



ICT, connectivity and productivity

Rules for growth: telecoms regulatory
reform in the run-up to i2010,
European Policy Forum

8 March 2007, Brussels

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Indepen

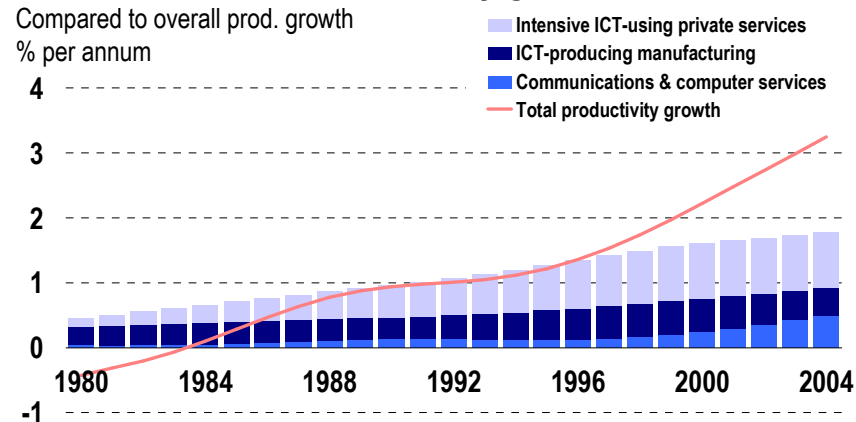
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The reason the contribution of ICT has risen in the EU is that productivity growth has slowed

ICT contribution to productivity growth, US

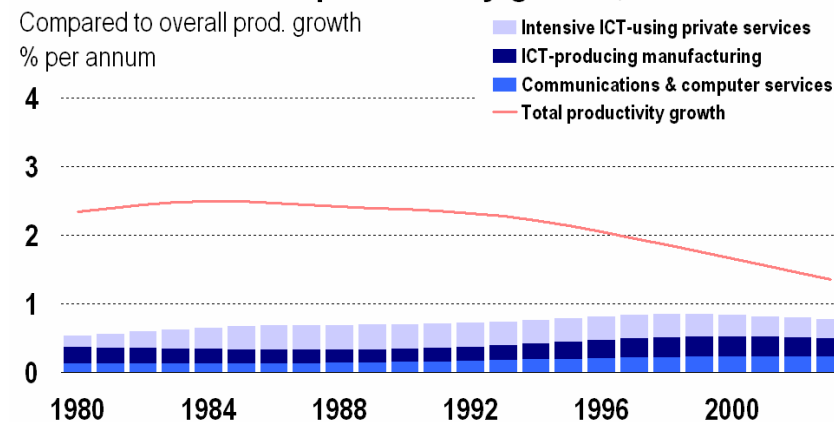
Compared to overall prod. growth
% per annum



Source: Indepen, GGDC data (smoothed using Hodricks-Prescott filter)

ICT contribution to productivity growth, EU-15

Compared to overall prod. growth
% per annum



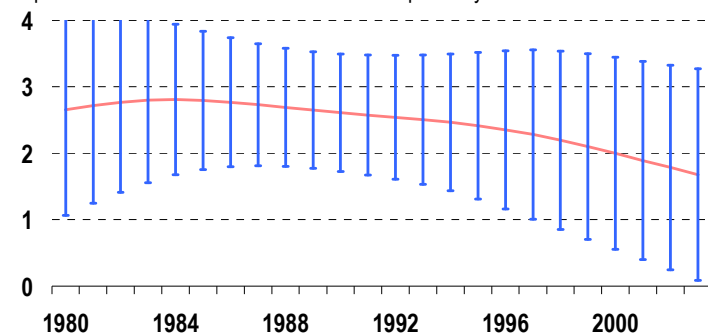
Source: Indepen, GGDC data (smoothed using Hodricks-Prescott filter)



ICT not contributing to convergence in Europe

Labour productivity growth & variance, EU-15

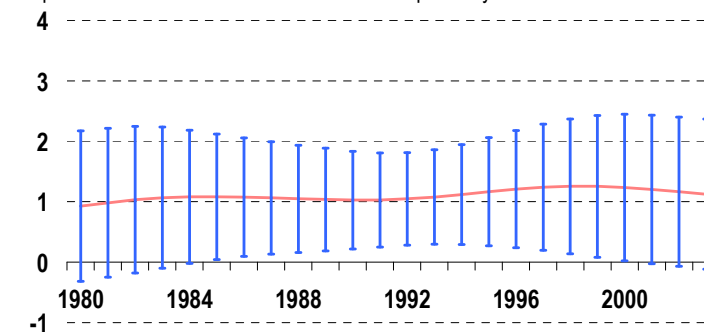
% per annum and 95% confidence interval respectively



