



**GLOBAL INDEX OF REGIONAL KNOWLEDGE
ECONOMIES 2003 UPDATE:
Benchmarking South East England**

A FINAL REPORT TO:



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EXECUTIVE SUMMARY

INTRODUCTION

This report represents the second Global Index of Regional Knowledge Economies produced for the South East England Development Agency (SEEDA). The analytical framework that has been developed to undertake the measurement of the South East's knowledge economy in comparison to the world's leading knowledge-based regional economies generates three core factors for analysis: (1) *knowledge economy inputs*; (2) *knowledge economy outputs*; and (3) *knowledge economy sustainability*. This report updates the 19 variables analysed in the 2001 report, benchmarking the South East region against the 39 other knowledge-based regions also contained in the 2001 report. The report also analyses the findings from the global benchmarking study, provides a sub-regional analysis of the South East of England's knowledge economy and analyses the future prospects of the sub-regional economy.

KNOWLEDGE ECONOMY INPUTS

The South East is a strong-performing region in many of the areas representing *knowledge economy inputs*. In our 2003 index, it ranked 13th in terms of economic activity, having risen 3 places on the back of a 0.3% annual growth rate. In terms of the number of managers by region, the South East remained in sixth position, whilst it gained 14 places to rise to 10th position in the index of employment as a proportion of the population. This emphasises the continued growth in the region and its capacity for job creation.

The region's employment in IT and Computer Manufacturing sectors slipped two places to 10th with a large drop of 6.9%. This fall reflects a decline across most of the high-performing regions in this sector, suggesting that businesses are relocating to cheaper areas in terms of wages and location, as well as a general decline in the sector. Employment in the Biotechnology and Chemical sectors has also fallen within the region, declining by an annual 6.0% to 9th place. In the index of Instrumentation and Electrical Machinery, the South East fell 4 places to 14th. However, in the Automotive and High-Technology Mechanical Engineering Sectors, the South East registered one of the highest growth rates at 6.6% and rising 4 places to 14th with a rating of 103.3. Another sector in which the South East has performed well is the High-Technology Service Sector. In the 2003 Index, the South East ranked 6th at 148.3 on the back of a 1.7% rise. This reflects the continued strength of the sector in the region and the quality of employees and companies that the region continues to attract.

In terms of Government expenditure on R&D, the South East remains in 9th position with a rating of 146.0 and shows a slight rise in spending. The rise of 7.6% in

business expenditure on R&D reflects a growing confidence of firms in the region to innovate and develop new products and processes.

KNOWLEDGE ECONOMY OUTPUTS

We highlighted in the 2001 report that the South East appeared unable to fully convert its *knowledge economy inputs* into *knowledge economy outputs*. The 2003 index suggests that the region is making progress in terms of all five of the variables relating to knowledge economy outputs, albeit from a low base in the case of some of the indices. The strongest performance was once again in terms of unemployment rates.

South East England recorded a 14% rise in patent production to 60.8. This is consistent with the increase in both government and business R&D expenditure in the region, and improving links between regional higher education institutions and industry. In terms of per capita GDP, the South East jumped three places to 31st. The South East also had an improved ranking in the productivity index, up one place to 34th. Earnings increased by 6.0 % in the region, but remained in 28th position. The South East has seen a big fall in unemployment, leading to it being ranked 2nd highest overall in the reverse ranked unemployment index. This reflects the continued buoyancy of the jobs market in the region and the low unemployment rates in the UK as a whole.

KNOWLEDGE SUSTAINABILITY

The region's investment in *knowledge economy sustainability* continues to be relatively weak, and significantly lower than the average for the top 40 regions. The South East, along with Eastern and London, all recorded a small 0.1% fall in primary and secondary education spending to 73.8. In contrast, the South East saw the biggest rise of all in the index of higher education spending, increasing 9.2%, albeit from a relatively low base. This rise in expenditure reflects national government policies of extending access to HE for prospective students and increasing the amount of courses available.

INTRA-REGIONAL DISPARITIES

The significant disparities we reported among the sub-regions of South East England appear to have widened since 2001. Surrey, Buckinghamshire and Thames Valley all recorded increases, suggesting that the growth of the knowledge economy is continuing in these sub-regions. However, the picture at the other end of the index shows growing gulf between the knowledge economy powerhouses of Surrey, Buckinghamshire and Thames Valley and the poor performing sub-regions of East Sussex and the Isle of White. These sub-regions recorded falls in their index scores,

displaying a lack of the necessary economic conditions and institutional infrastructure within which the knowledge economy can thrive.

CONCLUDING REMARKS

The South East is very strong in terms of knowledge economy inputs. In fact, 9 out of its 10 input factors score higher than the average for the benchmarked regions. Among these, some factors are particularly strong, such as employment in biotechnology and chemical sectors, employment in high-technology services, and managers per thousand inhabitants. The only input factor which is below average is R&D expenditure by business.

The region lags considerably behind its counterparts in terms of outputs such as patents, GDP per capita and productivity, despite its inputs. The South East – as is the case with the rest of the UK - is also seen to contribute insufficient funds in both primary and secondary education and higher education, which may harm its knowledge economy sustainability.

1. INTRODUCTION

- 1.1. This report represents the second Global Index of Regional Knowledge Economies produced for the South East England Development Agency (SEEDA). An analytical framework has been developed to undertake the measurement of the South East's knowledge economy in comparison to the world's leading knowledge-based regional economies. The framework is based upon identifying the key factors driving regional knowledge-based development. A total of 19 variables were used to benchmark the top 40 regions across the globe. The 19 variables are once again grouped under three main themes: Knowledge Economy inputs, Knowledge Economy outputs, and Knowledge Economy sustainability.
- 1.2. The report also updates the 19 variables analysed in the 2001 report, benchmarking the South East region against the 39 other knowledge-based regions also contained in the 2001 report. The report also analyses the findings from the global benchmarking study, provides a sub-regional analysis of the South East of England's knowledge economy and analyses the future prospects of the sub-regional economy.

DEFINING THE KNOWLEDGE-BASED ECONOMY

- 1.3. The term 'knowledge economy' is increasingly freely used by commentators to describe both economic factors and processes without any degree of precision regarding what this 'economy' actually consists of. We have some sympathy with these commentators since the level of imprecision is mainly due to the lack of a robust definition as to what we can rightly determine to be the 'knowledge' elements of an economy. Fundamentally, the concept of the knowledge economy has emerged from an increasing recognition of the requirement for the production, distribution and use of knowledge within modern economies. In this instance, we define knowledge as referring to:

The cumulative stock of information and skills concerned with connecting new ideas with commercial values.

- 1.4. This stock of information and skills can usefully be broken down into the following types of knowledge:
- Know-what – referring to factual knowledge
 - Know-why – referring to knowledge of the principles and laws of nature
 - Know-how – referring to the skills or capability required to undertake a task
 - Know-who – referring to information on who knows what and who knows how to do what.

- 1.5. Utilising the above, our fundamental understanding of the knowledge economy, or at least the knowledge-base of an economy, is:

The capacity and capability to create and innovate new ideas, thoughts, processes and products, and to translate these into economic value and wealth.

- 1.6. The most perplexing issue is how to measure this capacity and capability across regional economies. We consider that some of the current available indicators that are a measure – in terms of both stock and accumulation (growth/decline) – of the knowledge economy include levels of investment in R&D activities, levels of investment in education, economic and business activity rates, along with the proportion of businesses and employees involved in knowledge-based economic activity. Although it is clear that knowledge utilisation is not confined to any particular sectors of activity, in terms of the best available means of analysis and measurement, we are required to work on the assumption that the intensity of knowledge utilisation is higher in certain sectors of activity than others. These so-called knowledge-based activities primarily concern high-technology manufacturing and knowledge-based services such as IT/telecommunications and other high-technology services.

CHOICE OF REGIONS

- 1.7. We included the following 40 high-performing regions in our analysis with a view to identifying the common drivers of knowledge-based economic development.

European regions (19)

- Baden-Württemberg, Germany
- Bayern, Germany
- Berlin, Germany
- Brussels, Belgium
- Denmark
- Eastern, UK
- Hamburg, Germany
- Hessen, Germany
- Île de France, France
- London, UK
- Luxembourg
- Norway
- Ostösterreich, Austria
- South East, UK

- Stockholm, Sweden
- Switzerland
- Uusimaa, Finland
- West-Nederland, Netherlands
- Zuid-Nederland, Netherlands

1.8. These regions are based on the European Union's definition of regional units, NUTS-1. Because of the definition, some nations are included as regions (i.e. Denmark and Luxembourg). Further, regions in Finland and Sweden are based on NUTS-2, a lower level of units. In addition, two non-EU member countries, Switzerland and Norway are included in the analysis. As with Denmark and Luxembourg, these two small nations are treated as regions.

