The Innovation Revolution

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Will Hutton

Innovation, Enterprise and the 2010s

The rise of " unproductive entrepreneurship"

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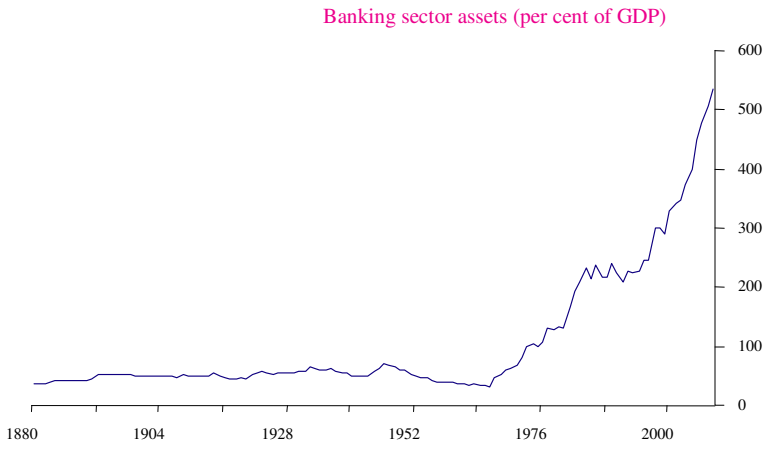
Size of UK banking sector



Source: Sheppard, D. K. (1971) and Bank of England.

Britain is private debt capital of the world

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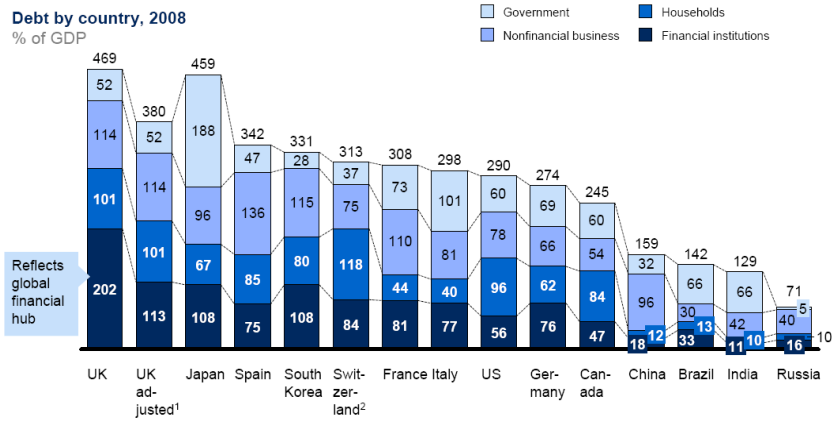

Compound annual growth rate of debt in local currency, %													
2000-08	10.2	0.3	14.5	10.8	4.5	7.7	6.3	8.1	2.5	6.1	15.1	15.1	16.5	31.6

1 The UK financial sector was adjusted to reflect its position as a financial hub. See the technical appendix for details.
2 Data for Switzerland represent year-end 2007.

SOURCE: Haver Analytics; McKinsey Global Institute

Recessions compared

Note: In the past it has taken between 36 and 48 months to return the level of output to where it was at the start of the recession. Source: NIESR

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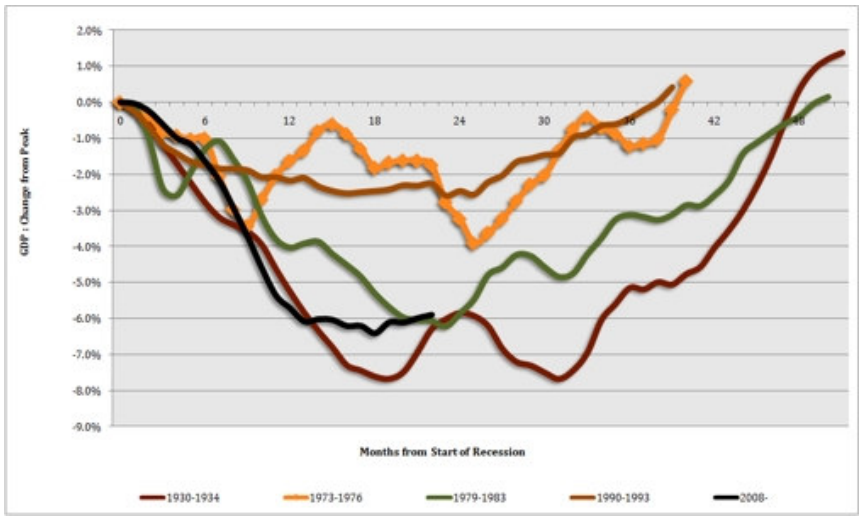

The tough 2010s

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- Minimum 5 per cent of GDP lost for ever. Loss could be as high as 10 per cent.
- Trend growth rate 1991 to 2009 (trough to trough) was 2.0 per cent but contained bubble effects. Note between 1997 and 2007 half GDP growth financial services, property and construction.
- Barclays worst case forecast in IFS Green Budget is trend growth of 1.75 per cent
- There will be deleveraging and build up of saving
- Yet 3 million economically inactive, 2.8 million involuntarily idle and 2.45 million unemployed.
- Public sector has generated half jobs growth since 1997. Cannot be repeated 2010-20.

