Economic Growth V:
Productivity

Gavin Cameron

Lady Margaret Hall

Hilary Term 2004

questions, questions

- Why did the UK under-perform during the Golden Age?
- To what extent did it catch-up in the 1980s?
- How important were sectoral shifts and FDI?
- Has the New Economy made a difference yet?
- What are the five drivers?
- What has happened to the regions?

recap: technology and TFP

- Growth of output = weighted growth of inputs + growth of total factor productivity
- Growth of total factor productivity = growth of labour productivity - weighted growth of capital per worker
- Growth of inputs
  - Capital and labour
  - Materials and energy
- TFP is a macroeconomic measure of the level of technology.
- TFP rises due to innovation:
  - Higher quality products
  - New products
  - Better ways to use existing inputs

under-performance in the Golden Age

Table 1. Levels and growth rates of real GDP per person, 1950-1979.

	GDP/person,1950 ($1990 international)	GDP/person, 1979 ($1990 international)	Growth rate % per year (rank)
Switzerland	9064	18050	2.4 (15)
Denmark	6946	15313	2.8 (13)
UK	6907	13164	2.2 (16)
Sweden	6738	14721	2.7 (14)
Netherlands	5996	14643	3.1 (11=)
Norway	5463	14460	3.4 (9)
Belgium	5462	13861	3.3 (10)
France	5270	14970	3.7 (7=)
West Germany	4281	15257	4.5 (4=)
Finland	4253	12331	3.7 (7=)
Austria	3706	13449	4.5 (4=)
Italy	3502	12731	4.5 (4=)
Ireland	3446	8367	3.1 (11=)
Spain	2397	9388	4.8 (2)
Portugal	2069	7783	4.7 (3)
Greece	1915	8904	5.5 (1)

Source: Maddison, *The World Economy*, except for West Germany from Maddison, *Monitoring*.

the Broadberry-Crafts view

- The UK could not have grown as fast as Germany and France in the Golden Age since it had fewer catch-up opportunities and less scope to move labour out of farming.
- Nevertheless, growth was lower than it could have been by about 1 per cent a year.
- This was due to poor supply-side policies, such as corporatism, the failure of industrial relations, lack of competition, and only modest increases in the supply of highly trained and educated workers.

slowdown in the ’70s, speedup in the ’80s

- In common with most other OECD economies, manufacturing TFP growth in the UK slowed in the 1970s (from about 2½ per cent per annum in the 1960s to about 0.2 per cent per annum between 1973 and 1979).
- UK manufacturing TFP experienced an increase in growth in the 1980s, attaining a growth rate of about 3 per cent per annum.
- Two possible explanations for the slowdown and speedup:
  - Mismeasurement: Capital Scrapping; Labour Hoarding; Single Deflation Bias.
  - Structural Change: Institutional Rigidities and Strong Unions in the 1970s followed in the 1980s by weakening of trade union power, withdrawal of state-subsidies, shedding of below average plants, increased subcontracting and catch-up to international best practice, along with foreign direct investment.

UK manufacturing growth decomposed

	1960q1-73q1	1973q1-79q2	1979q2-90q2	1990q2-95q3	1960q1-95q3
Decomposition of Y/L					
Y/L	4.20%	1.50%	4.62%	3.46%	3.75%
TFP	2.58%	0.15%	3.03%	2.20%	2.23%
K/L	1.62%	1.35%	1.59%	1.26%	1.51%
Decomposition of TFP					
TFP	2.58%	0.15%	3.03%	2.20%	2.23%
Biases	0.12%	-1.16%	0.33%	0.50%	0.02%
Cycle	-0.81%	0.11%	-0.11%	0.03%	-0.31%
Trends	3.04%	1.88%	2.75%	2.56%	2.67%
Other*	0.23%	-0.67%	-0.06%	-0.88%	-0.15%
Decomposition of Trends					
Trends	3.04%	1.88%	2.75%	2.56%	2.67%
SKILL	0.52%	0.34%	0.29%	0.22%	0.37%
UNION	-0.11%	-0.06%	0.25%	0.06%	0.04%
R&D	0.92%	-0.11%	0.50%	0.55%	0.55%
Other+	1.72%	1.72%	1.72%	1.72%	1.72%