US regions (12)

- Atlanta GA MSA
- Austin TX MSA
- Boston MA-NH-ME-CT CMSA
- Chicago IL-IN-WI CMSA
- Hartford CT MSA
- Los Angeles CA CMSA
- New York NY-NJ-CT-PA CMSA
- Philadelphia PA-NJ-DE-MD CMSA
- Raleigh-Durham NC MSA
- San Francisco CA CMSA
- Seattle WA CMSA
- Washington, DC-MD-VA-WV CMSA

1.9. These 12 US regions are based on the units called consolidated metropolitan statistical areas (CMSAs) and metropolitan statistical areas (MSAs). MSAs, defined by the US Census Bureau, consist of a set of counties and represent a single labour market with a one- to two-hour commute from edge to edge. CMSAs, consisting of a set of Primary Metropolitan Statistical Areas (PMSAs), includes the county hinterlands of two or more large central cities that are adjacent to each other. Also as the suffix attached to each region suggests, some CMSAs extend over more than one state. Compared with counties, cities and states, both MSAs and CMSAs analysed in this study are better units for economic analysis as they reflect well the boundaries of clusters of firms in related industries.

Rest of the World (9)

- British Columbia, Canada
- Hong Kong, China
- Kanagawa, Japan
- Kyoto, Japan
- New South Wales, Australia

- Ontario, Canada
- Osaka, Japan
- Singapore
- Tokyo, Japan

1.10. As with some small countries in Europe, Singapore is included in the analysis as a region-state.

CHOICE OF VARIABLES

1.11. Because of data availability and compatibility between regions in Europe, the US and the rest of the World, the following variables were selected for the global analysis:

Knowledge Economy Inputs

1.12. The following ten variables are our measures of the availability of inputs for the production of knowledge within each regional economy:

Economic Activity and Knowledge Workers

- Economic Activity Rate
- Employment per 1,000 inhabitants
- Number of Managers per 1,000 inhabitants

Knowledge-Based Sectors and Employment

- Employment in IT and Computer Manufacturing per 1,000 inhabitants
- Employment in Biotechnology and Chemicals per 1,000 inhabitants
- Employment in Automotive and Mechanical Engineering per 1,000 inhabitants
- Employment in Instrumentation and Electrical Machinery per 1,000 inhabitants
- Employment in High-Technology Services per 1,000 inhabitants

R&D Expenditures

- Per Capita Expenditures on R&D performed by Government
- Per Capita Expenditures on R&D performed by Business

Knowledge Economy Outputs

1.13. The following five variables were chosen as the best available measures of the size of outputs of knowledge economy production in each region:

Patents

- Number of Patents registered per one million inhabitants

Gross Domestic Product and Productivity

- Per capita GDP
- Labour Productivity

Earnings and Unemployment

- Mean Gross Monthly Earnings
- Unemployment Rates

Knowledge Sustainability

1.14. The four key measures of knowledge sustainability are:

- Per capita expenditures on Primary and Secondary Education
- Per capita expenditures on Higher Education
- Secure Servers per one million inhabitants (national level)
- Internet Hosts per 1,000 inhabitants (national level)

1.15. For the sub-regional analysis within the South East region, the following variables were adopted:

Knowledge Capital

- Economic Activity Rate
- Proportion of the Workforce Employed in Higher Education and R&D establishments
- Proportion of Managerial, Professional and Technically Occupied Workers within the Employed Workforce

Innovation Capacity

- Per Capita Number of Businesses
- Proportion of Businesses Operating in Knowledge-Based Defined Sectors

Knowledge Economy Outputs

- Per capita GDP
- Labour productivity

Knowledge Economy Outcomes

- Earnings
- Unemployment Rates

Knowledge Sustainability

- Percentage of Pupils in Last Year of Compulsory Schooling with 5 or more A-Cs at GCSEs
- Average A/AS Level Points Score

THIS REPORT

1.16. The remainder of this report consists of the following:

Chapter 2 analyses the results of the global benchmarking of high-performing regions.

Chapter 3 provides a sub-regional analysis of the knowledge economy of South East England based on the level of the 11 sub-regional economic partnership areas.

Chapter 4 focuses on analysing the future economic prospects of South East England utilising the *European Knowledge Futures* model developed by Robert Huggins Associates.

Chapter 5 provides a review and further analysis of the findings.

2. GLOBAL KNOWLEDGE ECONOMY BENCHMARKING

2.1 This chapter updates and analyses the findings from the global benchmarking study of high-performing regions. It updates the 19 variables analysed in 2001 report, benchmarking the South East region against the 39 other knowledge-based regions also contained in the 2001 report. The 19 variables are once again grouped under three main themes: Knowledge Economy inputs, Knowledge Economy outputs, and Knowledge Economy sustainability. **In all cases an index score of 100.0 equates to the mean average score of the 40 regions.**

KNOWLEDGE ECONOMY INPUTS

2.2. The following ten variables are our measures of the availability of inputs for the production of knowledge within each regional economy.

Economic Activity and Knowledge Workers

- Economy Activity Rate
- Employment per 1,000 inhabitants
- Number of Managers per 1,000 inhabitants

Knowledge-Based Sectors and Employment

- Employment in IT and Computer Manufacturing per 1,000 inhabitants
- Employment in Biotechnology and Chemicals per 1,000 inhabitants
- Employment in Automotive and Mechanical Engineering per 1,000 inhabitants
- Employment in Instrumentation and Electrical Machinery per 1,000 inhabitants
- Employment in High-Tech Services per 1,000 inhabitants

R&D Expenditures

- Per Capita Expenditures on R&D performed by Government
- Per Capita Expenditures on R&D performed by Business

ECONOMIC ACTIVITY, EMPLOYMENT AND KNOWLEDGE WORKERS

2.3. The level of economic participation within a region or nation is a fundamental indicator of its ‘vibrancy’ and knowledge capital capacity at the macro-level. With sufficient labour market engagement there is opportunity for long-term and on-going knowledge investment. As shown by Table 2.1, Stockholm has

- the highest economic activity rate at 123.3, rising 3 places to the top of the index. Stockholm's annual growth rate of 3.8% confirms Sweden's potential as one of the fastest growing EU member states over the next decade. Austin, top-ranked in 2001 has dropped one place with a rating of 120.6, reflecting the uncertainty in the US markets and a general stagnation for most US metropolitan areas.
- 2.4. The South East has risen 3 places to 13th position, and a rating of 103.9, on the back of a 0.3% annual growth rate. The South East is followed closely by Eastern in 15th position with a rating of 103.3, whilst London drops two places to 22nd with an index score of 99.9. The biggest risers include British Columbia and Ontario, with the biggest faller being Chicago, down 11 places to 18th with a rating of 102.6 - its manufacturing industry being particularly susceptible to cyclical weaknesses.
- 2.5. The importance of the number of managers within firms in a region is that innovation – whether it is product, process or organisational - is usually stimulated and co-ordinated through those workers with management responsibilities. These non-production employees are now more generally termed knowledge workers. Table 2.2 illustrates that Eastern England remained at the top of the index of managers recording a 1.7% rise to 152.0. Eastern's location as a base for many multinationals and spin-off companies from the region's universities is one of the main reasons for its high level of managers. The Canadian provinces of Ontario and British Columbia also showed steady gains in second and third positions respectively.
- 2.6. The South East remained sixth in the index at 132.8 despite recording a 1.4% fall. The biggest risers include Hessen which rose 11.7% albeit from a low level, reflecting a strong rise in numerous sectors in the region and its importance as a driver of the German economy. Ile de France also rose 3.9% into the top five, a region similar to Eastern England with its presence of numerous multinationals and a strong spin-off tradition.
- 2.7. A further measure of the economic vibrancy underlying the potential for knowledge-based development is the level of employment compared to population. As shown by Table 2.3, Austin remains at the top of the index of employment, maintaining its record of job creation and retention, despite seeing a fall of 4.6% to 113.4. This fall is mainly due to job shedding in the high-technology industries that Austin is so dependent on, as a result of weak global demand for products. Switzerland jumped six places to second with a rating of 111.4 and Uusimaa, one of Finland's most industrial regions, rose four places to third, with a rating of 110.0.

2.8. The South East saw the biggest gains of all, rising 14 places to 10th with a rating of 105.0, emphasising the continued growth in the region and its capacity for job creation. Eastern also rose strongly, climbing 9 places to 13th while London experienced a more modest change rising 4 places, with a rating of 97.2. Apart from the South East, the other biggest risers included Ontario and Bayern, whilst the biggest fallers included Chicago and Seattle, with the continued depression in the transportation industry causing job losses in both metropolitan areas.