Source: Indepen, GGDC data (smoothed using Hodricks-Prescott filter)

ICT contribution to prod. growth & variance, EU-15

% per annum and 95% confidence interval respectively



Source: Indepen, GGDC data (smoothed using Hodricks-Prescott filter)

- Most ICT is tradable and therefore universally available – with the exception of access networks in particular
- ICT contribution to divergence suggests that policy differences matter more for effective use of ICT than other investment and innovation



Why is the EU failing to benefit fully from ICT?

■ Irrelevant

1. ICT sector similar size in US & EU, and size not correlated with ICT related growth
2. Broadband is too recent to explain productivity differences up to 2003
3. Lack of investment in ICT capital, ICT R&D and ICT skills?
BUT investment reflects return, so why are returns low?

■ Relevant

1. Economic flexibility and “creative destruction”
2. Connectivity – potential transformation and separation from service and applications
=> Need for regulatory flexibility?

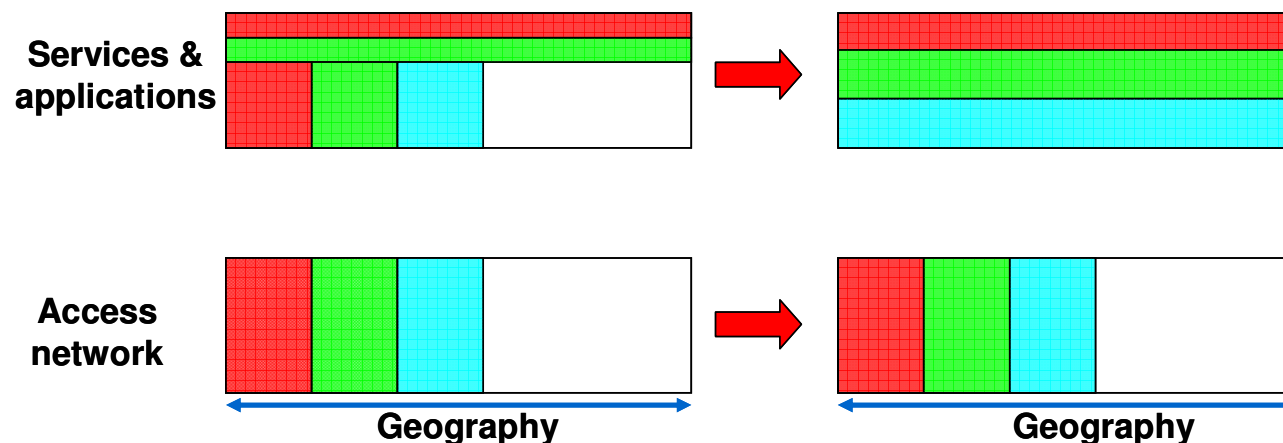
“[ICT] provides a striking example of the need for policy makers to promote entrepreneurship and a healthy process of ‘creative destruction’” DG Ecofin, 2005

“The opportunity cost of security and preservation of the status quo – whether it is the status quo technology, the status quo trading partner, or the status quo job – has risen greatly in recent times.” James Heckman (Nobel winner)

“the traditional European strength in human capital has been in workers with strong vocational training and the relative weakness has been in the production of college graduates... In the ICT era, however, it is strength in depth in higher education that has paid off.” Professor Nicholas Crafts, 2003 [ICT]