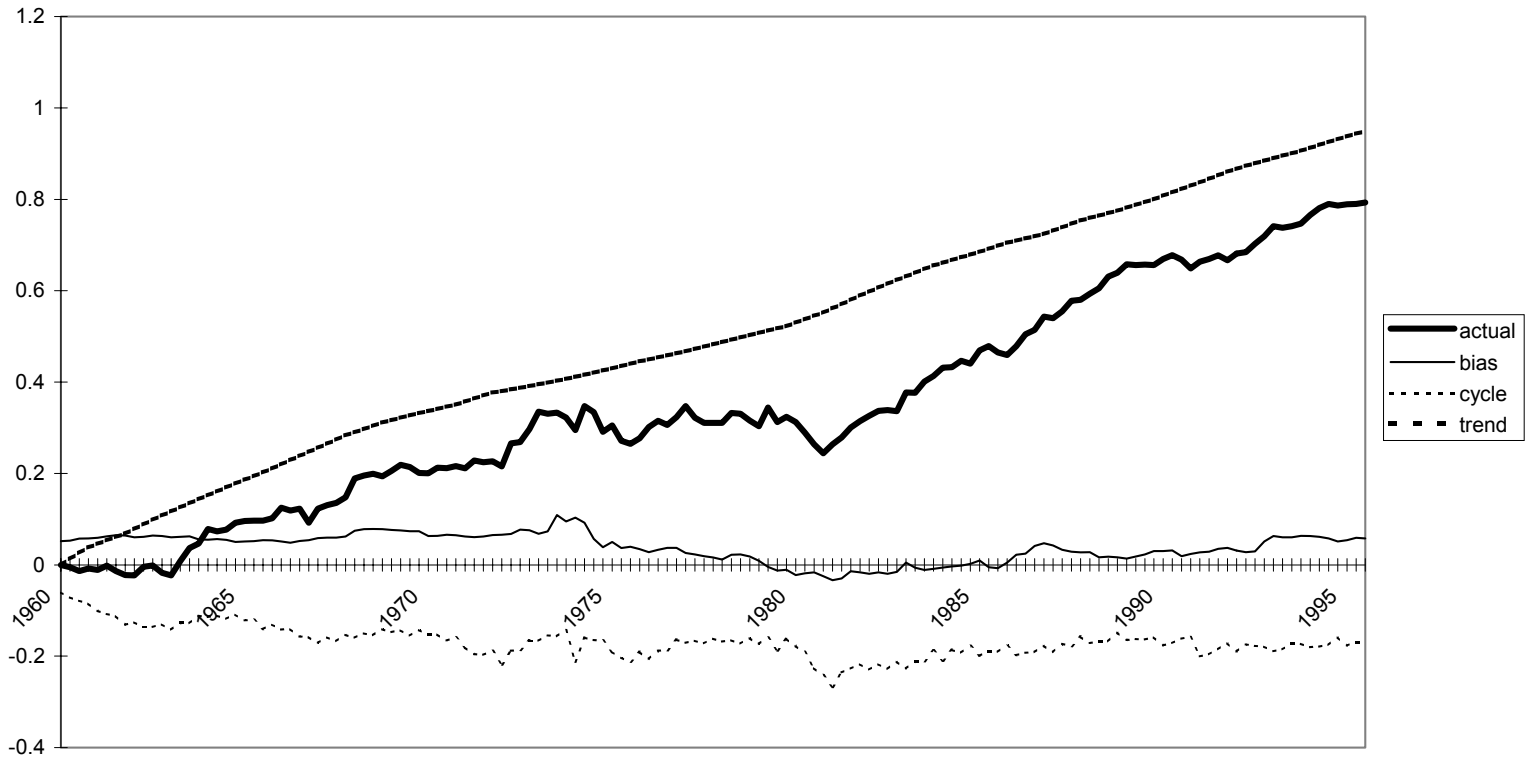
Notes:

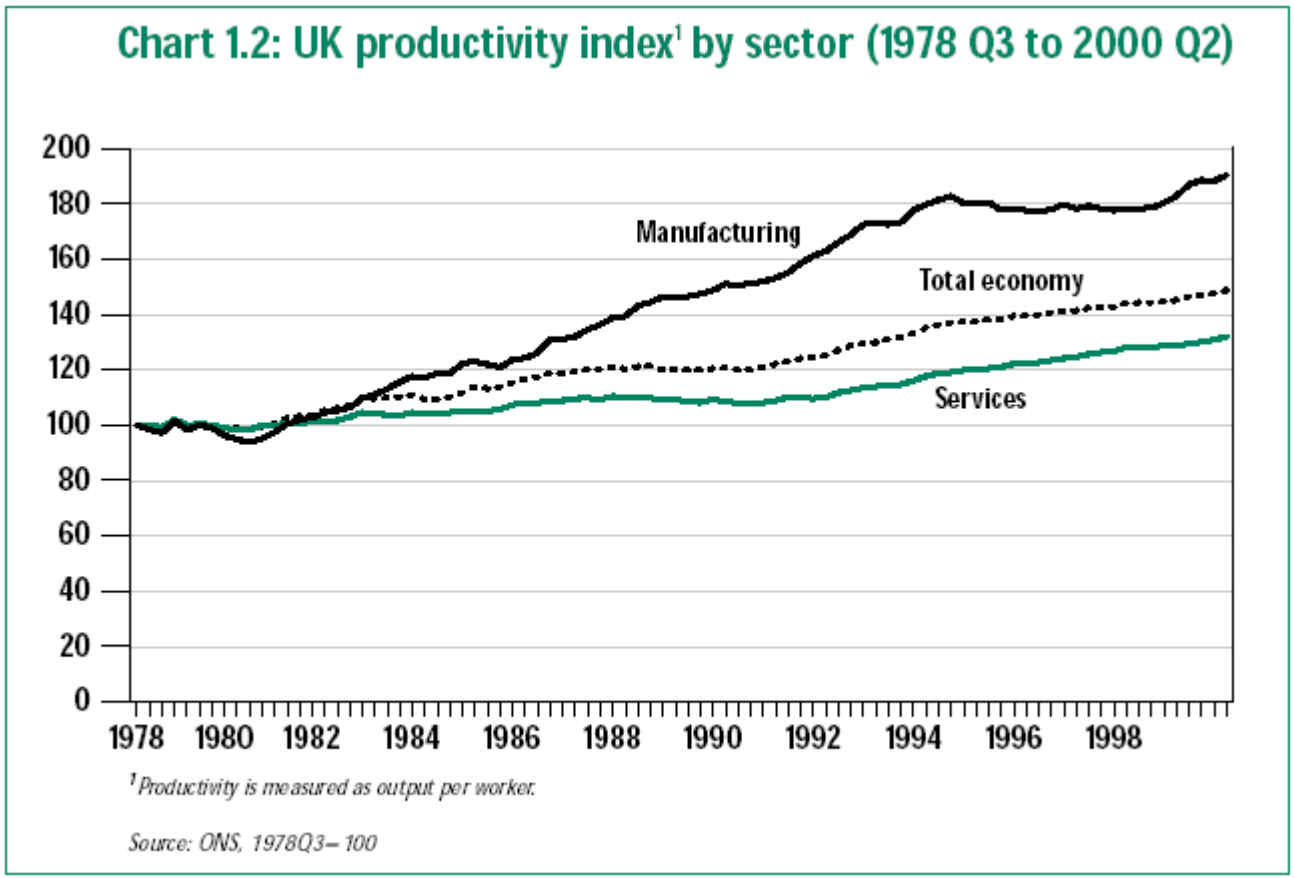
May not sum exactly due to rounding. These estimates are based on the parameters in regression (1). SKILL is the ratio of administrative, technical and clerical staff to total workers. UNION is the proportion of full-time manual males covered by collective agreements. R&D is the ratio of the stock of industry-funded Business Enterprise spending on R&D (BERD) to the physical capital stock. % change in labour productivity = % change in TFP + % change in the contribution of the capital to labour ratio.

** Includes the residual plus seasonal factors.*

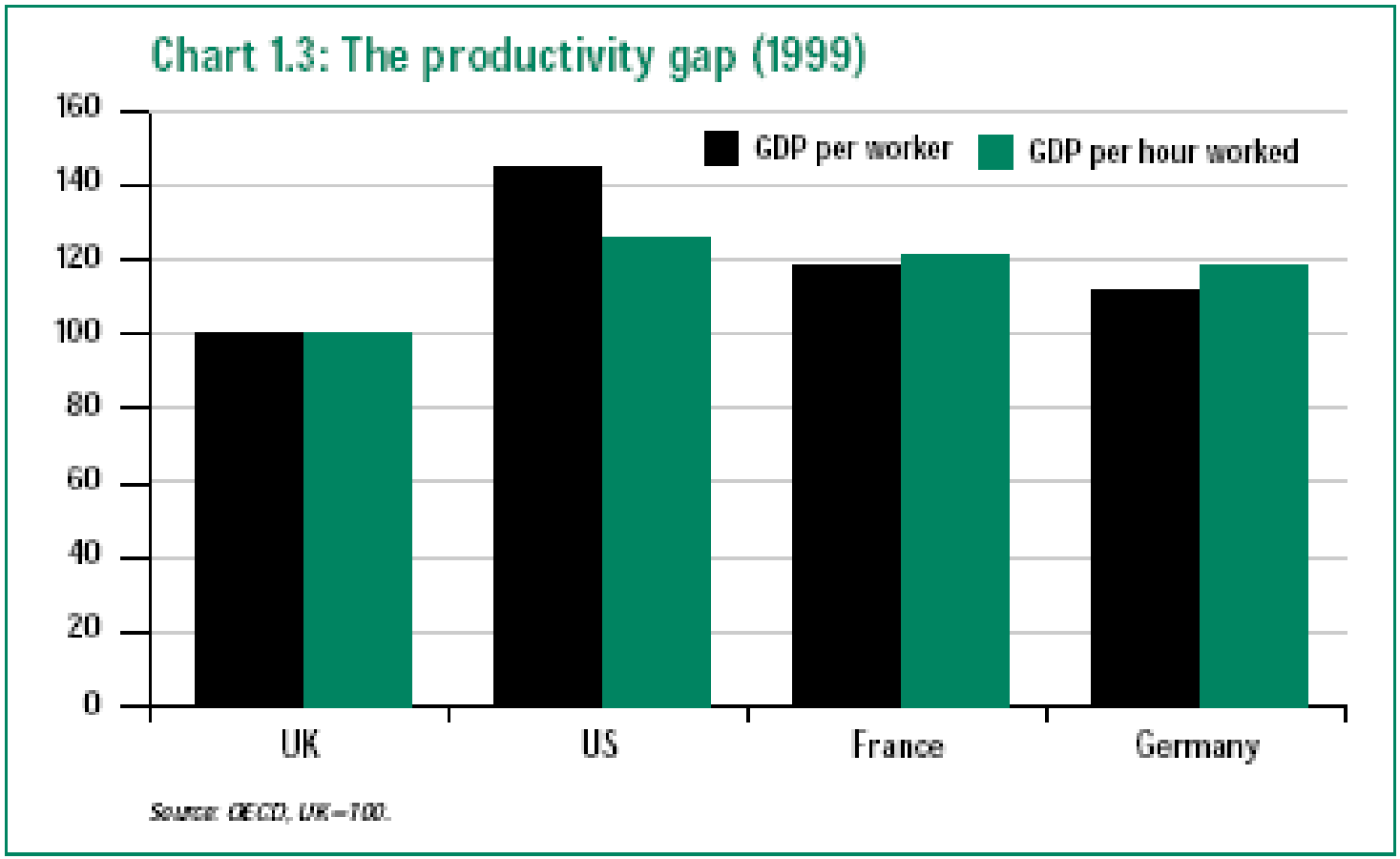
+ This is the effect of the base trend.