Table 2.1: Index of Economic Activity by Region

Rank	Economic Activity Rate	Index 2003	Index 2001	Annual % Change	Rank 2001	Change in Rank
1	Stockholm	123.3	113.8	3.8%	4	3
2	Austin	120.6	126.9	-2.8%	1	-1
3	Atlanta	112.7	116.5	-2.0%	2	-1
4	Raleigh-Durham	112.4	114.8	-1.4%	3	-1
5	Uusimaa	110.0	108	0.6%	9	4
6	Ontario	109.2	105.1	1.6%	11	5
7	Washington	108.5	108.4	-0.3%	8	1
8	Boston	108.1	108	-0.3%	10	2
9	Seattle	107.7	111.8	-2.2%	5	-4
10	San Francisco	106.1	108.9	-1.6%	6	-4
11	Norway	105.6	101.5	1.7%	17	6
12	British Columbia	104.0	101.5	0.9%	18	6
13	South East	103.9	102.6	0.3%	16	3
14	Los Angeles	103.6	103.2	-0.1%	12	-2
15	Eastern	103.3	100.5	1.0%	20	5
16	Denmark	102.9	103	-0.4%	13	-3
17	West-Nederland	102.8	98.3	1.9%	24	7
18	Chicago	102.6	108.6	-3.1%	7	-11
19	Tokyo	102.3	101	0.3%	19	0
20	Philadelphia	102.2	102.8	-0.6%	14	-6
21	Hartford	101.4	102.8	-1.0%	15	-6
22	London	99.9	100.3	-0.5%	21	-2
23	Kanagawa	99.9	99.9	-0.3%	22	0
24	Zuid-Nederland	99.8	98	0.6%	25	1
25	New York	97.4	99	-1.1%	23	-2
26	Île de France	97.3	96.9	-0.1%	27	1
27	Kyoto	96.6	96.2	-0.1%	28	1
28	Osaka	96.5	97.5	-0.9%	26	-2
29	Bayern	95.8	95.1	0.1%	29	0
30	Baden-Württemberg	93.8	93.3	-0.1%	31	1
31	Hamburg	93.5	91.8	0.6%	34	3
32	Berlin	93.3	93.4	-0.4%	30	-2
33	New South Wales	93.3	92.9	-0.1%	32	-1
34	Ostösterreich	92.2	92.8	-0.6%	33	-1
35	Hessen	91.7	90.8	0.2%	35	0
36	Switzerland	88.7	85.1	1.8%	36	0
37	Luxembourg	84.9	82	1.4%	38	1
38	Brussels	78.6	80.1	-1.2%	39	1
39	Hong Kong	78.0	74.9	1.7%	40	1
40	Singapore	75.5	83.7	-5.4%	37	-3

Table 2.2: Index of Number of Managers by Region (as a proportion of the population)

Rank	Managers per 1000	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	Eastern	152.0	142.6	1.7%	1	0
2	Ontario	144.6	133.0	2.7%	3	1
3	British Columbia	141.7	132.9	1.8%	4	1
4	New South Wales	138.1	131.3	1.0%	7	3
5	Île de France	134.1	120.7	3.9%	15	10
6	South East	132.8	132.6	-1.4%	6	0
7	Singapore	123.2	121.1	-0.6%	14	7
8	Washington	122.8	131.1	-4.7%	8	0
9	Boston	121.0	126.9	-3.8%	10	1
10	Tokyo	117.4	115.8	-0.8%	17	7
11	West-Nederland	115.3	101.2	5.2%	25	14
12	San Francisco	115.1	123.9	-5.0%	11	-1
13	Chicago	115.0	123.9	-5.0%	12	-1
14	Zuid-Nederland	114.9	101.3	4.9%	24	10
15	Atlanta	113.3	128.8	-7.6%	9	-6
16	Kanagawa	111.9	110.4	-0.8%	21	5
17	Philadelphia	110.0	119.8	-5.6%	16	-1
18	Austin	109.4	132.9	-10.6%	5	-13
19	Osaka	107.3	105.9	-0.8%	22	3
20	Hartford	106.8	122.9	-8.2%	13	-7
21	Kyoto	105.1	103.7	-0.8%	23	2
22	New York	103.1	111.6	-5.3%	19	-3
23	Raleigh-Durham	102.9	134.4	-13.8%	2	-21
24	London	102.3	92.0	3.9%	27	3
25	Los Angeles	97.2	112.3	-8.3%	18	-7
26	Stockholm	91.8	91.7	-1.4%	28	2
27	Norway	90.1	94.7	-3.9%	26	-1
28	Seattle	85.5	111.4	-13.7%	20	-8
29	Uusimaa (suuralue)	85.4	77.7	3.3%	31	2
30	Switzerland	82.6	78.2	1.2%	30	0
31	Hong Kong	73.2	79.2	-5.3%	29	-2
32	Denmark	67.7	67.8	-1.5%	32	0
33	Baden-Württemberg	65.3	58.8	3.9%	35	2
34	Hessen	61.1	47.6	11.7%	37	3
35	Luxembourg	60.9	64.4	-4.2%	33	-2
36	Brussels	60.9	64.3	-4.2%	34	-2
37	Bayern	58.8	51.6	5.3%	36	-1
38	Berlin	51.4	38.2	14.3%	39	1
39	Hamburg	50.1	43.9	5.3%	38	-1
40	Ostösterreich	21.6	17.7	8.9%	40	0

Table 2.3: Index of Employment by Region (as a proportion of the population)

Rank	Employment per 1000	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	Austin	113.4	123.0	-4.6%	1	0
2	Switzerland	111.4	107.6	1.1%	8	6
3	Uusimaa	110.0	107.7	0.4%	7	4
4	San Francisco	109.5	108.8	-0.3%	6	2
5	Atlanta	106.4	113.1	-3.6%	3	-2
6	Washington	106.2	105.0	-0.1%	10	4
7	Ontario	106.1	102.6	1.1%	15	8
8	Tokyo	105.7	109.2	-2.3%	5	-3
9	Raleigh-Durham	105.5	114.9	-4.8%	2	-7
10	South East	105.0	98.8	2.4%	24	14
11	Denmark	104.7	104.2	-0.4%	11	0
12	Norway	104.0	102.3	0.2%	17	5
13	Eastern	104.0	99.6	1.6%	22	9
14	Kanagawa	103.5	105.6	-1.6%	9	-5
15	Seattle	101.8	109.4	-4.2%	4	-11
16	Hartford	101.4	103.0	-1.4%	13	-3
17	West-Nederland	100.9	99.9	-0.1%	21	4
18	Boston	100.8	102.5	-1.5%	16	-2
19	Bayern	100.6	97.8	0.8%	26	7
20	British Columbia	100.2	97.8	0.6%	25	5
21	Kyoto	99.4	102.0	-1.9%	18	-3
22	Singapore	98.9	102.9	-2.6%	14	-8
23	Chicago	98.7	103.3	-2.9%	12	-11
24	New South Wales	98.3	94.5	1.4%	30	6
25	Hamburg	98.1	94.2	1.4%	32	7
26	Philadelphia	97.9	99.3	-1.4%	23	-3
27	Zuid-Nederland	97.9	100.1	-1.7%	20	-7
28	Baden-Württemberg	97.4	94.2	1.0%	31	3
29	Osaka	97.2	101.3	-2.7%	19	-10
30	London	97.2	93.6	1.3%	34	4
31	Stockholm	96.6	97.1	-0.9%	27	-4
32	Los Angeles	96.4	96.2	-0.5%	29	-3
33	Île de France	96.0	90.1	2.6%	37	4
34	Hong Kong	96.0	93.2	0.8%	35	1
35	Ostösterreich	95.3	94.0	0.0%	33	-2
36	Hessen	95.3	90.7	1.8%	36	0
37	New York	93.3	96.7	-2.4%	28	-9
38	Berlin	89.4	86.8	0.9%	38	0
39	Luxembourg	87.2	84.7	0.8%	39	0
40	Brussels	72.2	72.4	-0.7%	40	0

KNOWLEDGE-BASED SECTORS AND EMPLOYMENT

2.9. The concept of knowledge-based and non-knowledge-based sectors is used to distinguish between industries with higher or lower levels of research and development activity. Knowledge-based sectors, therefore, clearly offer a high potential for innovation, and subsequently competitive advantage. As in the 2001 study, we have created five broad groups of knowledge-based sectors, in order to undertake an analysis of employment. It is our hypothesis that some sectors have a higher propensity for developing a knowledge-driven economy than others. The five sectors consist of:

- IT and computer manufacturing – communication equipment, computer and office equipment, electronic components and accessories.
- Biotechnology and chemical sectors – pharmaceuticals, drugs, chemicals and chemical products.
- Automotive and high-tech mechanical engineering – motor vehicles and transport equipment, machine tools and equipment.
- Instrumentation and electrical machinery – precision and optical instruments, electrical transmission and distribution equipment lighting and wiring equipment.
- High-tech services – software and computer related services, telecommunications, research, development and testing services.

2.10. As illustrated by Table 2.4, Austin is significantly ahead on the index of employment in IT and Computer Manufacturing, despite a fall of 3.4% to 538.4 and remains the centre of the US IT industry. The South East slipped two places to 10th with a large drop of 6.9% to a rating of 117.8. This large fall reflects a decline across most of the high-performing regions in this sector, suggesting that businesses are relocating to cheaper areas in terms of wages and location, as well as a general decline in the sector in general. Eastern stayed in 16th at 92.4 while London fell three places to 34th with a rating of only 29.0.