.....Where are growth and jobs to come from in the 2010s?

% Net public sector jobs 1998-2008

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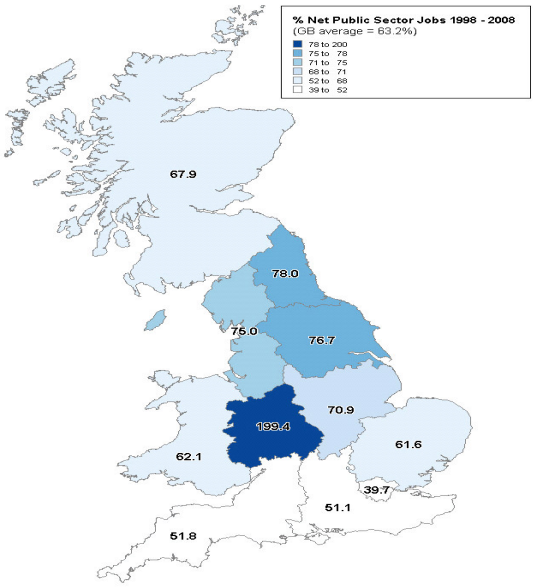

Knowledge economy and the 1980s recession and recovery

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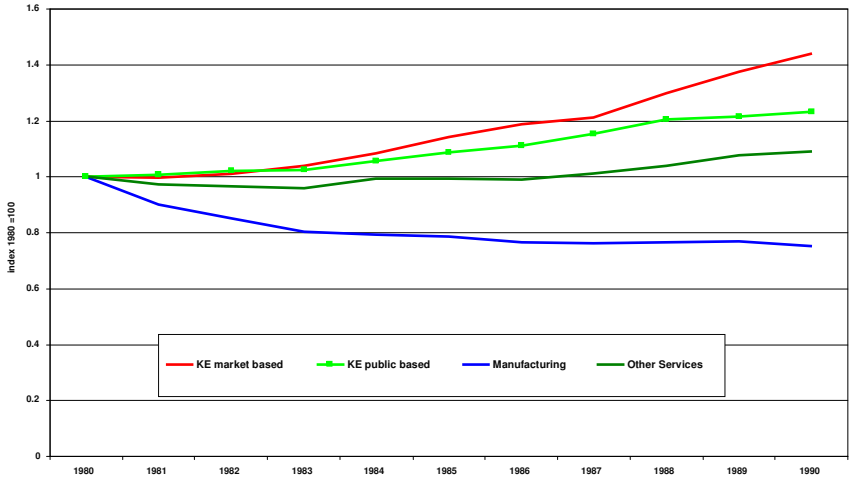

Total employment, EU KLEMS database definition 1980=100. KE market based is telecoms, high tech, business, financial, and cultural services; KE public based is education and healthcare

Knowledge economy and the 1990s recession and recovery

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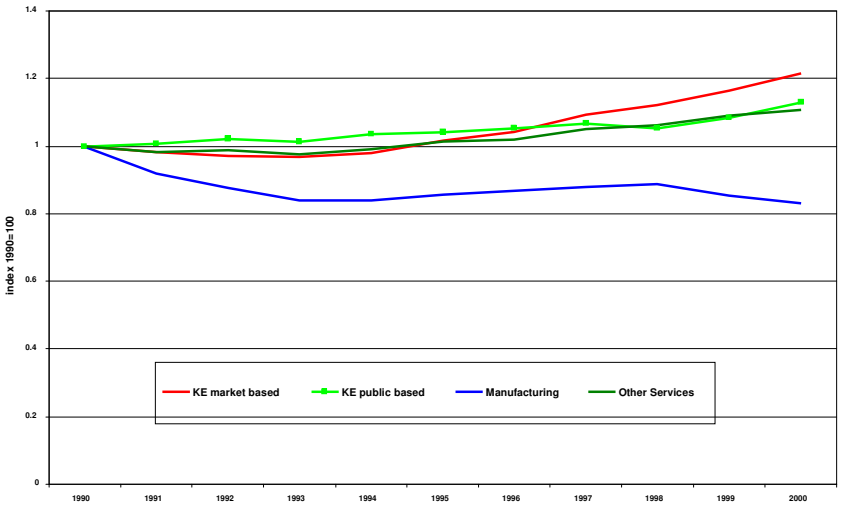

Total employment, EU KLEMS database definition 1980=100. KE market based is telecoms, high tech, business, financial, and cultural services; KE public based is education and healthcare

Defining the Knowledge Economy

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" Economic success is increasingly based on the effective utilisation of intangible assets such as knowledge, skills, and innovative potential as the key resource of competitive advantage. The term knowledge economy is used to describe this economic structure"

Source: UK Economic and Social Research Council 2005

Knowledge based industries defined by the OECD

Note: manufacturing classified by R&D intensity; services classified by ICT use and employment of graduates. Recreational and cultural industries recognised as knowledge based by EU but not OECD, and includes libraries and museums.