Log Total Factor Productivity in UK Manufacturing -
Actual, Trend, Bias, and Cycle





Source: HM Treasury *Productivity in the UK*, 2000.



Source: HM Treasury *Productivity in the UK*, 2000.

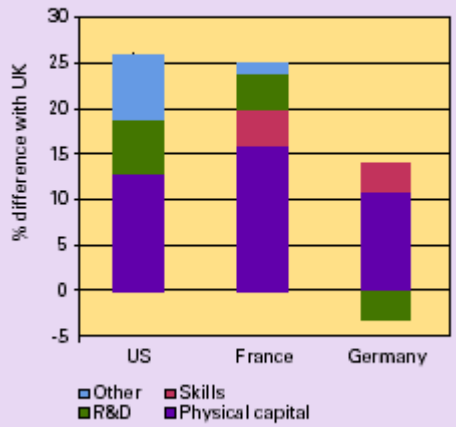
Table 2.2: Decomposition of the productivity[1] gap, 1999 (per cent)

	US	Germany
Physical capital	31	55
TFP	69	45
of which: Innovation	*65*	*17*
Skills	*0*	*14*
Other	*4*	*14*
Total productivity gap	100	100

[1]*Labour productivity measured as output per hour worked.*

Source: Crafts and O'Mahony (2000).

Figure 1.3
Contributions to the UK productivity gap with the US, France and Germany, 1999



Source: Crafts and O'Mahoney (2001).

Source: HM Treasury *Productivity in the UK*, 2000 and DTI *The Innovation Challenge*, 2003.

UK TFP relative to the USA

Industry	$RTFP_{70}$	$RTFP_{90}$	$\Delta RTFP_{70\text{-}90}$	$\Delta RTFP_{70\text{-}79}$	$\Delta RTFP_{80\text{-}89}$
Food & Drink	68.4	56.1	-1.00	-0.73	-1.12
Textiles & Clothes	51.6	58.9	0.66	0.23	1.07
Wood Products	51.8	54.5	0.25	0.28	-0.23
Paper & Printing	39.5	48.7	1.04	-0.31	2.21
Minerals	76.1	76.9	0.05	-0.69	1.56
Chemicals	49.4	64.0	1.30	1.88	1.42
Rubber & Plastic	74.2	90.5	1.00	0.10	1.84
Primary Metals	49.7	73.3	1.94	4.27	9.43
Metal Products	41.0	60.2	1.93	2.20	1.53
Machinery	79.5	75.3	-0.27	-0.16	0.04
Electricals	58.9	56.2	-0.24	-0.74	0.36
Transport Equip.	44.8	73.3	2.46	0.42	4.54
Instruments	62.1	76.6	1.05	1.65	0.57
Other Manufacturing	39.8	48.5	0.98	2.29	0.36
Average	56.2	65.2	0.80	0.15	1.68

Source: Cameron, Proudman and Redding (1999) 'Productivity Growth, Convergence and Trade in a Panel of Manufacturing Industries', CEP Discussion Paper 428.

structural change

Shares of Sectors in UK Output

Sector	Share in Gross Output		Share in Value Added	
	1979	1990	1979	1990
Primary	0.17	0.19	0.16	0.13
High Tech Manufacturing	0.17	0.15	0.13	0.11
Other Manufacturing	0.23	0.16	0.12	0.10
Fin Services	0.06	0.16	0.07	0.15
Trade Services	0.06	0.05	0.05	0.06
Non-Trade Services	0.32	0.30	0.46	0.45

Sector	Share in export value added		Share in export gross output	
	1979	1990	1979	1990
Primary	0.16	0.10	0.13	0.13
High Tech Manufacturing	0.27	0.31	0.30	0.33
Other Manufacturing	0.18	0.18	0.28	0.22
Fin Services	0.08	0.15	0.05	0.13
Trade Services	0.09	0.08	0.09	0.06
Non-Trade Services	0.23	0.19	0.15	0.13