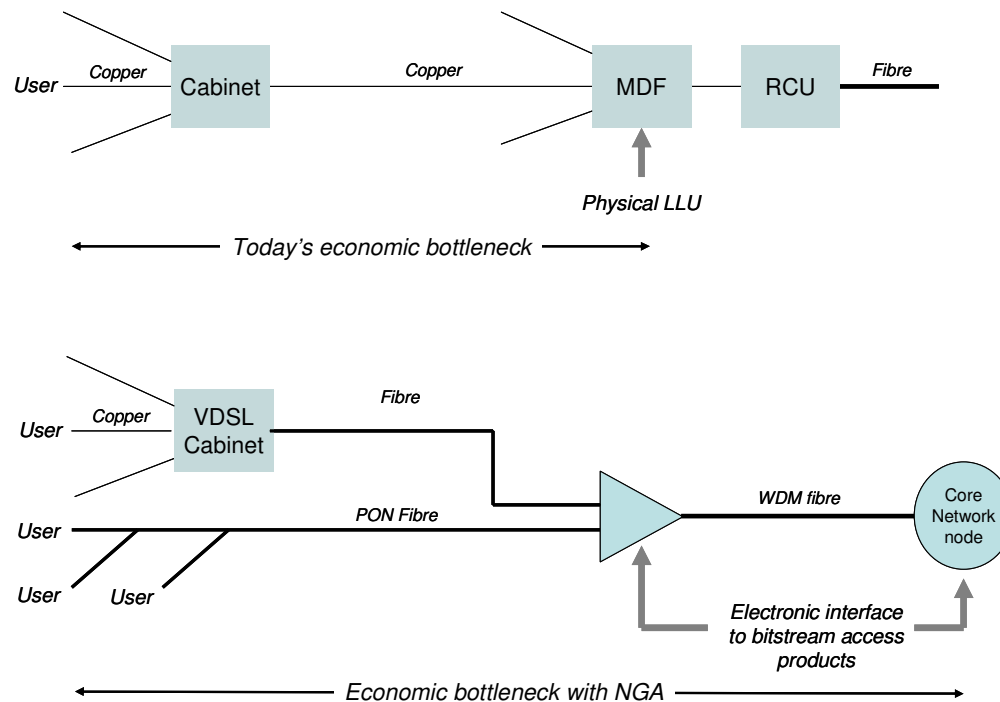
Transformation of market on the back of ubiquitous connectivity?



- Access will remain local (street or premise) bottleneck in many locations
- Services and applications layer could develop independent of particular local access infrastructure provided have equivalence of inputs
- Analogy with ICT more generally i.e. separation of platforms and applications
- “We find that it is important empirically to have a separate measure of how businesses use computers...computer networks are a new technology that shifts the production function, distinct from the productive effect of computer inputs in the production process.” *Atrostic and Nguyen, July 2006* <http://www.nber.org/books/CRIW03-BH/atrostic-nguyen7-26-06.pdf>



Access network transformation



- Larger economic bottleneck with efficient architecture, but electronic interface would improve prospects for service innovation and competition
- What framework will support efficient network transformation?



Limitations of current access networks

- Core network NGN transformation – lower cost and more flexible, optimal network highly consolidated

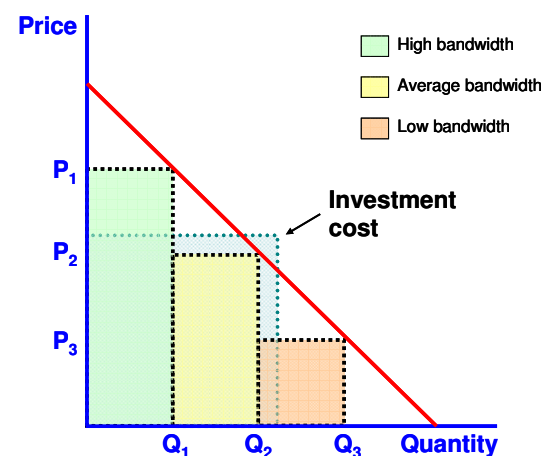
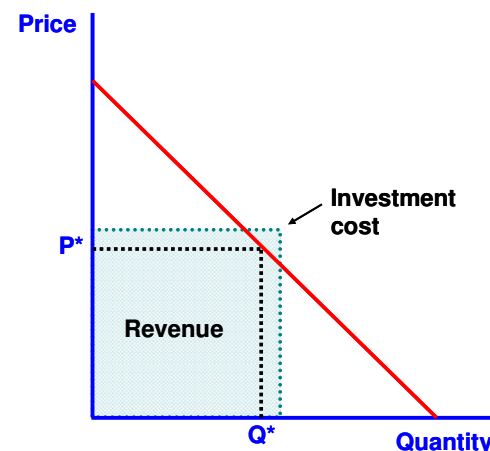
- Copper access network limitations now more apparent:
 - Variability of speed due to network characteristics and contention reduces value to consumers, and makes marketing of services more difficult
 - Highly asymmetric - upload speeds limited and will remain so – constraint on Web 2.0
 - Probably cannot support some new services such as real time HDTV
 - Service level challenge exacerbated by unbundling at local exchange

