8th World Telecommunication/ICT Indicators Meeting (WTIM-10)
Geneva, Switzerland, 24 - 26 November 2010

Contribution to WTIM-10 session 1

Document C/15-E
25 November 2010

English

SOURCE: Imperial College Business School

TITLE: The economic impact of ICT and intangibles: what do we know, what do we need to know?

The economic impact of ICT and intangibles: what do we know, what do we need to know?

Jonathan Haskel,
Imperial College Business School, j.haskel@ic.ac.uk
All source material available from www.coinvest.org.uk

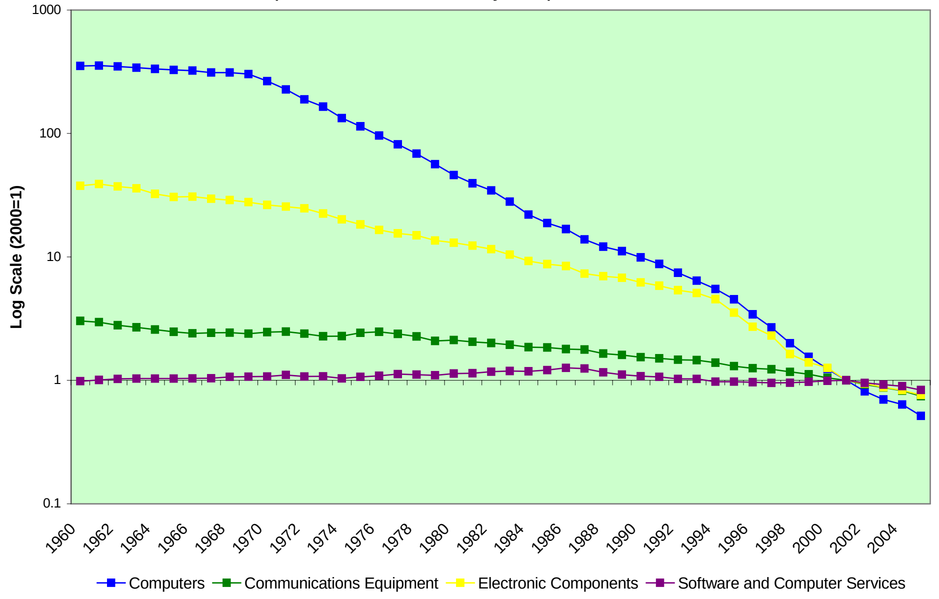
Presentation to 8th World Telecommunication/ICT Indicators Meeting, Geneva, Switzerland, 24-26 November 2010.

Thanks to NESTA, COINVEST , ESRC UK-IRC for financial support

The effect of ICT on the economy

- Ultimate determinant of living standards: productivity growth. So question is: how does ICT affect productivity growth?
- ICT does tasks better, faster, cheaper. How do we measure impact on productivity growth? Research stages:
  - 1 : TECHNICAL CHANGE IN THE COMPUTER INDUSTRY. As in any industry, fast technical change contributes to the average.
  - 2. INVESTMENT: computers as capital goods used in many industries. Measure capital services from computers. Main method: quality improvement means conventional non-quality adjusted prices understate fall in computer prices.
  - 3 : CO-INVESTMENT: computers bring complementary investment in new business models, organisational change.
  - 4 : CONNECTIVITY : improvements in communication technology e.g. the internet make connectivity better, faster, cheaper. Communication prices understated, network effects need to be measured, learning from others cheaper
- How does all this affect growth? Growth accounting describes this
  - Contribution of capital and labour to growth is their
    - share in value added times
    - change in real stock.
  - Contribution of networks, learning etc. = total factor productivity (residual)

Relative Prices of Computers, Communications, Semiconductors, and Software and Computer Services Industry Output, 1960-2005



Source: Jorgenson (2007)