Sector	Share in employment	
	1979	1990
Primary	0.10	0.09
High Tech Manufacturing	0.15	0.13
Other Manufacturing	0.13	0.11
Fin Services	0.09	0.16
Trade Services	0.05	0.05
Non-Trade Services	0.47	0.48

Source: Mary Gregory and Christine Greenhalgh, "International Trade, Deindustrialization and Labour Demand - An Input-Output Study for the UK 1979-90," (Oxford: Institute of Economics and Statistics Leverhulme Discussion Paper No. 1, May 1996).

shift-share analysis

Shares of total growth		Between	Within	Total
TFP	**Whole economy**	17.1	82.9	100.0
	Manufacturing	10.2	89.8	100.0
Labour Productivity	**Whole economy**	4.4	95.6	100.0
	Manufacturing	3.0	97.0	100.0

Source: Gavin Cameron, James Proudman, and Stephen Redding, 'Deconstructing Growth in UK Manufacturing,' (London: Bank of England Working Paper 73, 1997).

- Growth can be decomposed into two components: 'within' and 'between'. The 'within' component shows how much is due to the growth in productivity within individual sectors of the economy; the 'between' component shows how much is due to movements of labour and capital between sectors of the economy.

the share of FDI

	Value Added	Investment	Employment	Relative Labour Productivity
1981	18.3	25.5	14.8	1.28
1983	18.6	23.1	14.5	1.35
1984	19.3	20.4	14.2	1.45
1985	18.1	21.1	13.6	1.41
1986	17.0	19.7	12.7	1.40
1987	17.9	20.4	12.8	1.49
1988	17.8	20.8	12.9	1.46
1989	20.6	26.7	14.6	1.51
1990	21.7	26.9	16.0	1.45
1991	21.6	33.4	17.1	1.34
1992	23.4	31.6	18.1	1.38

Source: Office of National Statistics, Census of Production (London: ONS, various years).

the effects of FDI

- Between 1983 and 1990, the share of foreign-owned enterprises (FOEs) in UK manufacturing rose from 19 per cent to 22 per cent. In 1983, FOEs had a 35 per cent labour productivity advantage, rising to 45 per cent in 1990.
- However, FOEs tended to be located in high productivity sectors. If they had the same employment mix as UK firms, they would have been 24 per cent more productive in 1983, rising to 31 per cent in 1990.
- Nick Oulton (1997) argues that once you take into account the higher capital intensity and higher skilled workers in FOEs there is no significant difference in TFP between FOEs and UK firms (except for US owned firms which have a TFP advantage of about 10 per cent).
- Very little of the productivity growth in the 1980s was due to the shift towards foreign-ownership. Between 1981 and 1991, real labour productivity rose by 3.7% p.a. on average, with 3.63% p.a. accounted for by within sector growth and only 0.06% p.a. accounted for by employment shifts to FOEs.
- The idea that FDI is caused by differences in technology also has trouble explaining why the UK is a massive outward investor. In the 1990s, both inward and outward direct investment averaged about 1.1 per cent of UK GDP.

the dog that didn't bark

	USA 1995-9 over 1990-5	UK 1994-8 over 1989-94
Growth of output per hour	+1.04	-1.54
Growth of output	+2.07	+1.73
Contributions from		
ICT capital	+0.45	+0.24
Other capital	+0.03	-1.02
TFP plus labour-force quality	+0.55	-0.76
Memorandum items		
ICT income share (% GDP)	+1.00	+1.48
Growth rates of inputs		
Computers	+18.40	+9.78
Software	+0.30	-5.20
Telecoms	+3.60	4.86

Source: Oulton, OXREP, 2002

the five drivers

Box 1.1: The key drivers of productivity growth : developments

Investment:

- Business investment as a percentage of GDP was around 14 per cent in 2000, up from around 10 per cent in 1994;
- In the 2000 Spending Review, the Government allocated some £43 billion of additional funding; as part of this, net public sector investment is set to more than double by 2003–04.

Skills:

- Literacy levels at age 11 have improved by nearly a third over the last four years;
- More sixteen year olds are obtaining higher levels of qualifications than ever before; 49 per cent of sixteen year-olds obtained at least five GCSEs in 2000, compared to 43 per cent in 1994.

Innovation:

- Civil R&D spending by business increased by around 8 per cent between 1998 and 1999;
- ICT usage figures have grown steadily, with over 1.7 million small and medium-sized businesses now online, exceeding the Government's target of 1.5 million.

Enterprise:

- The UK has been rated by the OECD as having the lowest barriers to entrepreneurship of any major economy;
- The number of small businesses in the economy grew by 170,000 between 1997 and 1999.

Competition:

- Increased competition has forced prices in some key sectors to fall; prices for fixed telephone lines, for example, are estimated to have fallen by 27 per cent between 1994–95 and 1999–2000, with prices for international calls falling by 38 per cent over the same period.
- There is evidence that the new competition regime is generating public attention to competition problems, allowing the competition authorities to monitor the economy more actively and effectively.

A detailed analysis of the progress made against each driver is contained in chapter 3.