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Market based Knowledge industries	Public based knowledge industries	Other market based industries	Other public based industries
• High to medium high tech based manufacturing • High tech services (telecommunications, computer services, R&D services) • Financial services • Business services (real estate, advertising, accountancy, legal, technical, consultancy) • Creative Industries	• Education • Health and social work	• Low to medium low tech based manufacturing • Distribution, hospitality • Transport • Other services (dry-cleaning, hairdressing, refuse collection • Recreational and cultural services*	• Public administration

Key drivers of the knowledge economy

Growing as proportion of GDP in all western & advanced Asian economies

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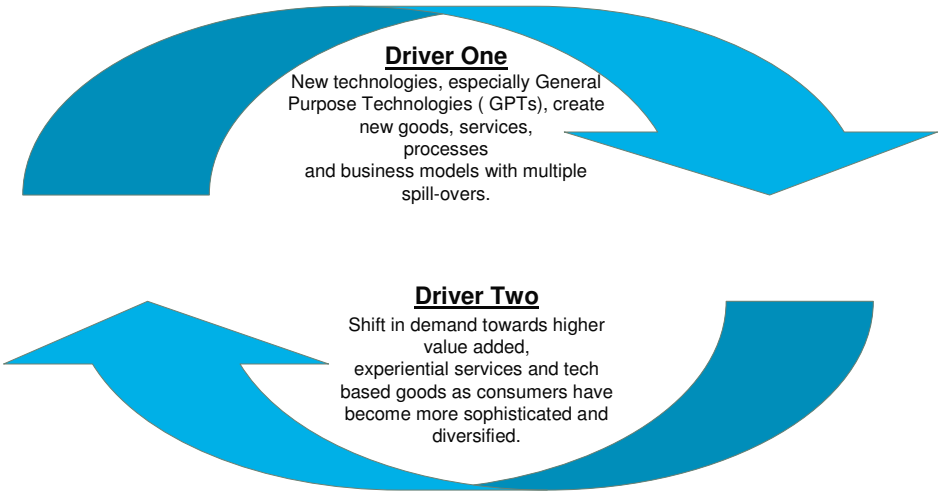

Intangibles and tangible forms of investment

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Tangibles	Intangibles	
Buildings	Computerised information	Software and databases*
Plant and machinery	Innovative property	Scientific and non-scientific R&D Mineral exploration, copyright, licence costs* New products from the finance industry New architectural and engineering designs
Vehicles	Economic competencies	Brand equity (strategic advertising plus market research) Firm specific human capital (employer provided training) Organisational structure (share of management time spent on strategy plus cost of external consultants)

The rise and rise of "intangibles" – proof positive of the emergent Knowledge Economy

Intangibles investment share 1970-2004

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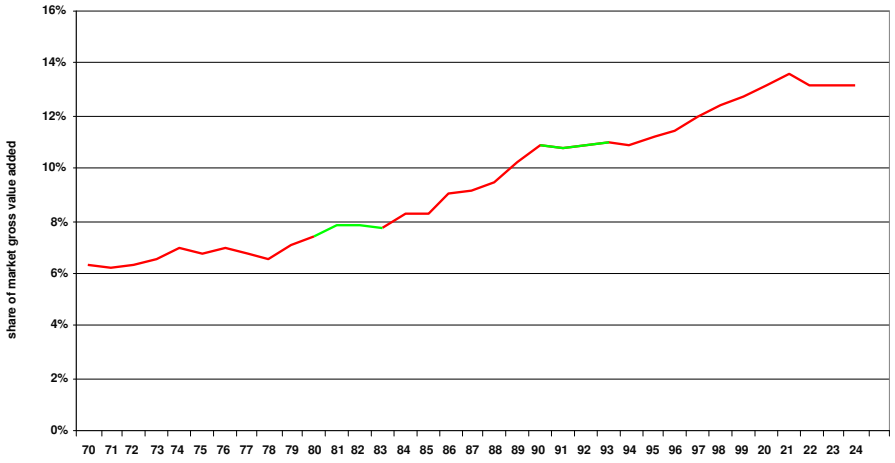
Business investment in intangibles as a share of market sector value added adjusted to take account of intangibles. HMT October 2007.