The EU/US divergence puzzle

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	VA	L	*H*	*LC*	K	*KIT*	*KNIT*	MFP
	(1)=(2)+(5) +(8)	(2)=(3)+(4)	(3)	(4)	(5)=(6)+(7)	(6)	(7)	(8)
1980-1995								
USA	3.2	1.1	0.8	0.2	1.4	0.8	0.6	0.8
EU 15	2.1	0.0	-0.3	0.3	1.1	0.4	0.7	1.0
1995-2005								
USA	3.6	0.7	0.4	0.3	1.6	1.0	0.5	1.3
EU 15	2.2	0.6	0.4	0.2	1.2	0.6	0.6	0.4

Why the divergence? Possible answers:

a. lack of EU co-investment

b. Structural problems preventing EU services from TFP growth

Source: EUKLEMS. EU15 are those for whom data available AUT, BEL, DNK, ESP, FIN, FRA, GER, ITA, NLD & UK.

Coinvestment and intangibles

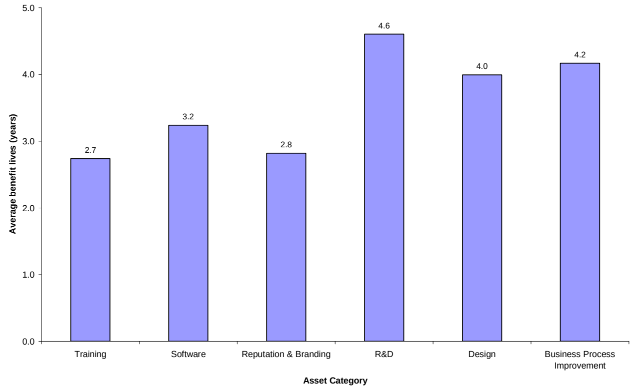
- Focus on computers is focus on tangible capital
- At same time, firms developing intangible capital. Examples:
- The iPhone:
  - R&D and patents. Plus:
  - Software, Design, Marketing and reputation,
- EasyJet
  - No R&D, no patents. But:
  - Software, branding, business process
- Financial services
  - No R&D, no patents. But:
  - Non R&D product development, software, branding, business process, training
- Thus broaden growth accounting approach to contributions of
  - Labour
  - Tangible capital (ICT and non-ICT)
  - Intangible capital (R&D, software, design, branding, training, business process)
  - Total factor productivity

Intangible investment is more than just R&D..

Type of intangible investment	Includes the following intangibles	Current treatment in National Accounts
Computerised information	(1) Computer software (2) Computer databases	Both treated as investment
Innovative property	(1) Scientific R&D (2) Mineral exploration (3) Copyright and license costs (4) New product development costs in the financial industry (5) New architectural and engineering designs (6) R&D in social science and humanities	Only (2) and (3) treated as investment
Economic competencies	(1) Brand Equity (2) Firm-specific human capital (3) Organisational structure	None of these treated as investment

Micro data suggests intangibles are capital

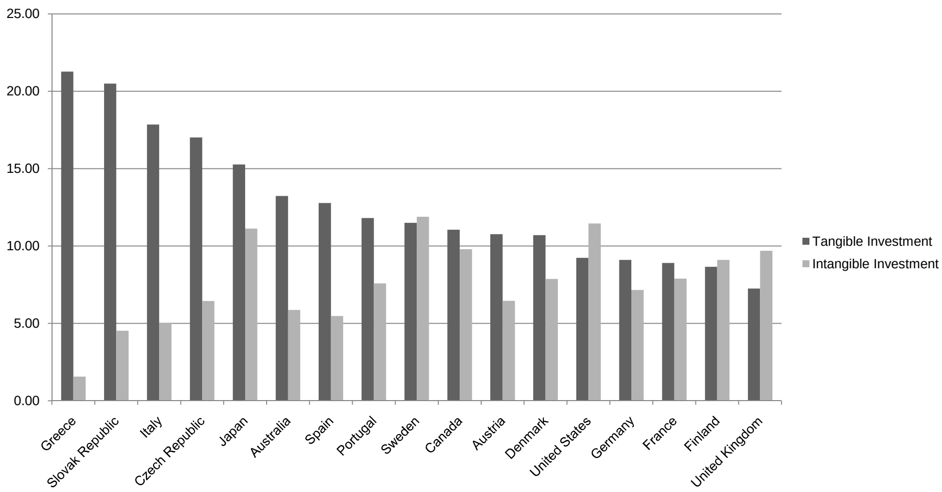
- **UK micro survey: how long do you expect to benefit from spending on intangible assets?**