Table 2.4: Index of Regional Employment in the IT and Computer Manufacturing Sectors (Employees per 1,000 inhabitants)

Rank	Employment in IT and Computers	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	Austin	538.4	567.1	-3.4%	1	0
2	San Francisco	395.9	372.3	2.2%	2	0
3	Kanagawa	239.5	228.4	1.5%	3	0
4	Boston	190.0	175.8	3.1%	5	1
5	Zuid-Nederland	182.6	200.1	-5.3%	4	-1
6	Uusimaa (suuralue)	161.1	142.4	5.5%	7	1
7	Kyoto	131.4	122.9	2.6%	9	2
8	Stockholm	129.1	152.5	-8.8%	6	-2
9	Singapore	120.5	115.0	1.5%	11	2
10	South East	117.8	133.6	-6.9%	8	-2
11	Baden-Württemberg	115.7	119.2	-2.3%	10	-1
12	Hong Kong	111.6	104.1	2.6%	12	0
13	Hessen	106.7	98.0	3.5%	13	0
14	Raleigh-Durham	95.0	93.5	-0.1%	15	1
15	New South Wales	95.0	90.4	1.7%	17	2
16	Eastern	92.4	90.9	-0.1%	16	0
17	Ostösterreich	86.6	95.8	-5.7%	14	-3
18	Bayern	86.5	76.8	5.3%	21	3
19	Osaka	86.2	80.0	2.9%	19	0
20	Berlin	84.1	71.9	7.2%	23	3
21	Île de France	83.5	76.7	3.4%	22	1
22	Switzerland	82.1	81.0	-0.2%	18	-4
23	Norway	77.6	77.0	-0.4%	20	-3
24	Los Angeles	63.3	66.2	-3.0%	24	0
25	Denmark	63.3	64.5	-1.7%	25	0
26	Hamburg	55.6	48.0	6.7%	27	1
27	Chicago	47.5	54.8	-7.7%	26	-1
28	Philadelphia	47.5	44.6	2.4%	28	0
29	Hartford	47.5	44.5	2.4%	29	0
30	New York	31.7	38.1	-9.6%	32	2
31	Atlanta	31.7	40.8	-12.6%	30	-1
32	Seattle	31.7	38.0	-9.5%	33	1
33	Ontario	31.7	37.7	-9.1%	34	1
34	London	29.0	40.2	-15.8%	31	-3
35	West-Nederland	24.9	19.6	11.7%	37	2
36	Brussels	21.7	29.4	-14.7%	35	-1
37	Tokyo	16.0	15.1	2.0%	39	2
38	Washington	15.8	17.2	-4.9%	38	0
39	Luxembourg	15.8	15.0	1.9%	40	1
40	British Columbia	15.8	21.2	-14.3%	36	-4

- 2.11. Hessen retained its top ranking on the index of employment in biotechnology and chemical sectors – Table 2.5 - despite a fall of 3.6% to 296.6. The top 4 ranked regions of Hessen, Philadelphia, Raleigh-Durham and Zuid Nederland all remain in the same positions with Raleigh-Durham experiencing the biggest growth of 2.4%. The South East fell three places to 9th with a rating of 131.7, with the 6.0% annual decline one of the steepest drops, while Eastern England rose two places to 19th on the back of a 0.3% rise. London stayed in 29th position at 60.6. The biggest climber was Baden-Württemberg moving to 6th with a rise of 5.8%, while biggest fallers include Hamburg and West Nederlands down to 11th and 24th respectively.
- 2.12. Table 2.6 shows the index of regional employment in the automotive and high-technology mechanical engineering sectors. Baden-Württemberg, the centre of the German car manufacturing industry, remains at the top of the index seeing a 5.9% rise to 328.5. Philadelphia remains in second at 264.9, its lack of change suggesting that the manufacturing job losses there have steadied, while Bayern, another German ‘Land’ with a major automotive tradition, experienced the strongest growth, up 7.1% and one place to third. The South East registers one of the highest growth rates at 6.6% and rises 4 places to 14th with a rating of 103.3. Eastern England is one place ahead at 103.5 despite a 4.1% fall, and London remains 36th with a score of 33.2.
- 2.13. The index of instrumentation and electrical machinery employment is shown by Table 2.7, with Bayern remaining the leading region recording a rise of 3.9% to 273.4 reinforcing its dominance in this sector. Baden-Württemberg remains in second despite a stagnation in growth (-1.1%), with Boston and San Francisco remaining key players in this field. The biggest riser was Hessen reinforcing its position as an innovative, manufacturing ‘Land’ with a rise of 7.7%. The South East fell 4 places to 14th with a rating of 115.8 after seeing a fall of 4.7%. Eastern saw an even greater fall of 6.5% and slipped to 19th, while London was in 35th after recording a fall of 13.4%, the biggest on the index.
- 2.14. The index of high-technology service sector employment is shown in Table 2.8. San Francisco remains the leader in high-technology services, with Washington also remaining in second place. The South East is ranked 6th at 148.3 on the back of a 1.7% rise, reflecting the continued strength of the high-technology service sector in the region and the quality of employees and companies that the region continues to attract. The region is now ranked the 3rd highest in terms of high-technology service sector employment across Europe as a whole. Eastern England has also recorded impressive growth moving up 3 places to 11th.

Table 2.5: Index of Regional Employment in the Biotechnology and Chemical Sectors (Employees per 1,000 inhabitants)

Rank	Employment in Biotech and Chemical Products	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	Hessen	296.6	305.4	-3.6%	1	0
2	Philadelphia	231.1	230.0	-1.9%	2	0
3	Raleigh-Durham	211.9	193.6	2.4%	3	0
4	Zuid-Nederland	161.2	164.3	-3.1%	4	0
5	Osaka	140.9	135.6	-0.2%	8	3
6	Baden-Württemberg	137.7	117.8	5.8%	12	6
7	Switzerland	137.1	139.4	-2.9%	7	0
8	Stockholm	134.5	124.5	1.7%	10	2
9	South East	131.7	142.6	-6.0%	6	-3
10	Norway	129.7	132.5	-3.2%	9	-1
11	Hamburg	119.1	142.6	-10.6%	5	-6
12	New York	115.6	110.5	0.1%	16	4
13	Chicago	115.6	108.1	1.2%	18	5
14	Denmark	115.6	110.9	-0.1%	15	1
15	Ostösterreich	110.9	112.5	-2.8%	13	-2
16	Île de France	110.9	112.4	-2.8%	14	-2
17	Bayern	110.8	119.8	-5.9%	11	-6
18	Uusimaa (suuralue)	99.0	110.3	-7.3%	17	-1
19	Eastern	97.9	93.2	0.3%	21	2
20	New South Wales	96.3	98.7	-3.3%	19	-1
21	Tokyo	92.2	90.2	-1.1%	22	1
22	Singapore	86.5	85.2	-1.4%	23	1
23	Hong Kong	80.1	77.2	-0.3%	26	3
24	West-Nederland	79.2	98.5	-12.3%	20	-4
25	Ontario	77.0	69.5	3.0%	28	3
26	Kanagawa	76.7	75.9	-1.6%	27	1
27	Berlin	76.4	81.7	-5.4%	24	-3
28	Brussels	64.8	77.4	-10.5%	25	-3
29	London	60.6	58.3	-0.3%	29	0
30	Kyoto	59.5	57.6	-0.6%	30	0
31	Los Angeles	57.8	53.5	1.7%	32	1
32	San Francisco	57.8	52.7	2.5%	33	1
33	Boston	57.8	56.9	-1.4%	31	-2
34	Atlanta	57.8	51.5	3.7%	34	0
35	British Columbia	43.3	39.1	3.0%	37	2
36	Washington,	38.5	35.8	1.5%	38	2
37	Austin	38.5	41.6	-5.8%	36	-1
38	Hartford	38.5	47.2	-11.6%	35	-3
39	Luxembourg	33.5	29.2	4.9%	39	0
40	Seattle	19.3	16.2	6.7%	40	0

Table 2.6: Index of Regional Employment in the Automotive and High-Technology Mechanical Engineering Sectors (Employees per 1,000 inhabitants)

Rank	Employment in Automotive and Mechanical Engineering	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	Baden-Württemberg	328.5	295.8	5.9%	1	0
2	Philadelphia	264.9	267.4	0.0%	2	0
3	Bayern	229.7	202.2	7.1%	4	1
4	Seattle	195.3	200.5	-0.8%	5	1
5	British Columbia	178.6	223.8	-10.3%	3	-2
6	Hessen	162.7	149.2	4.9%	8	2
7	Ontario	161.9	169.5	-1.8%	6	-1
8	Hartford	150.7	158.9	-2.2%	7	-1
9	Switzerland	121.7	119.0	1.6%	9	0
10	Austin	117.2	112.1	2.7%	13	3
11	Norway	115.1	113.1	1.3%	12	1
12	Kanagawa	110.3	116.8	-2.4%	10	-2
13	Osaka	104.8	107.9	-1.0%	14	1
14	Eastern	103.5	113.5	-4.1%	11	-3
15	South East	103.3	91.8	6.6%	19	4
16	New South Wales	100.5	97.1	2.2%	15	-1
17	Singapore	97.3	94.1	2.2%	17	0
18	San Francisco	95.7	96.5	0.0%	16	-2
19	Denmark	94.9	93.7	1.1%	18	-1
20	Hong Kong	90.1	85.2	3.3%	20	0
21	Hamburg	83.9	82.8	1.2%	21	0
22	Boston	78.7	79.4	0.0%	22	0
23	Uusimaa	76.1	76.5	0.2%	23	0
24	Chicago	73.8	74.5	0.0%	24	0
25	Île de France	72.4	74.1	-0.8%	25	0
26	Zuid-Nederland	72.0	72.4	0.2%	27	1
27	Kyoto	71.1	73.7	-1.4%	26	-1
28	Los Angeles	69.7	70.4	0.0%	28	0
29	Tokyo	64.4	67.5	-1.9%	29	0
30	Berlin	57.2	65.0	-5.8%	30	0
31	Ostösterreich	52.2	60.2	-6.5%	31	0
32	Atlanta	50.2	59.9	-8.0%	32	0
33	West-Nederland	48.9	42.9	7.2%	33	0
34	Stockholm	45.2	42.9	3.2%	34	0
35	Raleigh-Durham	39.1	36.7	3.6%	35	0
36	London	33.2	30.1	5.5%	36	0
37	New York	23.9	24.2	0.0%	37	0
38	Brussels	23.2	15.8	21.5%	40	2
39	Washington	22.5	22.7	0.0%	38	-1
40	Luxembourg	15.6	20.2	-11.9%	39	-1

