe. There is also a negative relationship between productivity growth in ICT-intensive using sectors and employment law rigidity.

Labour market flexibility is related to productivity growth in ICT-using sectors



Data source: IMF (2004) and World Bank (2004)

In contrast, European expectations and policy have been shaped by post-war productivity catch-up with the US at a time when “creative destruction” may have mattered much less to economic progress. European economies have not obviously suffered from significantly lower growth due to structural rigidities in the past. However, that position changed abruptly in the mid-1990s.

A number of researchers have now concluded that “creative destruction” and general purpose skills are essential ingredients of success in an ICT age:

“Countries with a business environment that enables this process of creative destruction may be better able to seize benefits from ICT than countries where such changes are more difficult and slow to occur.”

OECD, 2004

[ICT] “provides a striking example of the need for policy makers to promote entrepreneurship and a healthy process of ‘creative destruction.’”

*EC Directorate-General for Economic and Financial Affairs,
February 2005*

“In the earlier postwar period, countries like Germany obtained substantial productivity advantages from their training systems geared to producing craft qualifications. In the ICT era, however, it is strength in depth in higher education that has paid off.”

Professor Nicolas Crafts, November 2003

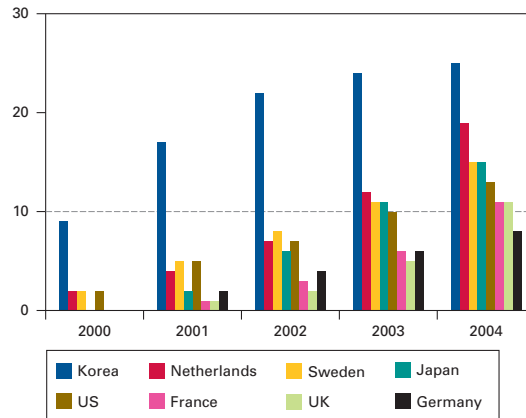
The challenge for policy makers is to ensure that regulation does not impede “creative destruction” and that there is a rapid response in terms of skills requirements. Barriers to the reallocation of labour – including undue restrictions on hiring and firing and impediments to labour mobility – should be lowered. Barriers to the creation and destruction of firms and to market integration should also be lowered in order to allow innovation and “creative destruction” to flourish and to enable economies of scale to be exploited in relation to ICT use.

Finally transaction-based taxes or levies that inhibit resource switching should be removed, and if necessary, replaced by taxes on income and consumption (e.g. value added tax) to allow the reallocation of resources.

Single European Information Space

To date much attention has been focussed on “broadband”, and a great deal has been achieved in terms of consumer acceptance and availability since the Lisbon Strategy was launched. Broadband has been a revolutionary technology, but the investment required was largely incremental on the back of existing infrastructure.

Broadband connections per 100 population



Source data: Ofcom (2005) and OECD

The global focus on broadband reflects, in part, existing differences in penetration – particularly in relation to South Korea. However, while South Korea has led in the pace of broadband deployment, an OECD review in 2004 found that:

“[South Korea] is clearly the world leader in broadband infrastructure and has high levels of consumer use. However business diffusion appears uneven despite rapid progress, ICT investment and use remain around the OECD average in general, and ICT impacts on business may be lower than expected.”

While South Korea has, and continues to have, a rapidly growing economy, a productivity growth acceleration in ICT-using sectors did not occur in the mid 1990s. In contrast, the US, with much more modest broadband penetration, achieved a substantial productivity acceleration in the ICT-using sectors of the economy from the mid 1990s.

The productivity acceleration in the mid-1990s coincided with the widespread networking of computers via the internet. The future contribution of ICT will be crucially dependent on the scope for networks and content to evolve in response to demand. Communications regulation should therefore be considered within the wider context of ICT and economic performance. There is a potential trade-off between limiting the scope for abuse of dominance in relation to existing services versus the possible chilling effect of regulation on infrastructure investment and the pace of introduction of new services provided over such infrastructure.

Telecommunications services will in future be provided via software applications running on Internet Protocol “IP” Next Generation Networks “NGNs”. New forms of content and content delivery, for example on mobile handsets and IP based TV delivered over the internet, will drive convergence. Convergence and platform competition raise new challenges for policy in terms of the meaning of technology neutrality, the balance of sector specific regulation versus general competition law, and over the future focus of remaining sector specific regulation.