Source: HM Treasury *Productivity in the UK*, 2001.

progress?

Box 3.1: Opportunity for all in a world of change: White Paper on Enterprise, Skills and Innovation

Published in February 2001, the White Paper included announcements on:

Closing the skills gap – improving basic skills for 750,000 adults, boosting vocational courses, and bringing in more ICT training and reforming sectoral and company training;

Building strong regions and communities – boosting R&D, innovation and skills through new centres in regions, providing new support for start-up businesses and manufacturing, and working through Regional Development Agencies to develop strategies for success;

Investing in innovation – providing £90 million for the commercialisation of research, working to ensure faster broadband rollout and faster take-up of e-business, promoting the take-up of digital TV, and giving stronger emphasis to green technologies and markets;

Fostering enterprise – relaxing insolvency rules, creating a new role for the Office of Fair Trading to monitor Government regulations, and driving forward the "Think Small First" strategy of the Small Business Service; and

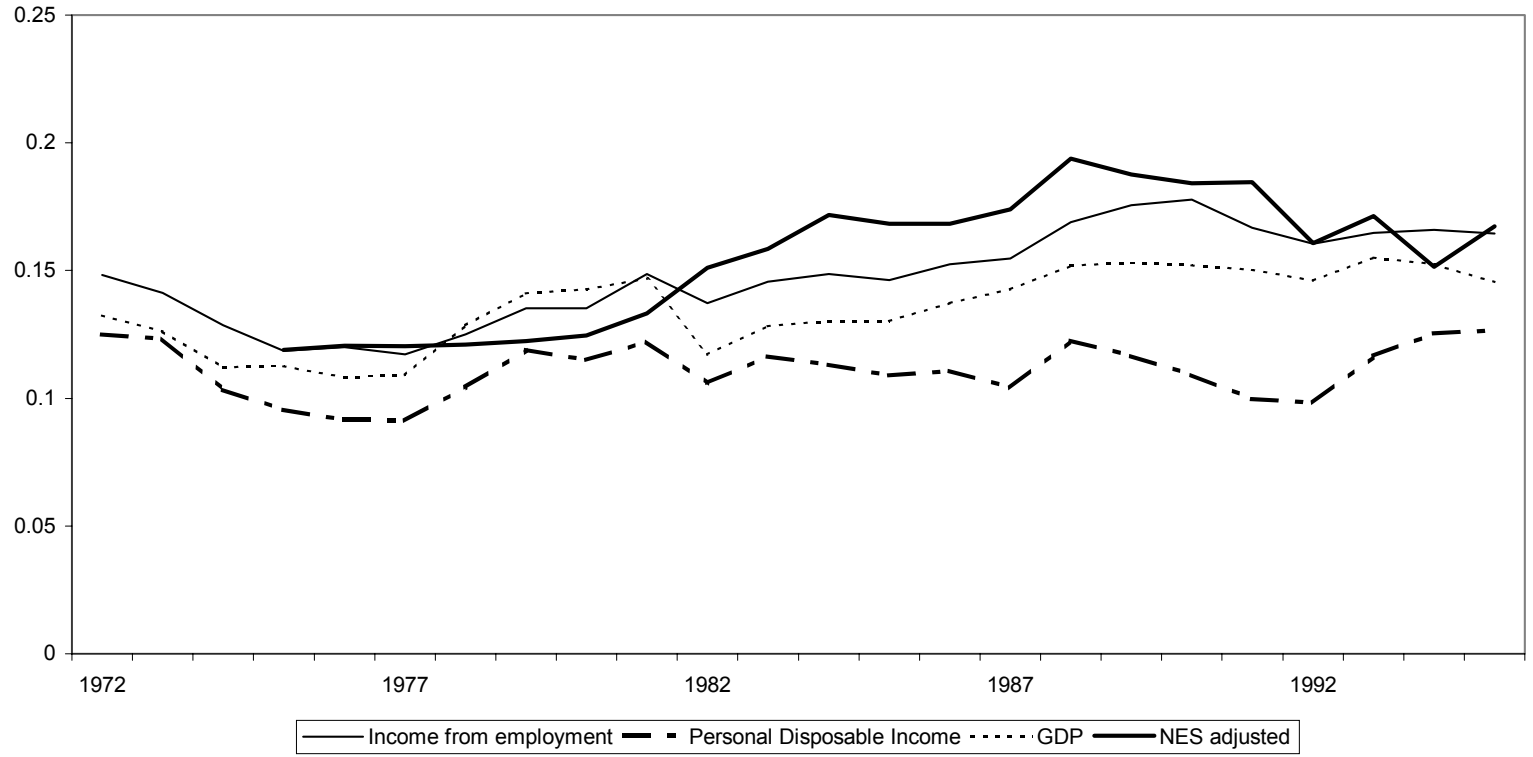
Strengthening European and global connections – introducing two initiatives to attract business talent to the UK, launching a global partnership programme to help UK firms attract international partners, and undertaking a major study on the benefits of EU economic reform.

Source: HM Treasury *Productivity in the UK*, 2001.