- But next generation access upgrade challenging transformation since
 - Costs may be higher (even if willingness to pay higher)
 - Regulatory challenge of ensuring efficient and timely investment



The challenges of uncertainty and information asymmetry

- IF the optimal network upgrade plan were common knowledge the regulator could just say “do it, and I’ll allow you to recover the cost”
- BUT, no one knows the optimal plan (which will be contingent on new information), the efficient cost or optimal pricing
- No agreed plan or price cap can deliver efficient and timely investment
- Pricing flexibility is needed to align investment decision with good public policy
 - △ Revenue > △ cost; whenever
 - △ Willingness to pay > △ cost
- Sunk costs irrelevant to decisions

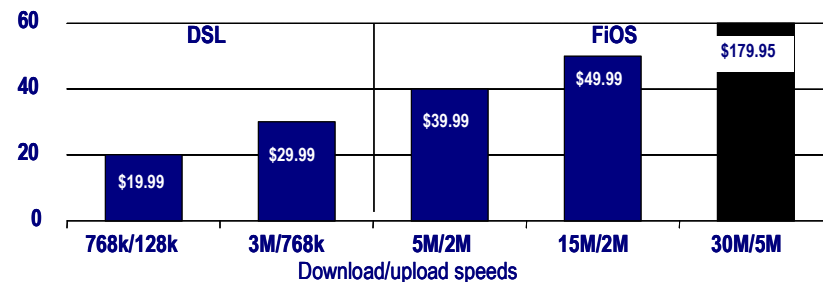




Broadband price differentiation by bandwidth

Comparison of Verizon data pricing and speeds

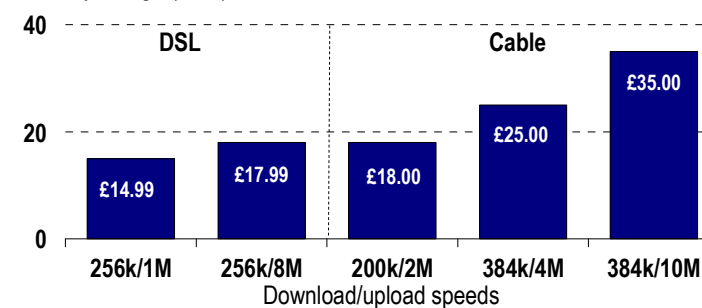
Monthly charge (USD)



Source: Indepen, www2.verizon.com as at 29 January 2007. Note that 1 year contracts include free installation. The pricing of FIOS services are based on one-year contracts.

Comparison of Virgin data pricing and speeds

Monthly charge (GBP)



Source: Indepen, www.virginmedia.com. The price of the 2M cable product is currently £14.99 for 12 months, offer ends 31/03/07.

- Price discrimination efficient way to support timely and efficient investment
 - Voice network discrimination occurred via service pricing
 - Discrimination via service not sustainable - discriminate via price for access capacity, but on equivalence of inputs basis
- No price is 'cost reflective' with capacity based discrimination



Customer protection, competition, and efficient investment – can we have it all?

- Require availability of products with NGA that emulate end user experience of existing copper based voice and broadband services at current prices
 - No end user worse off (NGA investment only if Pareto welfare improvement)
 - Constrain potential abuse of dominance via chain of substitution
- Require equivalence of access for all NGA access services to
 - Ensure innovation and competition in service/applications layer
 - But without price or service level regulation for offerings above base service emulation products - to promote efficient and timely investment
- Do not artificially delay NGA, or compensate (some) investors
 - Ensure efficient and timely investment i.e. do not consider sunk costs
 - Protect end users from delayed availability of service and/or transfer to producers

“The new developments also raise the issue of dealing with incumbents’ and competitors’ assets which might become stranded at the wrong time at the wrong place. At first sight, however, it would be retrograde to seek to compensate an operator for past investment decisions it has willingly undertaken.”

Martin Cave. 26 October 2006. Beesley Lecture 2006 - ‘The regulation of access in telecommunications: A European Perspective’.



Challenge to our thinking

- Focus on transformation to efficient network architecture and on regulation consistent with getting there, rather than investment consistent with existing regulation

- Goal remains the same in terms of promoting consumer interests, but means change in terms of
 - Type of competition we promote (should be no trade-off between investment and competition)

 - “Cost reflectivity” as a principle in relation to individual services over fibre access will not be meaningful

- “The difficulty lies, not in the new ideas, but in escaping from the old ones.”
John Maynard Keynes, 1935