In the new technology environment a new software based service can be launched independent of established players in the market. New voice over the internet (VoIP) services are a forerunner of this. The current focus of communications regulation on specific voice services and wholesale products will no longer be fit for purpose in this rapidly emerging world.

i2010 notes *“Regulation must keep pace with technological and market developments.”* The emerging telecoms environment will challenge the capacity of the existing style of regulation to keep pace with market developments. The “converged” UK sector regulator Ofcom, having conducted a strategic review of UK telecoms regulation during 2004/05, noted that:

“the European Union’s telecommunications directives were a thoughtful and intelligent attempt to provide a coherent framework for the delivery systems of convergence. Yet – three years on – their implementation is far from complete in several European markets. And they are also coming under stress from market and technology developments not foreseen and catered for in their drafting...”

Stephen Carter, Ofcom Chief Executive, June 2005, OECD Roundtable on Convergence.

The Framework Review in 2006, the review of relevant markets under the framework, and the review by the European Regulators Group of guidance on remedies provide an opportunity to review existing approaches to regulation.

An opportunity will be missed if the focus of these reviews is simply on the more comprehensive implementation of existing approaches; change is needed. There are also EC proposals to extend existing regulation of broadcasting content to new audio-visual services. This could discourage investment, innovation and growth of such services.

A reappraisal of regulation is currently well underway in the US in response to related pressures, but in a very different institutional setting. The Federal Communications Commission removed regulatory requirements to allow access at regulated prices to new fibre in December 2004, and removed access requirements in relation to incumbents’ wireline broadband DSL services in August 2005. The former was based on a judgement over the balance of costs and benefits of *ex ante* regulation in relation to new investment, while the latter placed wireline and cable modem services on an equal regulatory footing.

After a period when the philosophy of regulation in Europe and the US was focussed on promoting service based competition – known as the “ladder of investment” and “stepping stones to competition” respectively – the US has moved in the direction of regulatory forbearance and emphasis on platform rivalry. The US regulatory “experiment” should be carefully appraised in terms of possible lessons for Europe.

The private sector can help ensure that regulatory debate is refocussed by:

- Recognising that there may be genuine public policy concerns in relation to non-discriminatory access to bottleneck facilities and content, and responding to these concerns by developing industry initiatives and management incentive structures that provide assurance of non-discriminatory access to such bottlenecks (as an alternative to intrusive regulation).
- Helping to inform discussion and expectations in relation to new services such as those based on high speed broadband. In the absence of an informed debate, political expectations may be driven by international benchmarks which will not necessarily lead to good national outcomes.

In reviewing the current regulatory framework, relevant markets and remedies, decision makers should focus on:

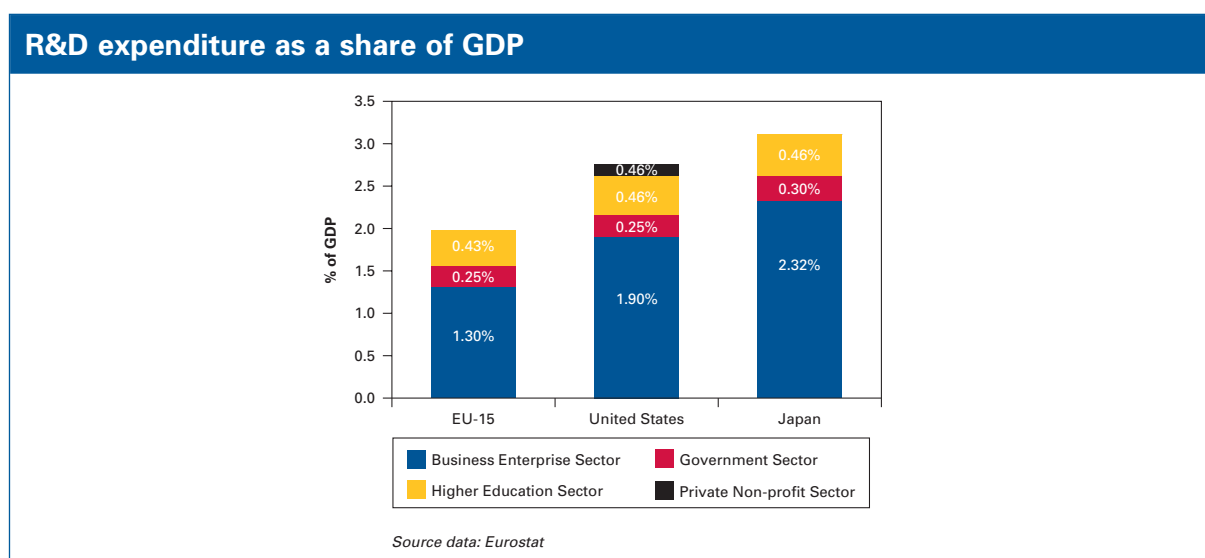
- Ensuring that the balance between preventing the abuse of market power in relation to existing communications services, and the possible chilling effect of regulation on the pace of introduction of new services is considered within the wider context of the impact of ICT on economic performance.
- Ensuring that regulation keeps pace with technological and market developments, and where appropriate is removed. Discussion should be refocussed on the implications of an environment in which new services (and service bundles) are provided via software applications running on competing NGN platforms. Possible lessons from international developments, in particular recent regulatory developments in the US, should also be carefully appraised.
- Adapting the Communications Framework to allow the costs and benefits of *ex ante* remedies to be appraised against the alternative of reliance on general competition law before one or more *ex ante* remedies is applied. This would allow for the possibility of forbearance, and is consistent with the general thrust towards greater scrutiny of regulation at a European and national level.
- Fostering innovation in relation to content and new content platforms via a clear commitment not to extend existing broadcasting content requirements (at a national or EU level) to new platforms such as mobile TV and the internet. Such requirements are not imposed in the US or Japan.

Innovation and Investment

R&D is a form of investment, and the general lessons in relation to the productive and profitable investment in ICT in the US versus Europe may also apply to R&D: namely, facilitating “creative destruction” via economic flexibility may be a key enabling factor for R&D.

There are two channels through which this would work. First, R&D specific to the production and use of ICT might be expected to have a greater payoff. Second, to the extent that “creative destruction” facilitates GDP growth it will increase the resources available for R&D. R&D expenditure levels will also be determined by public funding and tax incentives.

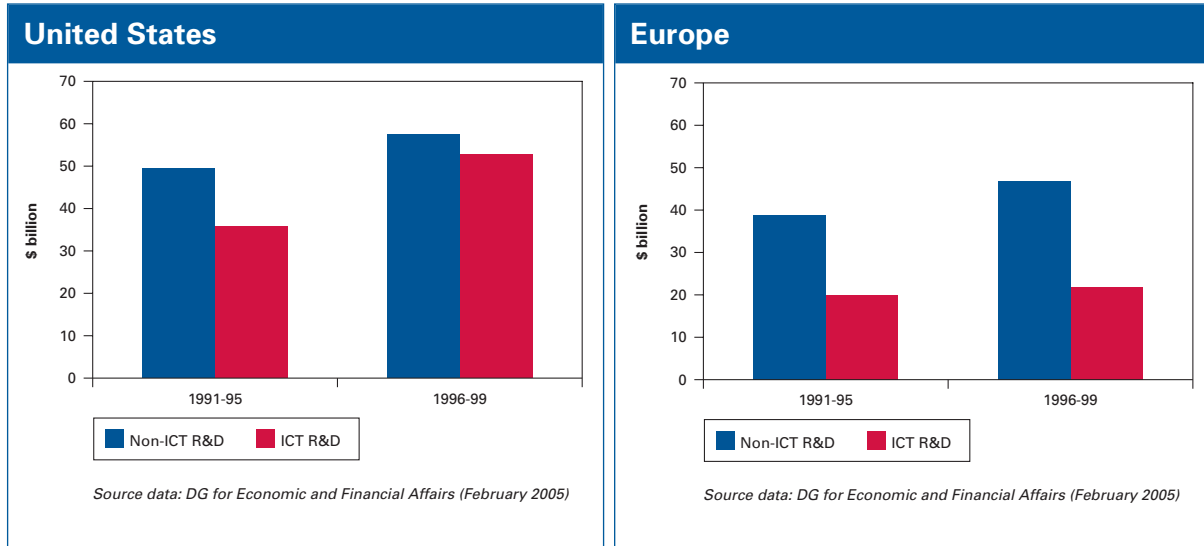
Looking at the empirical evidence in relation to R&D, we find that R&D is substantially higher as a share of overall investment in the US and Japan.