Business investment in intangible knowledge based assets across the OECD

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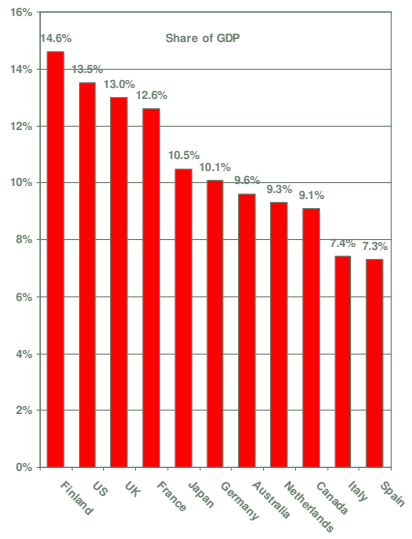

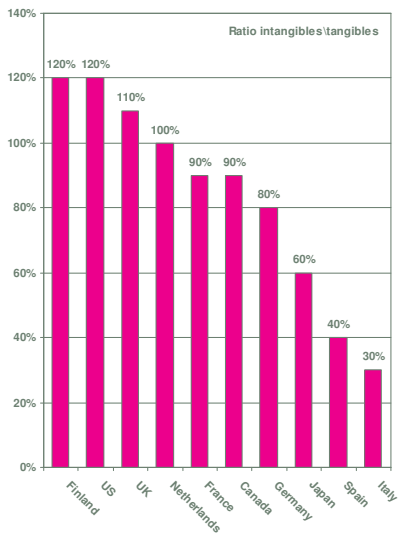

Jobs: 2008 – 2009 and the 2020 workforce

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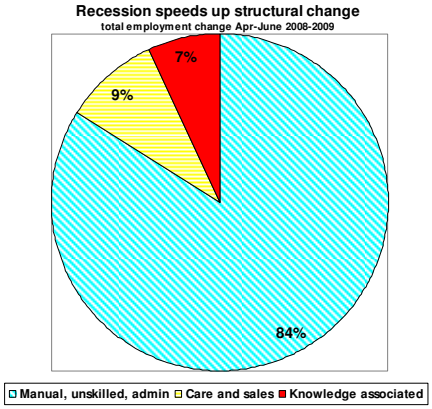

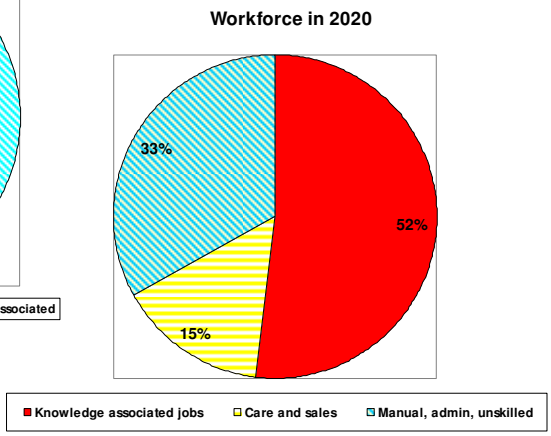

A short history of general purpose technologies (GPTs)…

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- **9000 BC – 1400AD**

  Seven GPTs

  domestication of animals & plants; wheel; smelting of ore; writing; use of bronze; iron & steel; creation of water wheel

- **1400 – 1750**

  Two GPTs

  three masted sailing ship and printing

- **1750 - 1900**

  Five GPTs

  steam engine; factory system; railway; iron steamship; communications

- **1900– 2000**

  Nine GPTs

  internal combustion engine; electricity; motor vehicle; airplane; mass production; computer; lean production; internet; biotechnology

Twenty-first century prospects ?
Grand Challenges for Engineering

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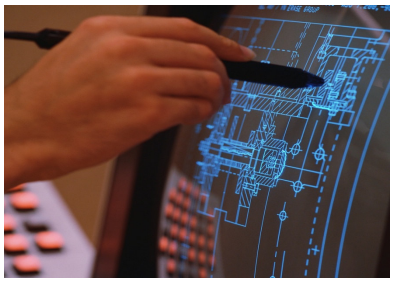
- Nanotechnologies
- Energy from fusion
- Advanced materials
- Carbon sequestration
- Manage the nitrogen cycle
- Water
- Health informatics
- Durable customised infrastructure
- Customised medicine
- The brain
- Cyberspace security
- Enhance virtual reality
- Personalised learning



Why exponential growth of innovation

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- Knowledge is a public good that constantly expands with each individual contribution to the pool of common knowledge from which others draw
- Multiple combinations of ideas ceaselessly growing
- As a result much invention and innovation happens simultaneously
- Research scientists report that their research anticipated by other teams

Potential sectors for Britain include….

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- Average life expectancy of S and P 500 company 45 yrs in 1955 – 11 years today
- " Manuservices" in aerospace, pharmaceuticals, defence, high tech engineering(cars, chemicals)
- Low carbon economy – energy production, energy efficiency, green manufacturing plus associated services
- Creative and cultural industries – design, electronic/digital media and publishing, games
- High tech and business services – computer, business to business services