Source: Awano, Franklin, Haskel, (2010)

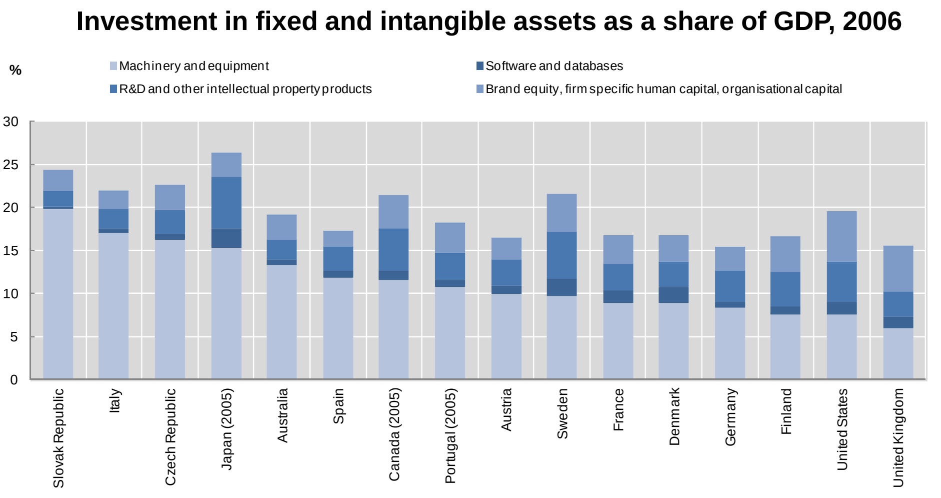
International data suggests intangible investment becoming more important

(data for 2004)



Source: COINVEST project, www.coinvest.org.uk

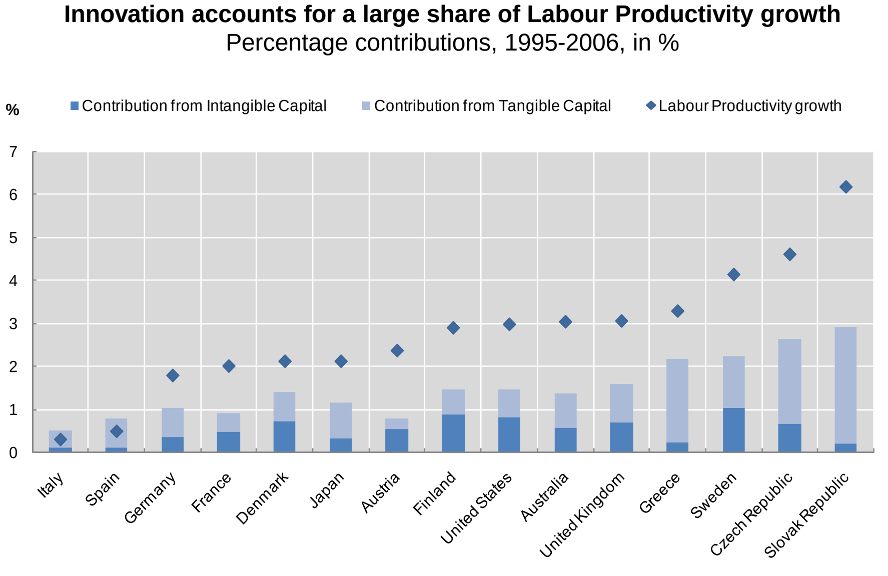
And important in range of intangible assets



Source: Data on intangible investment are based on COINVEST [www.coinvest.org.uk] and research papers, 2009.