The US and Japan spend more on R&D predominantly in the business enterprise sector, and the US uniquely have significant R&D activity in the private non-profit sector. The private non-profit sector in the US may be particularly important since, in the US, autonomous institutions rank highly relative to government-controlled ones in terms of prestige and talent (measured in terms of university rankings and Nobel laureates).

In terms of the focus of R&D expenditure, the following figure shows the amount spent on non-ICT related R&D and ICT-related R&D for the US and Europe during the first and second half of the 1990s.

ICT share of R&D over time



R&D is more focussed on ICT in the US than in Europe, and this focus has increased over time. In fact, as a share of R&D expenditure ICT fell from 34% to 32% in Europe between the first and second half of the 1990s, whilst in the US it increased from 42% to 48%. This is broadly consistent with evidence in relation to ICT investment where the US share of overall investment is much higher (29%) than the share in Europe (18%).

European R&D is lower than expenditure in the US and Japan overall, and remains focussed on “traditional” areas such as motor vehicles and the chemicals sector. This raises a question mark over market incentives for private R&D, and the ability of institutions to adapt over time in Europe versus the US.

In Europe, the private sector, EU and national policy makers should focus on the root causes of international differences in R&D expenditure, in particular the extent to which they relate to differences in market composition, incentives for investment and innovation in the wide economy (“creative destruction”), public funding versus independence, and institutional arrangements that may impede or promote partnership.

Inclusive European Information Society

In considering inclusion it is also important to consider access to services in a wide sense. For example, many people who do not have the internet at home access it through their workplace, libraries and internet cafes. Many of the metrics used to measure the digital divide focus on provision at the household level rather than access and use.

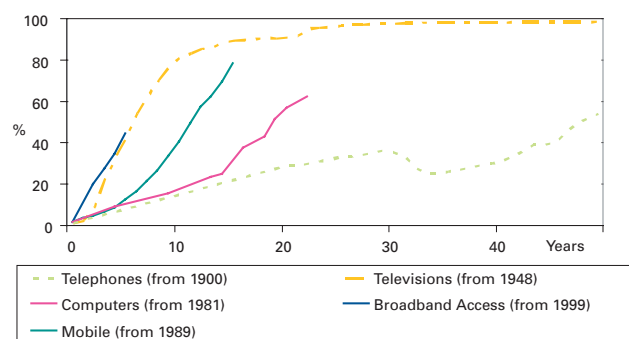
A key finding from international and within country studies is that income and education are important factors explaining internet and computer adoption and use at any given point in time. Age is also a factor. Issues around inclusion therefore relate to wider questions regarding income inequality and universal education (including literacy which is essential to use many ICT services).

Over time access to, and use of, any successful ICT-related service can be expected to increase. Technology and service diffusion typically follows an S-shaped curve with slow adoption initially, accelerating rates of adoption as learning and network effects kick in and prices fall, followed by a slower rate of adoption as the market matures. This pattern of diffusion implies that if one group in society adopts a technology faster than another, then relative levels of adoption will diverge for a time before converging again.

Observed differences in inclusion will tend to be self-correcting, for example, television ownership is now nearly universal. A key question is therefore how long it will take for the market to reduce differences in terms of inclusion to near negligible levels. A related question is what impact various interventions might have on this process.

The following figure based on US data shows that mobile telephony, computer ownership and broadband internet access have increased far more rapidly than fixed line telephony, and that broadband is growing at the same rate as television ownership did historically. There are therefore empirical grounds for viewing existing digital divides as transitory over relatively short time scales.

Adoption curves for new technologies in the US



Source data: Andrew Leigh and Robert D. Atkinson (2001) updated and modified to include mobile

The rate at which differences reduce will depend on policy initiatives and private sector action. The private sector can help by recognising profitable opportunities in the “fortune at the bottom of the pyramid” as management scholar C.K. Prahalad put it, or in pioneering a niche market.