Cities as engines of the economy

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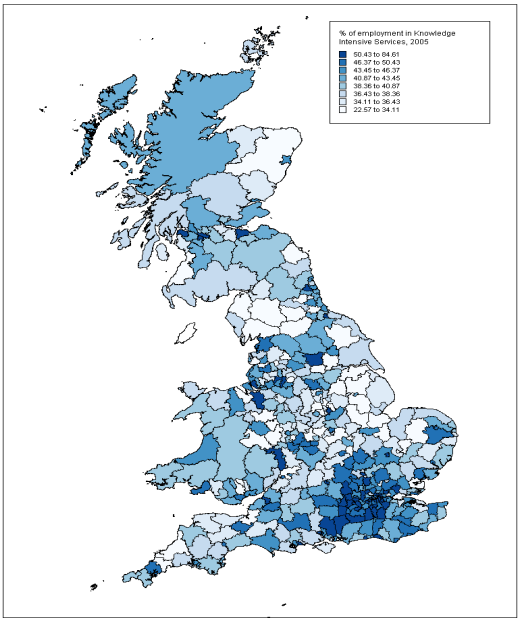
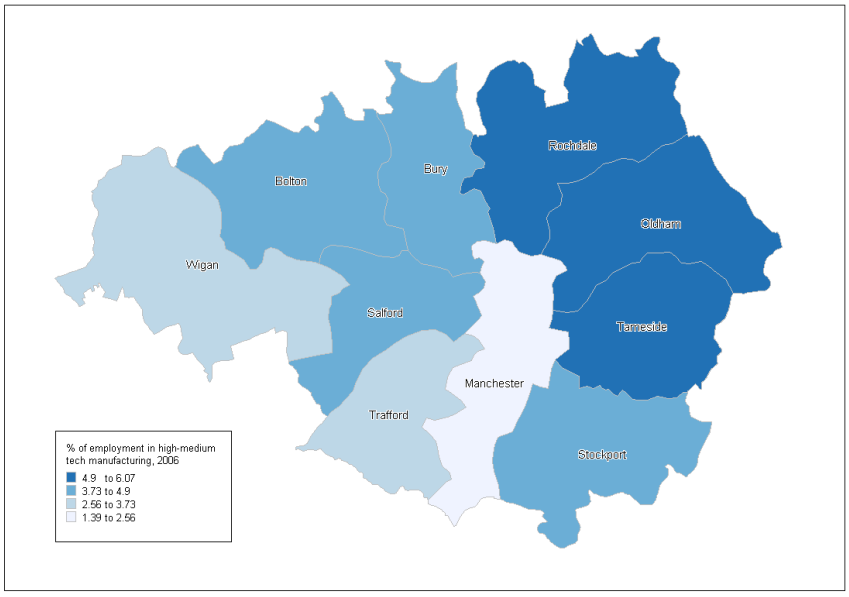


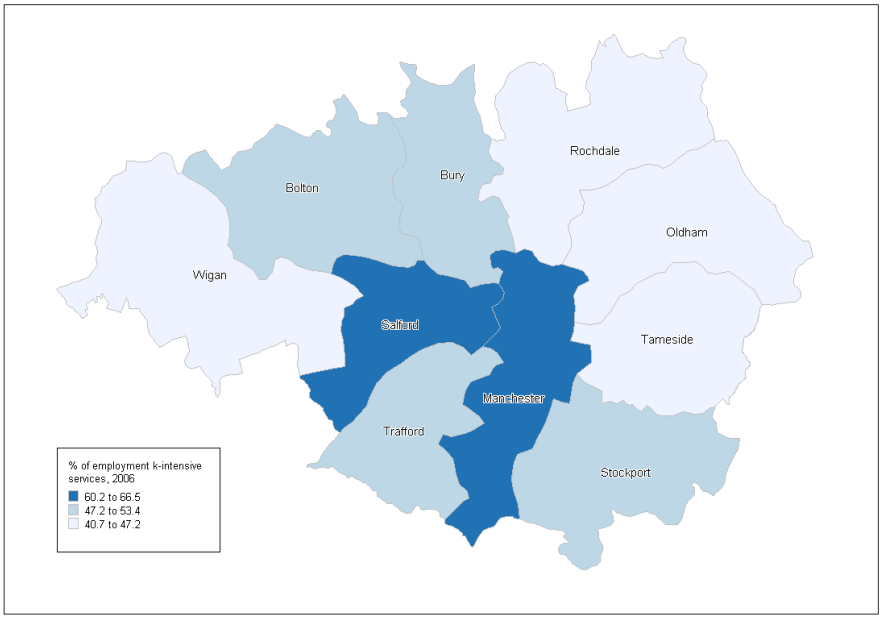
% Employment in knowledge-intensive services, 2006

Eurostat definition of knowledge intensive services includes: communications, computer services, other business services, financial services and health and education services.