Table 2.7: Index of Regional Employment in the Instrumentation and Electrical Machinery Sectors (Employees per 1,000 inhabitants)

Rank	Electrical Machinery and Instruments	Index 2003	Index 2001	% Annual Change	Rank 2001	% Change in Rank
1	Bayern	273.4	250.9	3.9%	1	0
2	Baden-Württemberg	233.1	236.1	-1.1%	2	0
3	Boston	179.7	167.2	3.2%	3	0
4	San Francisco	164.7	158.7	1.4%	4	0
5	Hessen	155.5	132.9	7.7%	7	2
6	Kyoto	147.0	149.8	-1.4%	6	0
7	Uusimaa (suuralue)	143.0	152.4	-3.6%	5	-2
8	Raleigh-Durham	134.8	128.2	2.1%	9	1
9	Tokyo	126.0	129.6	-1.9%	8	-1
10	Switzerland	125.6	110.0	6.4%	16	6
11	Berlin	123.8	110.1	5.5%	15	4
12	Hartford	119.8	117.2	0.6%	11	-1
13	Norway	118.8	104.6	6.1%	20	7
14	South East	115.8	126.4	-4.7%	10	-4
15	Osaka	115.5	116.8	-1.0%	12	-3
16	Kanagawa	108.7	113.0	-2.4%	13	-3
17	Los Angeles	104.8	109.3	-2.5%	18	1
18	Hamburg	103.6	88.7	7.6%	26	8
19	Eastern	99.4	112.8	-6.5%	14	-5
20	Singapore	94.5	109.6	-7.6%	17	-3
21	Île de France	92.9	89.6	1.3%	25	4
22	Chicago	89.9	98.1	-4.7%	22	0
23	New South Wales	89.9	91.3	-1.2%	23	-1
24	Denmark	89.9	87.6	0.8%	27	4
25	Ostösterreich	87.8	105.3	-9.1%	19	-6
26	Hong Kong	87.5	99.3	-6.5%	21	-5
27	Stockholm	79.8	69.9	6.3%	28	1
28	Austin	74.9	91.2	-9.8%	24	-5
29	Philadelphia	74.9	67.6	4.8%	29	1
30	Seattle	59.9	64.8	-4.3%	30	-2
31	Atlanta	59.9	62.1	-2.2%	31	0
32	New York	59.9	60.6	-1.0%	32	2
33	Zuid-Nederland	48.4	51.4	-3.4%	34	1
34	Ontario	44.9	45.7	-1.3%	35	1
35	London	40.0	52.8	-13.4%	33	-2
36	Washington	30.0	31.8	-3.4%	36	0
37	British Columbia	30.0	25.7	7.4%	39	2
38	Brussels	29.0	30.7	-3.1%	37	-1
39	West-Nederland	25.2	30.1	-8.9%	38	-1
40	Luxembourg	17.9	20.4	-6.7%	40	0

Table 2.8: Index of Regional Employment in the High-Technology Service Sectors (Employees per 1,000 inhabitants)

Rank	Employment in High Tech Services	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	San Francisco	190.4	178.9	8.5%	1	0
2	Washington	170.5	173.1	4.4%	2	0
3	Stockholm	152.3	152.8	-2.6%	5	2
4	Raleigh-Durham	150.7	152.0	-0.8%	7	3
5	Uusimaa (suuralue)	149.8	168.4	5.0%	4	-1
6	South East	148.3	135.5	1.7%	8	2
7	Tokyo	146.2	170.2	4.7%	3	-4
8	Atlanta	142.8	152.7	10.0%	6	-2
9	Boston	138.8	135.2	6.5%	9	0
10	Île de France	138.1	125.0	5.7%	11	1
11	Eastern	128.8	111.0	10.5%	14	3
12	Seattle	126.9	125.6	7.2%	10	-2
13	London	125.1	120.3	-1.9%	12	-1
14	Singapore	115.7	102.1	13.3%	15	1
15	West-Nederland	114.6	94.8	11.9%	19	4
16	Hong Kong	107.1	92.5	1.7%	21	5
17	Austin	103.1	118.4	-0.1%	13	-4
18	New York	95.2	101.8	0.1%	16	-2
19	Switzerland	94.1	87.4	15.6%	22	3
20	Denmark	91.2	101.1	2.1%	17	-4
21	Chicago	91.2	100.6	13.2%	18	-2
22	Norway	89.0	83.1	9.1%	24	2
23	New South Wales	87.3	92.6	2.3%	20	-3
24	Ostösterreich	85.5	67.2	8.8%	31	7
25	Hessen	80.6	70.9	-1.9%	29	4
26	Philadelphia	79.3	83.8	6.0%	23	-3
27	Berlin	79.2	77.9	-1.7%	26	-1
28	Bayern	77.0	66.5	-3.0%	33	5
29	Hartford	71.4	82.0	12.1%	25	-4
30	Baden-Württemberg	71.2	65.2	4.3%	35	5
31	Hamburg	68.8	69.9	18.7%	30	-1
32	Osaka	66.5	76.2	2.4%	27	-5
33	Los Angeles	63.5	66.9	13.2%	32	-1
34	Kanagawa	63.5	74.6	-7.0%	28	-6
35	Zuid-Nederland	61.6	58.0	9.9%	37	2
36	Ontario	55.5	57.9	-2.9%	38	2
37	Brussels	54.9	64.4	8.3%	36	-1
38	Luxembourg	51.3	65.5	3.0%	34	-4
39	British Columbia	43.6	43.8	4.9%	39	0
40	Kyoto	29.5	34.0	-2.1%	40	0

R&D EXPENDITURE

- 2.15. Research and development expenditure is an indication of attempts to enlarge the knowledge base and inputs to the process of searching for knowledge. Table 2.9 ranks public/government expenditure per head of population and shows that Washington remains at the top of the index with a rating of 605.8. Its location at the heart of US government and the presence of a wide variety of research institutes and R&D intensive sectors gives it its massively dominating position in terms of R&D spend.
- 2.16. The South East remains in 9th position with a rating of 146.0 and shows a slight rise in spending. Also, Eastern and London show slight changes and are at 20th and 32nd respectively. Other big risers include Ile de France reflecting its position as France's pre-eminent region in terms of R&D spending and capacity, accounting for 44% of national R&D expenditure, with a particular concentration of public research institutions in the region.
- 2.17. In terms of business R&D expenditure – Table 2.10 - Boston remains number one in the index at 232.5, despite a 6.1% fall. This fall, which mirrors the fall in government spending on R&D in Boston, also reflects US firms' lack of confidence in the economic future of the country as companies' R&D spending is usually the first to suffer in times of economic uncertainty. Seattle also suffers a 2.1% fall though it remains in second place in the index.
- 2.18. The South East records a rise of 7.6% to 88.3, reflecting a growing confidence of firms in the region to innovate and develop new products and processes. Eastern England remained ahead in 13th at 115.5 with a small rise of 0.7% and retains its role as the UK's leader in business R&D investment.

Table 2.9: Index of Government Research & Development Expenditure by Region (per capita)

Rank	R&D Expenditure by Government	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	Washington	605.8	598.2	3%	1	0
2	Hong Kong	346.9	350.5	2%	2	0
3	Berlin	223.7	224.6	2%	3	0
4	Uusimaa	210.3	195.9	6%	5	1
5	Boston	192.5	200.5	0%	4	-1
6	Île de France	171.3	157.6	7%	6	0
7	San Francisco	152.9	153.9	2%	8	1
8	Los Angeles	151.9	154.5	1%	7	-1
9	South East	146.0	142.4	4%	9	0
10	Hamburg	136.7	139.1	1%	10	0
11	Norway	114.2	112.5	3%	11	0
12	Baden-Württemberg	113.1	112.5	3%	12	0
13	Singapore	102.3	103.3	2%	14	1
14	Luxembourg	98.7	104.5	-1%	13	-1
15	Seattle	85.9	81.5	5%	17	2
16	New South Wales	82.1	81.0	3%	18	2
17	Denmark	81.9	74.0	8%	20	3
18	Zuid-Nederland	77.4	82.0	-1%	15	-3
19	West-Nederland	77.3	81.9	-1%	16	-3
20	Eastern	76.4	77.8	1%	19	-1
21	Bayern	66.7	63.9	4%	23	2
22	Chicago	66.0	70.4	-1%	21	-1
23	Ostösterreich	62.0	65.7	-1%	22	-1
24	Ontario	58.8	62.3	-1%	24	0
25	British Columbia	55.5	58.8	-1%	25	0
26	Philadelphia	51.0	48.9	4%	27	1
27	Brussels	50.8	50.5	2%	26	-1
28	New York	43.4	42.2	4%	30	2
29	Raleigh-Durham	41.5	46.3	-3%	28	-1
30	Hessen	39.9	42.3	-1%	29	-1
31	Atlanta	37.7	33.9	8%	34	3
32	London	36.8	38.9	-1%	31	-1
33	Switzerland	35.1	35.1	2%	33	0
34	Austin	34.9	38.0	-2%	32	-2
35	Stockholm	29.6	29.6	2%	35	0
36	Hartford	11.3	13.2	-5%	36	0
37	Kyoto	10.9	10.9	2%	37	0
38	Kanagawa	8.1	8.8	-2%	38	0
39	Osaka	7.8	6.9	9%	39	0
40	Tokyo	5.0	5.2	0%	40	0