The following are examples of private sector initiatives which aim to be profitable, and also help bridge the “digital divide”:

- The introduction of pre-pay mobile which has paved the way for widespread access to telecoms by low income groups in rich countries, and to those in poor countries.
- The tender to provide low cost – less than €32 – mobile handsets organised by mobile operators from the developing world under the auspices of the GSM Association which was won by Motorola.

- The introduction of online shopping tailored to the needs of the partially sighted and blind by the UK supermarket chain Tesco, which increased its revenues by an estimated €44 million per annum.

Decision makers and regulators can play a part by:

- Ensuring that any interventions promote, rather than slow, overall rates of diffusion since problems of inclusion will in general be temporary and rapid diffusion is the key to eliminating existing “digital divides”.
- Removing specific taxation of ICT services and devices through European legislation akin to US “Internet Tax Freedom Act” to lower barriers to access due to price.
- Adopting the suggestion put forward by the European review of the scope of Universal Service Obligations (USOs) May 2005 that any telecoms USO be funded by general taxation. This would assist in ensuring a level competitive environment within Europe and remove the sector specific burden of inclusion policy, thereby promoting investment and service take-up.
- Only publicly funding unprofitable extensions to services, for example broadband access, where doing so does not strand or compete with private sector initiatives.
- Focussing e-government initiatives by ensuring services are available to those with disabilities, and by accounting for citizens’ preferences and the value of their time in designing e-government services. The focus should be on the quality of services to promote use, rather than the quantity of services offered (irrespective of quality and use).

Conclusion

The key to lasting growth is productivity growth. After 50 years of catching up, European productivity growth slowed relative to that in the US from the mid-1990s. As recent analysis from the EC demonstrates the relative European productivity growth slowdown is dominated by the four large euro area countries. These countries have also seen persistently high unemployment, at levels almost twice those in the US and the rest of the EU-15.

The composition of the relative productivity slowdown points to a substantial contribution due to ICT. The ICT contribution to productivity growth during 1996-2000 was 1.85% points per annum in the US versus 0.67% points per annum in Europe. Two-thirds of the difference due to ICT is accounted for by the use of ICT and one-third of the difference is due to the production of ICT.

The US invests much more in ICT as a share of overall investment, and gains a larger productivity dividend per unit of investment than Europe. Analysis of earlier technological revolutions such as steam and electricity, cross country comparisons, and firm level studies point to the crucial role of economic and social change – “creative destruction” – to gain the full benefit from ICT.

Economic flexibility, including flexibility in relation to the entry and exit of firms and hiring and firing of labour, is required for “creative destruction” to occur. The potential for ICT to change the economy and society has therefore placed a premium on economic flexibility that may have been largely absent prior to 1995 – when Europe performed relatively well. Labour market flexibility, and/or active labour market policies, are also essential to resolve the structural unemployment problem in some European economies.

We propose a focus on:

- Facilitating “creative destruction” at the European and national level. This would contribute to outcomes in relation to all three of the areas of i2010, namely Single European Information Space, strengthening Innovation and Investment in ICT; and achieving an Inclusive European Information Society.
- Developing solutions to problems of access and discrimination in communications markets that is focussed on key bottlenecks, and which encourages initiatives from market operators rather than relying on detailed intervention.

- Delivering regulation fit for the emerging converged communications market. For example, cost-benefit assessment could be applied to choices between *ex ante* regulation and general competition law as convergence proceeds; the list of relevant markets for analysis in terms of finding significant market power should be reduced as markets converge; and attention should be focussed on analysis of competitive conditions in geographical sub-markets in member states to ensure regulation is lifted when and where infrastructure competition develops.
- The diffusion of ICT technologies, recognising that diffusion will eventually reduce existing “digital divides”. Eliminating specific taxation of ICT devices and services, and funding any telecoms USO from general taxation, would increase the rate of diffusion.
- e-government initiatives that focus on the quality of services to promote use, rather than the quantity of services offered (irrespective of quality and use).

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Indepen understands and has experience of government, regulation and investors, as well as business and other forms of enterprise. We believe that developing policies which align the incentives for these groups can produce better results for all stakeholders, and improved services for everybody. We use our knowledge to challenge constructively and our thinking is independent, distinctive and rigorous. We work in this way to promote both public and private value, with clients in the UK, EU and elsewhere in the world.