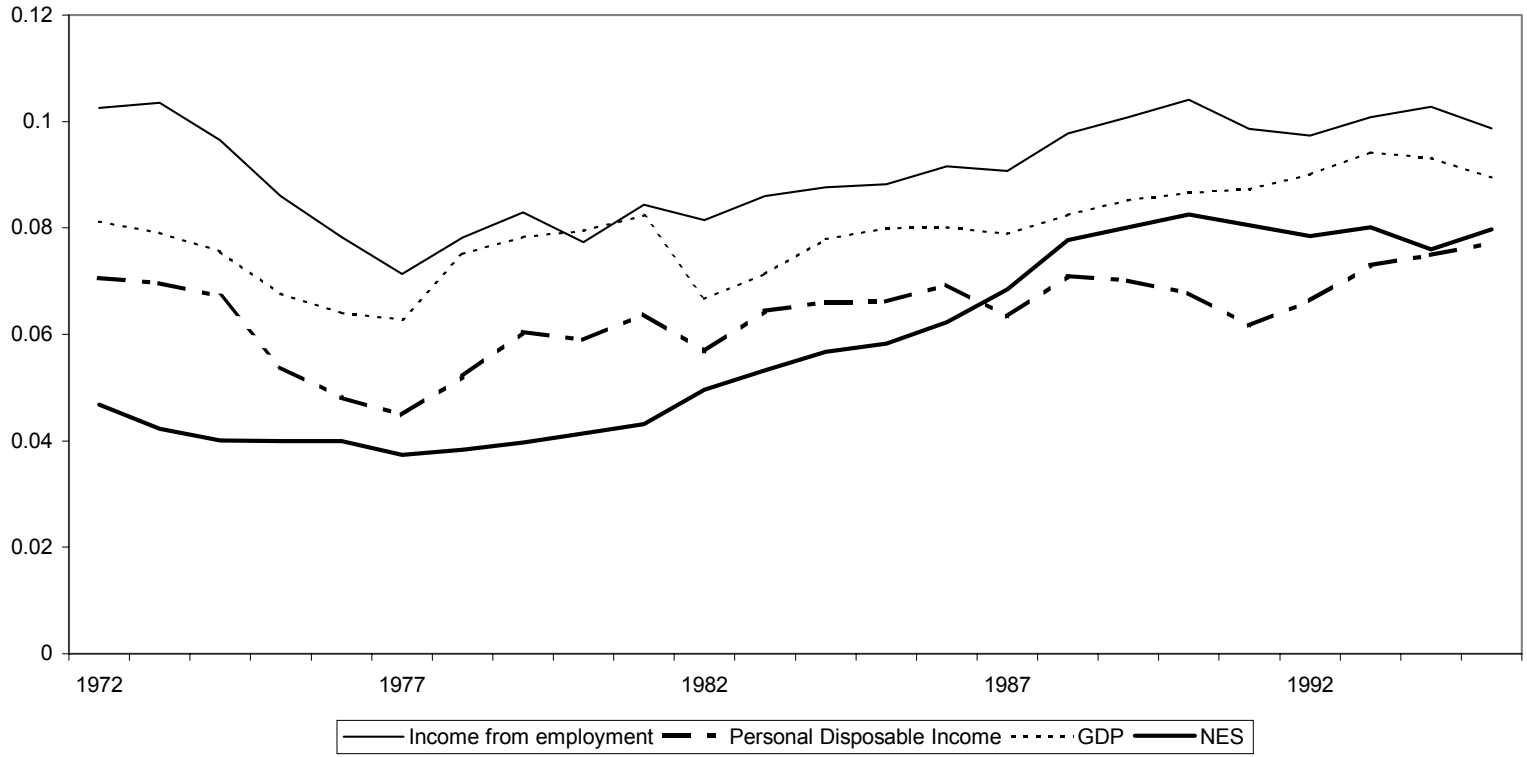
regional puzzles

- Both unemployment and non-employment in Great Britain fell steadily after 1993. But there was a dramatic rise in the regional dispersion of non-employment rates, back to its 1974 and 1985 peak levels; there was no such rise in the regional dispersion of unemployment rates.
- In the 1980s, the income gaps between the South East and the rest of Britain grew considerably. The gap remained fairly large throughout the 1990s, and may have risen again in the past couple of years.