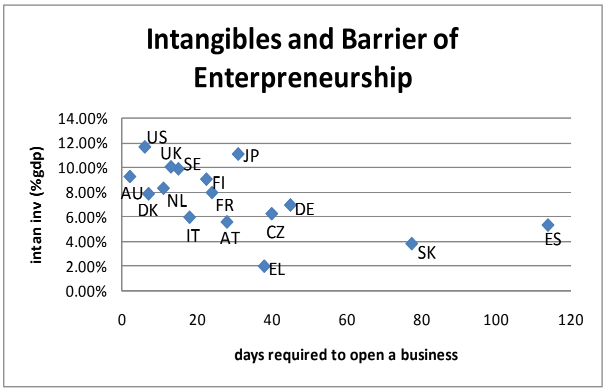
9

Becoming an important driver of growth



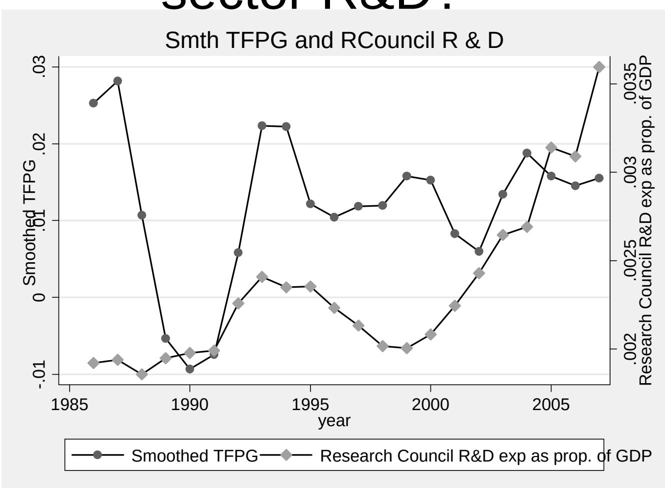
Source: Data on intangible investment are based on COINVEST [www.coinvest.org.uk] and research papers, 2009.

Policy 1: why is Europe not investing in intangibles?



Source: Hao *et al.* (2009) for Germany, France, Italy and Spain; CHS (2009) for the US , Marrano *et al.* (2009) for the UK, Jalava *et al.* (2007) for Finland, Fukao *et al.* (2009) for Japan, Edquist (2009) for Sweden, Van Rooijen-Horsten *et al.* (2008) for the Netherlands and Barnes and McClure (2009) for Australia. Days required to open a business is from WDI of the World Bank.

Policy 2: spillovers from public sector R&D?



Source: Haskel and Wallis (2010)

What's the contribution of the internet to productivity growth?

- Lowers price of communications equipment
  - Effect not included in Byne/Corrado communication equipment price index (change 1995-07 = - 4% pa).
  - Suppose understates true effect by 4% pa. Equals 7% of US productivity growth.
- Lowers price of R&D and innovation by
  - Research teams easier to form (Skype, international co-ordination)
  - Knowledge spillovers easier to absorb in invention (key role of search engines)
  - UK data, 5% of productivity growth
- Facilitates new business organisation
  - Widespread acceleration in US and UK TFP post-1995, centred in the computer-using industries.
  - UK data, 7% of productivity growth
- If all the internet, could be around 20% of productivity growth

What indicators do we need?

- ICT: better
  - quality-adjusted price measures of communication equipment
  - investment data on computers, communication equipment etc.
- Co-investments: better data on co-investment in intangible assets (ONS micro survey a possible template)
  - Spending
  - Depreciation
  - Prices

Summary

- Growth accounting the right framework for impact of ICT on productivity
  - 1980s/90s: technical progress in computer industry
  - 1990s:
    - computer capital deepening set up productivity gains in rest of the economy
    - co-investment also raised productivity
  - 2000s and beyond
    - Organisational and network change via the internet
- Clear research agenda on measurement to better inform policy
- Developing policy agenda favouring
  - Deregulation to favour intangible assets and experimentation
  - No tax credits on most intangible investments
  - Support for public sector R&D