Employment in high and medium tech manufacturing in Greater Manchester



Employment in knowledge intensive services in Greater Manchester



The Innovation Ecosystem

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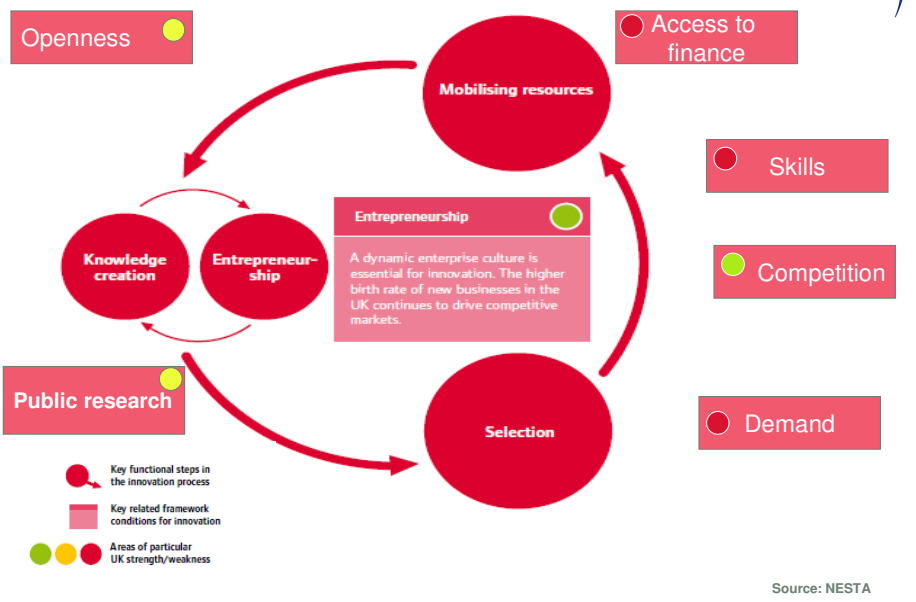

Source: NESTA

A national innovation eco-system to support productive entrepreneurship – A " new economic model "

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- Productive Entrepreneurship
- Knowledge Creation and Diffusion
- Selection and Dissemination of Research
- Market Formation
- Financial mobilisation
- Human Capital Development

A new architecture of " intermediate institutions"

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- Russell Group Universities plus science
- British " Fraunhofer" Institutes
- Creative hubs
- Network of intermediate financial institutions – Green Bank, Creative Industries Bank, Infrastructure Bank, new 3i
- Long term ownership, anchor companies
- Comprehensive lifelong learning
- Intermediate employment insurance mutuals, residential FE colleges, vocational academies to support flexi-security
- Cities with innovation "anchor" institutions

University Research Power

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		Aggregate proportion of research scored at:						
	Staff entered (FTE)	Research at 4*	Research at 3*	Research at 2*	Research at 1*	Research at 0	Linear research score	Research Power
London CR	9927.56	17.9	31.9	31.6	15.1	2.6	2.45	24,362.4
Edinburgh CR	3126.80	11.6	31.7	33.3	18.2	5.2	2.26	7,076.3
Birmingham CR	2759.95	10.8	28.6	35.9	21.6	3.2	2.22	6,132.7
Leeds CR	2497.51	9.8	27.1	36.0	23.2	4.0	2.15	5,382.1
Manchester CR	**2247.51**	**9.7**	**29.2**	**39.4**	**18.0**	**2.4**	**2.23**	**5,015.6**
Bristol CR	2063.41	11.6	33.5	38.0	15.3	1.6	2.38	4,910.8
Newcastle CR	2034.27	11.1	34.0	35.1	17.2	2.6	2.34	4,759.8
Glasgow CR	2064.97	12.9	28.3	35.1	20.4	3.2	2.27	4,694.3
Nottingham CR	1652.41	12.8	34.8	35.4	15.3	1.7	2.42	3,993.8
Sheffield CR	1490.62	13.4	33.1	34.2	17.2	2.2	2.38	3,550.7
Liverpool CR	1343.26	5.2	21.4	36.0	31.0	6.4	1.88	2,524.9
UNITED KINGDOM	52409.22	11.7	29.4	35.1	19.9	3.9	2.25	117,939.8

Support for innovation and investment in OECD stimulus packages

Note: all figures percentage of GDP. Break-down for Korea not available. Source: OECD, except for UK which is estimate by TWF.

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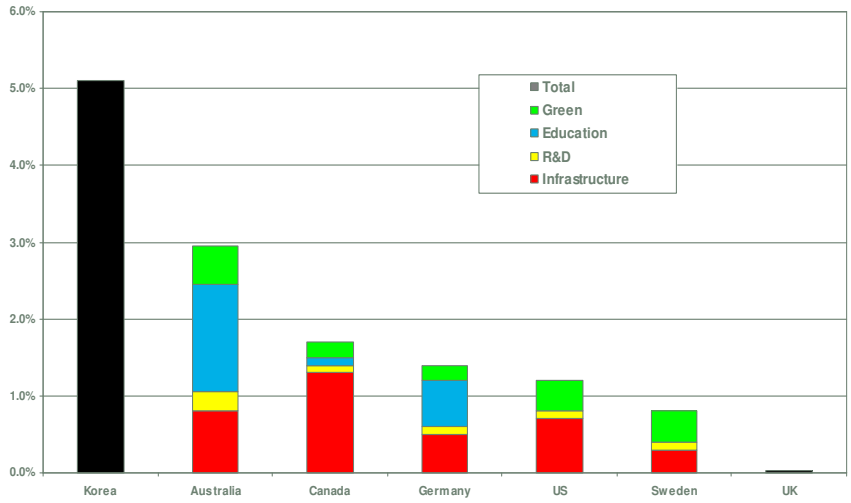