**Table 2.10: Index of Business Research & Development Expenditure by Region
 (per capita)**

Rank	R&D Expenditure by Business	Index 2003	Index 2001	% Annual Growth	Rank 2001	Change in Rank
1	Boston	232.5	278.7	-6.1%	1	0
2	Seattle	214.4	236.1	-2.1%	2	0
3	Stockholm	211.8	198.9	6.0%	3	0
4	San Francisco	201.3	194.4	4.6%	5	1
5	Los Angeles	200.6	195.0	4.2%	4	-1
6	Philadelphia	165.5	179.6	-1.3%	6	0
7	Hartford	161.6	170.7	0.0%	7	0
8	New York	153.4	155.9	2.0%	8	0
9	Île de France	152.5	131.7	10.6%	11	2
10	Baden-Württemberg	149.8	131.9	9.5%	10	0
11	Uusimaa	146.5	118.5	14.3%	14	3
12	Kanagawa	116.6	135.0	-4.5%	9	-3
13	Eastern	115.5	120.4	0.7%	13	0
14	Bayern	112.8	95.8	11.6%	16	2
15	Hessen	110.5	87.3	15.6%	20	5
16	Chicago	105.3	101.0	4.9%	15	-1
17	Tokyo	96.1	122.4	-8.9%	12	-5
18	Austin	88.5	81.8	6.9%	23	5
19	South East	88.3	80.6	7.6%	24	5
20	Brussels	86.2	92.4	-0.8%	17	-3
21	Switzerland	85.8	89.3	0.8%	18	-3
22	Hamburg	80.2	82.1	1.6%	22	0
23	Kyoto	78.9	78.2	3.3%	26	3
24	Osaka	78.6	88.4	-3.1%	19	-5
25	Raleigh-Durham	76.5	82.3	-0.9%	21	-4
26	Berlin	74.8	61.1	13.7%	28	2
27	Luxembourg	74.4	78.3	0.2%	25	-2
28	Ontario	74.3	78.1	0.2%	27	-1
29	Denmark	61.8	52.8	11.2%	29	0
30	Zuid-Nederland	52.2	46.5	9.0%	33	3
31	Washington	51.7	50.0	4.5%	30	-1
32	Ostösterreich	46.8	49.2	0.2%	31	-1
33	British Columbia	45.7	48.0	0.2%	32	-1
34	West-Nederland	40.9	46.4	-3.5%	34	0
35	Atlanta	40.6	34.7	11.1%	37	2
36	Singapore	40.3	36.9	7.5%	35	-1
37	Norway	34.9	35.8	1.5%	36	-1
38	New South Wales	24.9	28.0	-3.1%	38	0
39	London	24.7	24.4	3.4%	39	0
40	Hong Kong	2.5	1.9	16.2%	40	0

KNOWLEDGE ECONOMY OUTPUTS

2.19. The following five variables were chosen as the best available measures of the size of outputs of knowledge economy production in each region:

Patents

- Number of Patents Registered per one million inhabitants

Gross Domestic Product and Productivity

- Per capita GDP
- Labour Productivity

Earnings and Unemployment

- Mean Gross Monthly Earnings
- Unemployment Rates

PATENTS

2.20. Patent registrations are a representation of the generation of new ideas and are the nearest proxy to direct indicators of knowledge formation, and are perhaps the best measure of knowledge economy outputs. A high level of patent activity is often a reflection of high levels of applied research and development activity. Table 2.11 illustrates patent registrations across the regions, and shows that San Francisco leads the index with 452.7, overtaking Austin which fell 4% to 388.7. San Francisco's status reflects the continued rise in both government and business R&D spending, the availability of venture capital and the significant presence of high-technology companies with the region, as well as the geographic concentration of companies and high-technology research and software parks.

2.21. The South East of England recorded a 14% rise in patent production, albeit from a low base, to 60.8. This is consistent with the increase in both government and business R&D expenditure in the region and improving links between regional higher education institutions and industry. Eastern England also records a strong 13% growth in this sector while London also recorded an 11% growth, albeit from a very low base.

Table 2.11: Index of Patent Registrations by Region (per capita)

Rank	Patents	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	San Francisco	452.7	448.7	3%	2	1
2	Austin	388.7	449.5	-4%	1	-1
3	Raleigh-Durham	273.8	278.5	2%	3	0
4	Boston	195.5	211.5	-1%	4	0
5	Baden-Württemberg	150.6	138.2	7%	6	1
6	Zuid-Nederland	149.7	112.8	18%	13	7
7	Stockholm	149.1	136.8	7%	7	0
8	Uusimaa	139.2	133.1	5%	9	1
9	Bayern	138.0	125.6	8%	12	3
10	Seattle	134.9	134.2	3%	8	-2
11	Hartford	133.0	142.8	-1%	5	-6
12	New York	115.6	127.9	-2%	10	-2
13	Philadelphia	111.6	127.2	-4%	11	-2
14	Chicago	102.2	112.6	-2%	14	0
15	Hessen	99.5	101.7	2%	15	0
16	Tokyo	94.4	97.2	1%	16	0
17	Los Angeles	92.3	92.0	3%	17	0
18	Washington	84.8	87.7	1%	19	1
19	Île de France	82.5	82.9	2%	20	1
20	Atlanta	78.6	88.8	-3%	18	-2
21	Switzerland	66.6	62.8	6%	22	1
22	Eastern	65.8	54.7	13%	24	2
23	Osaka	62.0	63.1	2%	21	-2
24	South East	60.8	49.3	14%	27	3
25	Hamburg	59.2	56.6	5%	23	-2
26	Berlin	56.5	47.3	12%	29	3
27	Denmark	52.8	44.2	12%	30	3
28	Ontario	52.1	50.4	4%	26	-2
29	Luxembourg	51.3	51.0	3%	25	-4
30	British Columbia	49.6	47.8	5%	28	-2
31	Brussels	42.0	40.3	5%	31	0
32	Ostösterreich	37.5	34.4	7%	32	0
33	West-Nederland	36.4	34.0	6%	33	0
34	London	27.2	23.1	11%	35	1
35	Kanagawa	26.7	27.5	1%	34	-1
36	Kyoto	20.3	20.6	2%	36	0
37	Norway	19.5	18.0	7%	38	1
38	Hong Kong	18.0	19.0	0%	37	-1
39	Singapore	15.4	12.0	16%	40	1
40	New South Wales	13.7	14.0	2%	39	-1

GROSS DOMESTIC PRODUCT AND PRODUCTIVITY

- 2.22. GDP has again been measured on a workplace basis, reflecting the product generated by those working in each region. Table 2.12 highlights the GDP per capita for the regions, with Hartford remaining top of the index and recording an 8.6% rise to 166.5. Brussels is one of the biggest risers to second with a 21.1% increase, the Belgian capital's position showing its political importance as the centre of EU decision-making and the main base for a growing number of multi-nationals from across the European Union and beyond.
- 2.23. The South East rises to 31st with a rating of 77.3, ahead of Eastern but still a distance behind London with a score of 102.6. Strong growth in GDP per capita is seen in most of the regions in the index, with the US areas continuing to increase GDP despite the generally mild and sluggish conditions of the US economic recovery. The Scandinavian countries also recorded strong growth in GDP per capita.
- 2.24. Productivity is a crucial measure of regional performance, as it is influenced by a wide range of factors such as sectoral make-up, workforce skills, investment in innovation, and market competition. Hartford climbs to the top of the productivity index – Table 2.13 - with a rating of 166.1 closely followed by Luxembourg and Brussels. US metropolitan areas dominate the top of the index, with New York, Boston and Seattle all recording strong rises in productivity. The South East rated 74.4, just ahead of Eastern at 70.6, while London fell five places with a rating of 106.8 despite a 3.3% rise. These low levels of productivity continue to affect the South East's competitiveness on a global level, and all the UK regions apart from London score well below average.