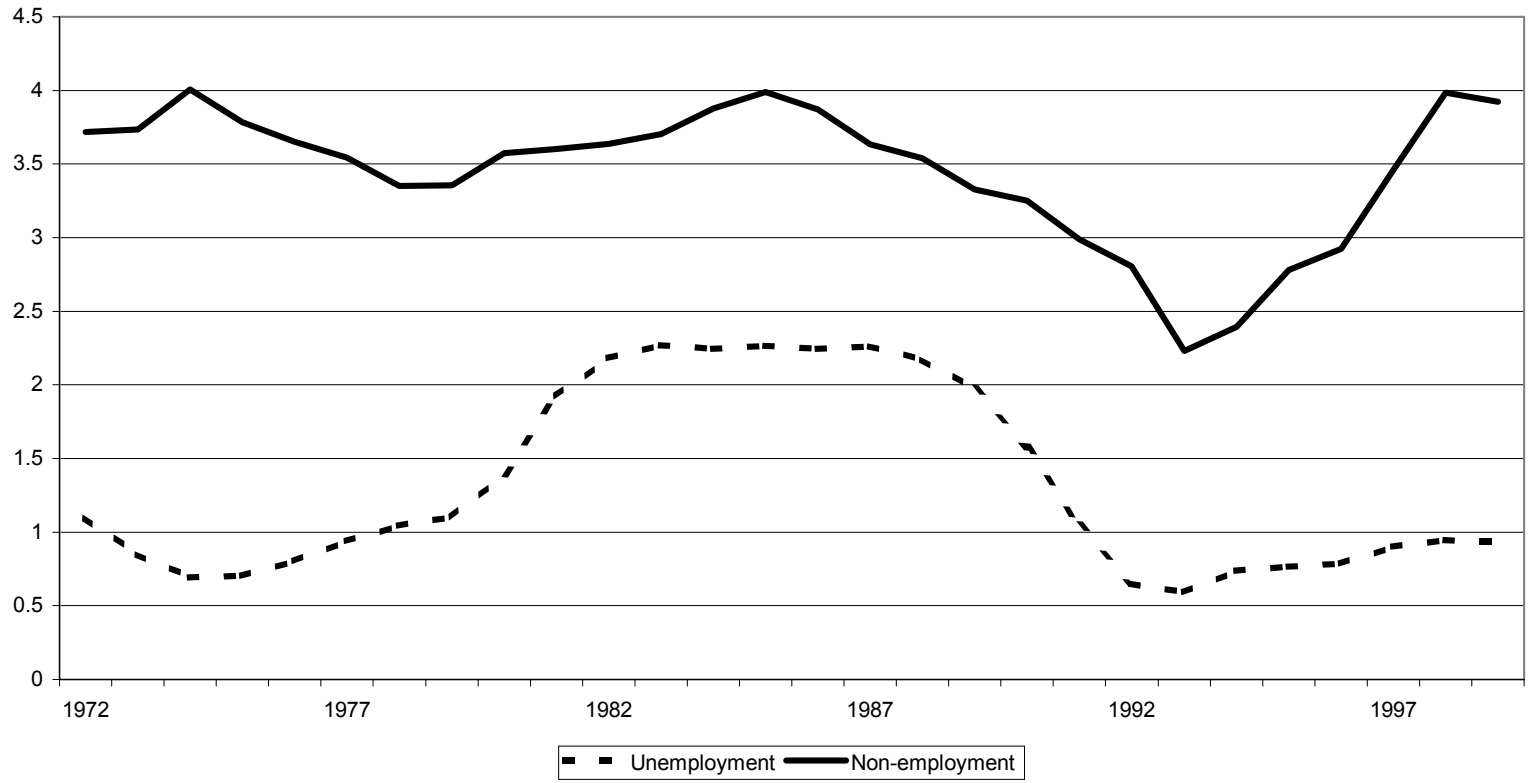
Log Ratios of South East to GB earnings per capita for different measures of earnings



Sigma Convergence in GB regions
for different measures of earnings



Standard Deviation of Unemployment and Non-employment in Great Britain



possible explanations

- The labour market and the housing market
  - Earnings, bargaining and the tax & benefit system;
  - Commuting, migration, and job migration;
  - Interest rates and mortgage debt; house prices; tenure.
- Regional industrial structure
  - Banking and production industries exposed to different shocks: financial liberalisation, world trade, real exchange rates, interest rates;
  - Part-time working, and new working practices (ICT, call centres).

regional performance

- In short, the 1990s were particularly kind to the South, with its large financial services sector, because of financial liberalisation, rising house prices, and the beneficial effect of low interest rates on a highly indebted region.
- In contrast, the rising real exchange rate was much worse for the North, with its large production sector.
- Naturally, economic forces such as migration, commuting, and wage flexibility will tend to operate against large employment differentials. One important channel in the results is the effect of high house prices in encouraging the movement of jobs and people.
- Nonetheless, the large and significant equilibrium correction term in the results suggests that regions are usually quite close to their steady-states. Therefore, the outperformance of the South is unlikely to be reversed except by a relative decline in the fortunes of the financial services industry, and a decline in the real exchange rate.

summary

- In the long-run, living standards are driven by improvements in technology. Five important factors in driving technology are innovation, competition, investment, skills and entrepreneurship.
- About half of the UK 'productivity miracle' in the 1980s was due to mis-measurement and about half was due to an improvement in the supply-side of the economy.
- Very little of this improvement was due to the effect of foreign direct investment, and surprisingly little was due to the changes in the relative sizes of different sectors of the economy. There is not much sign of a new economy effect on productivity in the UK as yet.
- UK GDP per capita is roughly the same as that of France and Germany, despite productivity being lower. The UK is able to do this by working longer hours and having a higher employment rate. French and Germany productivity is higher partly due to higher investment and partly due to better technology.