Investment in some knowledge assets (R&D, higher education, software) in 2003-2004

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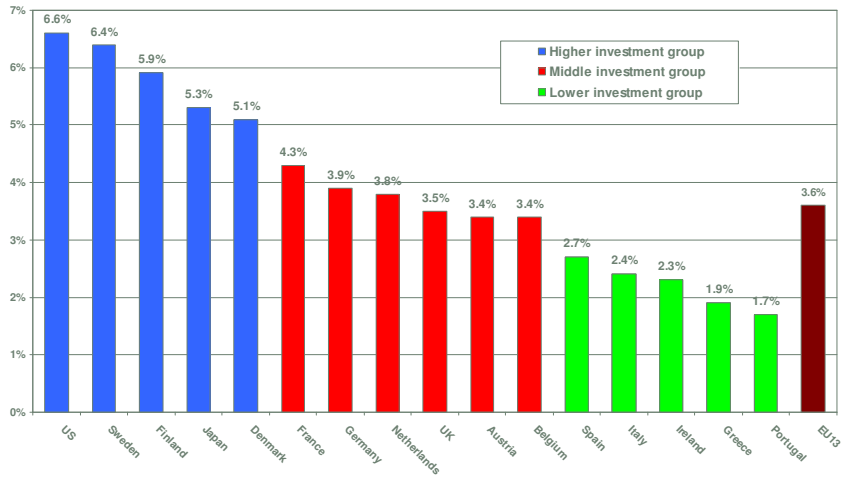
OECD composite indicator, share of GDP: EU13 excludes Greece. US, Japan, Germany are 2004, rest are 2003. OECD STI Scoreboard 2007.



The case for reform of finance

Source NESTA

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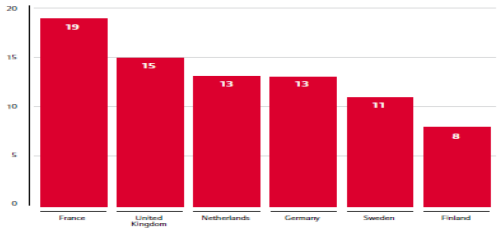
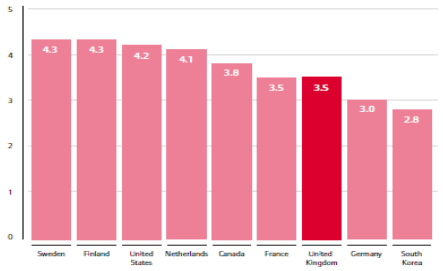
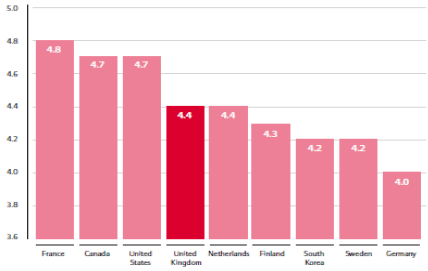
Companies identifying access to finance as the most pressing problem



Access to venture capital, 2009



Access to local equity markets, 2009



Flexicurity Capitalism

Flexicurity components…

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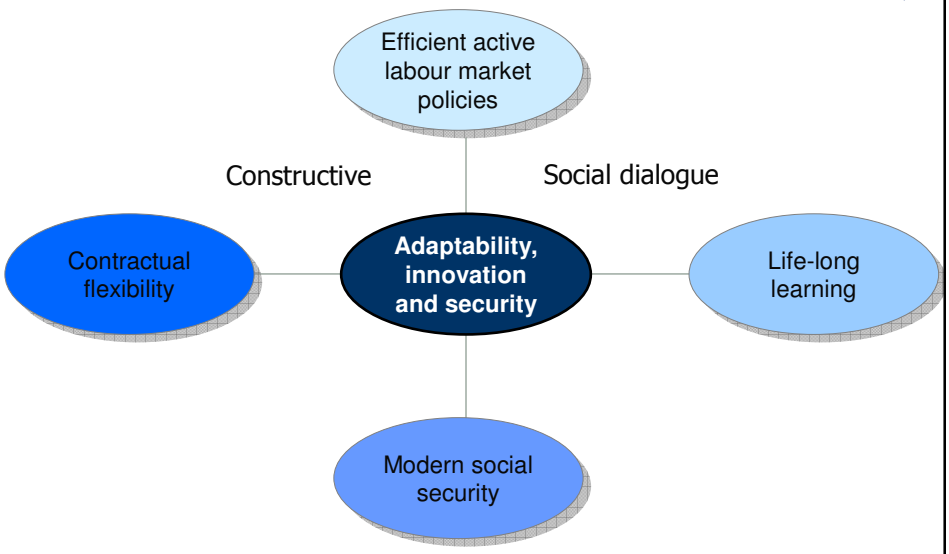