Table 2.12 Index of Gross Domestic Product by Region (per capita)

Rank	GDP per Capita	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	Hartford	166.5	160.3	8.6%	1	0
2	Brussels	151.7	117.4	21.1%	9	7
3	San Francisco	139.6	131.2	9.9%	3	0
4	Luxembourg	137.0	123.7	12.1%	7	3
5	Boston	135.9	129.3	9.2%	4	-1
6	New York	130.6	126.7	8.1%	6	0
7	Hamburg	126.6	128.6	5.7%	5	-2
8	Seattle	124.0	114.7	10.7%	11	3
9	Washington,	122.1	118.6	8.1%	8	-1
10	Tokyo	121.2	143.7	-2.2%	2	-8
11	Atlanta	116.5	116.0	6.7%	10	-1
12	Chicago	113.9	112.6	7.2%	13	1
13	Los Angeles	110.5	103.9	9.8%	18	5
14	Île de France	110.4	104.5	9.5%	17	3
15	Raleigh-Durham	110.1	112.5	5.3%	14	-1
16	Philadelphia	109.8	109.1	6.9%	15	-1
17	Austin	107.1	113.1	3.6%	12	-5
18	London	102.6	106.7	4.5%	16	-2
19	Stockholm	102.5	95.4	10.4%	21	2
20	Uusimaa (suuralue)	98.9	98.9	6.5%	19	-1
21	Hessen	90.3	91.3	5.9%	22	1
22	Switzerland	89.9	87.4	8.0%	24	2
23	Norway	89.8	81.0	12.2%	32	9
24	Ontario	89.6	95.8	3.0%	20	-4
25	Bayern	86.5	85.4	7.2%	28	3
26	West-Nederland	86.1	87.3	5.8%	25	-1
27	Ostösterreich	85.9	85.5	6.8%	27	0
28	Baden-Württemberg	85.1	85.2	6.5%	29	1
29	Denmark	82.7	82.7	6.5%	30	1
30	Osaka	79.1	90.5	-0.4%	23	-7
31	South East	77.3	77.0	6.8%	34	3
32	British Columbia	75.7	82.0	2.4%	31	-1
33	Zuid-Nederland	73.9	74.5	6.1%	36	3
34	Eastern	72.7	72.3	6.8%	38	4
35	New South Wales	70.7	86.0	-3.4%	26	-9
36	Hong Kong	70.1	77.2	1.5%	33	-3
37	Singapore	67.9	76.1	0.6%	35	-2
38	Berlin	66.7	70.7	3.5%	40	2
39	Kyoto	61.7	73.8	-2.7%	37	-2
40	Kanagawa	60.9	71.5	-1.7%	39	-1

Table 2.13 Index of Labour Productivity by Region (per capita)

Rank	Productivity	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	Hartford	166.1	155.5	9.9%	2	1
2	Luxembourg	158.8	144.9	11.4%	3	1
3	Brussels	156.0	161.0	4.7%	1	-2
4	New York	141.5	130.9	10.6%	6	2
5	Boston MA	136.4	125.2	11.0%	7	2
6	Hamburg	130.5	135.5	4.4%	4	-2
7	San Francisco	129.0	121.6	9.5%	8	1
8	Seattle	123.0	104.1	15.6%	15	7
9	Chicago	116.7	109.8	9.7%	13	4
10	Île de France	116.3	115.1	6.9%	9	-1
11	Washington	116.3	113.3	7.8%	10	-1
12	Los Angeles	116.0	108.0	10.2%	14	2
13	Tokyo	115.9	131.0	0.0%	5	-8
14	Philadelphia	113.5	110.2	7.9%	12	-2
15	Atlanta	110.6	101.8	10.9%	16	1
16	London	106.8	113.2	3.3%	11	-5
17	Raleigh-Durham	105.4	98.4	10.1%	18	1
18	Hessen	95.8	99.9	4.2%	17	-1
19	Austin	95.4	92.1	8.2%	20	1
20	Ostösterreich	91.2	90.3	6.9%	24	4
21	Uusimaa (suuralue)	90.9	91.2	6.2%	22	1
22	Baden-Württemberg	88.3	89.7	5.5%	25	3
23	Norway	87.3	77.8	12.7%	34	11
24	Bayern	87.0	86.7	6.5%	28	4
25	West-Nederland	86.3	86.8	6.1%	27	2
26	Stockholm	86.2	97.6	0.0%	19	-7
27	Ontario	85.1	91.5	2.5%	21	-6
28	Osaka	82.3	88.8	2.4%	26	-2
29	Denmark	79.7	78.7	7.0%	32	3
30	Switzerland	77.3	80.8	4.1%	31	1
31	Zuid-Nederland	76.4	73.9	8.1%	36	5
32	British Columbia	76.1	82.5	2.1%	29	-3
33	Berlin	75.5	80.9	2.7%	30	-3
34	South East	74.4	77.3	4.4%	35	1
35	New South Wales	72.7	90.4	-4.6%	23	-12
36	Hong Kong	71.0	78.5	1.2%	33	-3
37	Eastern	70.6	72.1	5.3%	38	1
38	Singapore	69.4	73.5	3.3%	37	-1
39	Kyoto	62.7	71.9	-0.7%	39	0
40	Kanagawa	59.5	67.8	-0.4%	40	0

EARNINGS AND UNEMPLOYMENT

- 2.25. Earning levels are an indicator of the relative wealth and the standards of living within an economy, particularly the value-added generated from economic activity. It is also a strong proxy of the relative quality of jobs within an economy. The index of earnings shown by Table 2.14 indicates that New York remains at number one with the whole of the top ten dominated by US metropolitan areas. These scores are correlated with strong US increases in productivity and GDP per capita. Most US labour income is generated by metro area economies and higher wage jobs are therefore typically located in these areas. London dropped a place, mirroring its slight ranking fall in productivity and GDP per capita. The South East remained in 28th at 85.7 seeing a rise of 2.9%.
- 2.26. Table 2.15 illustrates the levels of unemployment within the regions, reverse ranked so that a high score indicates a lower level of unemployment. West Nederland leads the index, rising 8 places at 103.5. The South East also saw a big rise, up 1.3% to 103.3 and is now ranked 2nd overall reflecting the continued buoyancy of the jobs market in the region and the UK's low unemployment rates as a whole. Eastern England also rose by a similar margin to a rating of 102.6. In contrast to the US dominance of the Earnings and GDP indices, US cities all experience falls with San Francisco, Seattle and Chicago all tumbling down the rankings.

Table 2.14: Index of Earnings by Region (Mean Gross Monthly Earnings)

Rank	Earnings	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	New York	157.8	152.2	6.7%	1	0
2	San Francisco	151.0	142.8	4.3%	2	0
3	Boston	145.8	135.8	5.2%	5	2
4	Washington	140.0	137.2	5.9%	4	0
5	Hartford	139.9	139.3	7.8%	3	-2
6	Chicago	130.3	129.2	4.2%	6	0
7	Atlanta	127.3	124.6	8.6%	7	0
8	Seattle	125.7	121.5	5.9%	9	1
9	Raleigh-Durham	123.5	117.2	6.6%	12	3
10	Philadelphia	122.8	124.2	7.6%	8	-2
11	Los Angeles	117.5	118.6	7.6%	11	0
12	Hamburg	113.1	108.7	5.0%	14	2
13	Tokyo	108.1	119.7	3.4%	10	-3
14	London	104.7	108.7	4.9%	13	-1
15	Baden-Württemberg	103.6	99.6	6.9%	16	1
16	Hessen	102.3	98.1	6.7%	17	1
17	Austin	101.1	96.0	5.7%	20	3
18	Bayern	97.4	94.0	6.9%	22	4
19	Ontario	94.7	97.3	7.0%	18	-1
20	West-Nederland	93.7	90.2	5.2%	24	4
21	Brussels	92.2	94.6	2.1%	21	0
22	Osaka	91.0	96.5	6.9%	19	-3
23	Berlin	90.5	89.0	7.3%	27	4
24	Kanagawa	89.6	101.7	7.9%	15	-9
25	Denmark	89.2	89.1	8.4%	26	1
26	Norway	87.1	87.6	7.3%	29	3
27	Zuid-Nederland	86.5	82.4	4.4%	32	5
28	South East	85.7	87.9	2.9%	28	0
29	British Columbia	85.3	91.0	3.5%	23	-6
30	Luxembourg	84.8	89.3	-0.4%	25	-5
31	Ostösterreich	83.6	78.9	-1.6%	33	2
32	Eastern	82.1	82.7	-1.2%	31	-1
33	Île de France	76.9	76.3	1.8%	34	1
34	Kyoto	76.5	86.0	3.4%	30	-4
35	Uusimaa (suuralue)	73.1	68.4	1.5%	37	2
36	Singapore	70.6	73.9	0.9%	36	0
37	New South Wales	69.2	74.6	-0.5%	35	-2
38	Stockholm	68.1	64.9	4.5%	39	1
39	Switzerland	60.0	66.5	-0.4%	38	-1
40	Hong Kong	57.8	63.9	2.4%	40	0

Table 2.15: Index of Unemployment Rates by Region (reversed rankings)