A new deal on macro-policy

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- Focus fiscal consolidation on reduction of current deficit – eg retirement age for all 70 by 2025 plus Swedish lock-in on life expectancy
- Boost rather than reduce capital investment – Infrastructure Bank
- Intelligent Public Procurement to support market creation
- Tax regime to focus on productive entrepreneurship
- Guaranteed carbon price floor
- Competition regime needs to reflect dynamic gains from competition
- Modernisation of Intellectual Property Right Regime

The British Opportunity

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- Productive entrepreneurship
- Focus on knowledge economy sectors
- Intermediate institutions to build an innovation eco-system
- A reframed macro-deal
- A new bargain on work – supporting workers as risk-taking authors of their own lives
- A second industrial revolution

Slides that follow are supplementary …

Knowledge Creation and Development

- Aggressive public investment in R and D, Russell Group Universities and be tough on strategic priorities
- Establish " University Consultancy" – JV with major PLCs professionally to identify and network ideas for commercial exploitation
- Innovation prizes of up to £10 million
- US style tax incentives for universities who commercialise research
- Assign Design Council lead role co-ordinating British design and applications

Selection and Dissemination of Research

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- Centrality of Intellectual Property Right Regime. Renewal fees for patent and copyright to be much higher
- Launch British network of Fraunhofer Institutes – to horizon scan, screen, and assess technologies identifying companies who might be able to exploit them, especially SMEs.
- Reform or replace RDAs with City based Innovation Panels to manage City based Innovation Funds to support clusters and specific knowledge generation to support. Each City to have " Total Innovation" strategy

Entrepreneurial Experimentation

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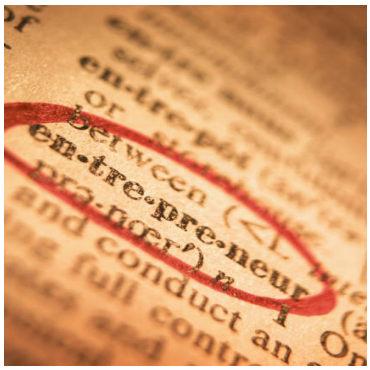
- Competition policy to be much tougher on merging for scale and consolidation advantages so achieving static gains – instead emphasising dynamic gains from plural firms competing hard.
- Tax policy to favour small firm start ups and exits
- New 3i to finance start-ups
- Support large firm entrepreneurship via procurement, financing and R and D support
- Promote even more contractual flexibility in return for better unemployment benefit, employment insurance, lifelong learning, proactive career development and active labour market policies. "Flexi-curity."



Market formation

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- Understand market creation – from infancy to maturity
- Regulate to create markets
- Standard setting for “credence” goods
- Benchmark against best eg “Top Runner”
- Smart public procurement looking to co-innovate
- Procurement to target key sectors eg defence, pharma, life sciences, ICT and Telecoms

Financial mobilisation – reducing casino bias of modern finance

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- Innovation Bank to provide medium term finance for knowledge based companies. Super 3i?
- Infrastructure Bank to plug up to £500 billion financing gap over next decade
- Refocus City on “ productive entrepreneurship” – ban guaranteed bonuses, establish clawback mechanisms etc
- Break up too-big-to-fail super banks
- Shrink shadow banking system
- Bank of England to discount Innovation and Infrastructure Bank paper
- Corporate governance reform to encourage committed share ownership, including full disclosure
- FSA to regulate rather than promote financial services

Human Capital Development

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- Introduce German style **"**Berufschule**"** and build up apprentice system
- Specialist FE Colleges to have residential capacity
- Education system to develop cognitive skills rather than learning for exams
- More interdisciplinary degrees
- Individualised training and Innovation Accounts to support lifelong learning

Skills key determinant of recession impact

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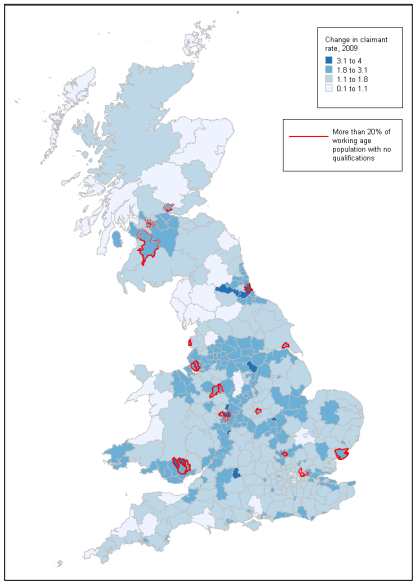

Places with low skills being affected the most

Places with high skills being affected the least

Other characteristics affecting impact:
•Employment in manufacturing
•Financial services employment outside SE and Greater London

A story of knowledge intensive cities

Public versus Private Sector Knowledge Economy

Private sector, 2005 **Public sector,2005**

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