Rank	Region	Index 2003	Index 2001	Rank 2001	Change in Rank
1	West-Nederland, Netherlands	103.5	102.1	9	8
2	South East, UK	103.3	101.9	11	9
3	Zuid-Nederland, Netherlands	103.3	102.1	8	5
4	Luxembourg	103.1	102.8	3	-1
5	Stockholm, Sweden	102.7	99.8	28	23
6	Eastern, UK	102.6	101.2	15	9
7	Switzerland	102.6	101.2	14	7
8	Hartford, US	102.1	102.8	4	-4
9	Ostösterreich, Austria	101.6	100.6	21	12
10	Norway	101.5	101.4	13	3
11	Baden-Württemberg, Germany	101.3	99.9	27	16
12	Washington DC, US	101.2	102.1	10	-2
13	Bayern, Germany	101.0	100.1	26	13
14	Denmark	100.9	99.4	29	15
15	Atlanta, US	100.6	102.2	7	-8
16	Raleigh-Durham, US	100.6	103.4	1	-15
17	Singapore	100.6	101.9	12	-5
18	Tokyo, Japan	100.3	100.2	24	6
19	Hong Kong, China	100.1	100.1	25	6
20	Uusimaa, Finland	100.1	97.9	34	14
21	Kanagawa, Japan	100.0	100.5	22	1
22	Boston, US	99.9	102.7	5	-17
23	Hessen, Germany	99.9	98.3	33	10
24	Austin, US	99.8	103.2	2	-22
25	London, UK	99.6	97.1	36	11
26	Kyoto, Japan	99.5	100.7	20	-6
27	Los Angeles, US	99.4	100.3	23	-4
28	New South Wales, Australia	99.3	99.0	31	3
29	Osaka, Japan	99.1	98.8	32	3
30	Philadelphia, US	98.8	100.9	18	-12
31	Hamburg, Germany	98.7	97.0	37	6
32	New York, US	98.6	101.0	17	-15
33	San Francisco, US	98.6	102.6	6	-27
34	Ontario, Canada	98.4	99.3	30	-4
35	Seattle, US	98.4	101.0	16	-19
36	Chicago, US	98.1	100.9	19	-17
37	Île de France, France	97.6	94.5	38	1
38	British Columbia, Canada	97.0	97.8	35	-3
39	Brussels, Belgium	94.0	90.6	40	1
40	Berlin, Germany	92.4	90.9	39	-1

KNOWLEDGE SUSTAINABILITY

Investment in future knowledge

- 2.27. Two key measures of knowledge sustainability are investments in primary and secondary education, as well as investments in higher education. Indeed, it is clear that future knowledge capital is currently embodied within those individuals undertaking education and training. Therefore, the resources dedicated to such education and training are an important source of knowledge investment. Much of the expenditure on education is set by national budgets, particularly in Europe for compulsory primary and secondary education, while higher education expenditure is a reflection of the number and type of institutions within a region.
- 2.28. Table 2.16 highlights regional expenditure on primary and secondary education on a per capita basis. Hartford leads the index with a rating of 184.2 having seen a 6.9% rise in spending. US cities score well in general with Chicago, Boston and Atlanta recording big increases in spending. This increase in spending in the US contrasts strongly with falls across most European regions. The South East, London and Eastern all recorded a small 0.1% fall in spending to 73.8.
- 2.29. Table 2.17 highlights expenditure on higher education by region. It shows that in contrast to falls in expenditure on school education in Japan, HE expenditure had increased by 5.2% across Japanese cities, with Osaka continuing to lead the index with a rating of 207.0, and Tokyo and Kyoto rising four and three places respectively. US cities also perform well with most recording percentage rises.
- 2.30. The South East region sees the biggest rise of all in the index with an increase in expenditure of 9.2%, albeit from a relatively low base. This rise in expenditure reflects national government policies of extending access to HE for prospective students and increasing the amount of courses available. Eastern sees a similar rise in expenditure, and London records a rise of 3.1% although all three UK regions remain at the bottom of the index.

ICT Infrastructure

- 2.31. In order to transfer knowledge effectively and efficiently across regions, a well-developed ICT infrastructure, particularly access to fast broadband telecommunications services, is required. Although broadband penetration data is unavailable for all our benchmark regions and nations, the OECD has collected certain data at the national level for its member states. In order to look in more detail at the ICT infrastructure, we have analysed the number of secure servers and Internet hosts per capita in the nations covering the

- benchmarked regions. Secure servers utilise encrypted software for e-commerce transactions, and therefore the number of such services within a nation gives a strong indication of the level of e-business undertaken.
- 2.32. Table 2.18 shows that the highest numbers of secure servers per capita are located within the US, with a score that is two and a half times higher than the mean. Australia, Canada, Switzerland and Luxembourg continue to hold the second, third, fourth and fifth positions respectively. The biggest riser in the table is Singapore, up 6 places to 9th position. The UK has dropped one place to 8th, with a score of 112.4.
- 2.33. The Internet is the most rapidly growing feature of ICT infrastructure, and is important for the movement and diffusion of knowledge. The proportion of Internet hosts within a nation is a representation of the degree to which it is developing its 'wired economy'. Once again, the US is ranked number one (280.4), as shown in Table 2.19, followed by Finland (188.0) and Canada (186.5). The UK has jumped 2 places to 11th position, with a score of 71.3, but continues to be well below the mean average of the benchmarked nations.
- 2.34. Tables 2.18 and 2.19 show that the position of the UK within the global information society is not overly strong. Despite the UK's stronger performance in the ranking of Internet hosts, it has slipped down the ranking of secure servers.

Table 2.16: Index of Public Expenditure on Primary and Secondary Education (per capita)

Rank	Region	Index 2003	Index 2001	% Annual Change	Rank 2001	Change in Rank
1	Hartford	184.2	170.7	6.9%	2	1
2	New York	175.8	174.9	3.1%	1	-1
3	Philadelphia	155.5	146.4	6.0%	5	2
4	Luxembourg	154.3	165.4	-0.6%	3	-1
5	Austin	148.6	149.8	2.4%	4	-1
6	Chicago	140.2	131.4	6.3%	7	1
7	Boston	133.6	125.1	6.3%	9	2
8	Seattle	133.4	135.1	2.2%	6	-2
9	Atlanta	132.9	129.3	4.3%	8	-1
10	San Francisco	131.6	122.0	6.8%	11	1
11	Los Angeles	124.9	122.5	3.9%	10	-1
12	Denmark	123.3	114.9	6.6%	12	0
13	Stockholm	114.9	107.7	6.2%	16	3
14	Raleigh-Durham	114.2	114.7	2.6%	13	-1
15	Norway	111.9	113.2	2.3%	14	-1
16	Switzerland	109.2	112.7	1.3%	15	-1
17	British Columbia	99.9	100.6	2.5%	19	2
18	Ontario	96.1	104.8	-1.5%	18	0
19	Ostösterreich	94.4	105.0	-2.5%	17	-2
20	Île de France	90.0	93.3	1.0%	20	0
21	Washington	88.1	83.6	5.6%	23	2
22	Uusimaa (suuralue)	81.7	86.7	-0.1%	21	-1
23	New South Wales	80.7	86.3	-0.5%	22	-1
24	Brussels	80.0	82.4	1.4%	24	0
25	West-Nederland	74.3	74.0	3.1%	28	3
26	Zuid-Nederland	74.3	74.0	3.1%	29	3
27	Eastern	73.8	78.3	-0.1%	25	-2
28	London	73.8	78.3	-0.1%	26	-2
29	South East	73.8	78.3	-0.1%	27	-2
30	Hong Kong	69.7	73.7	0.0%	30	0
31	Kyoto	69.4	71.2	1.6%	31	0
32	Osaka	68.4	71.2	0.8%	32	0
33	Berlin	68.2	69.9	1.6%	35	2
34	Hamburg	68.2	69.9	1.6%	36	2
35	Bayern	68.2	69.9	1.6%	37	2
36	Baden-Württemberg	68.2	69.9	1.6%	38	2
37	Hessen	68.2	69.9	1.6%	39	2
38	Kanagawa	64.5	71.2	-2.1%	33	-5
39	Tokyo	60.9	71.2	-4.9%	34	-5
40	Singapore	28.7	26.5	7.0%	40	0

Table 2.17: Index of Public Expenditure on Higher Education (per capita)

Rank	Higher Education Expenditure	Index 2003	Index 2001	% Change in Rank	Rank 2001	Change in Rank
1	Osaka	207.0	199.4	5.2%	1	0
2	Seattle	190.1	181.0	5.8%	2	0
3	Raleigh-Durham	180.6	172.0	5.8%	3	0
4	Austin	163.7	158.9	4.8%	4	-2
5	Los Angeles	167.2	157.7	6.3%	5	1
6	San Francisco	166.4	157.0	6.3%	6	1
7	Ostösterreich	141.5	141.5	3.2%	7	-1
8	Philadelphia	137.5	138.9	2.7%	8	-2
9	Berlin	140.5	137.8	4.2%	9	0
10	Atlanta	144.9	136.7	6.3%	10	3
11	Chicago	131.7	131.7	3.2%	11	-1
12	New York	124.4	125.7	2.7%	12	-2
13	Stockholm	107.0	124.3	-4.2%	13	-4
14	Hamburg	135.9	122.7	8.7%	14	3
15	Hartford	126.7	119.5	6.3%	15	2
16	Brussels	116.9	113.5	4.8%	16	1
17	Norway	104.3	104.1	3.3%	17	-2
18	Zuid-Nederland	95.7	103.9	-0.9%	18	-7
19	Ontario	103.4	103.4	3.2%	19	-1
20	Tokyo	107.2	103.3	5.2%	20	4
21	Kyoto	105.8	101.9	5.2%	21	3
22	Île de France	98.1	101.1	1.7%	22	0
23	Washington	98.4	100.4	2.2%	23	2
24	Switzerland	97.6	96.4	3.9%	24	1
25	Denmark	95.5	91.4	5.5%	25	-1
26	Boston	95.9	91.3	5.8%	26	2
27	West-Nederland	90.7	84.9	6.7%	27	-1
28	Hessen	86.8	83.2	5.5%	28	-1
29	New South Wales	91.1	81.4	9.2%	29	2
30	Baden-Württemberg	74.3	74.3	3.2%	30	0
31	Bayern	69.0	73.7	-0.1%	31	0
32	British Columbia	68.6	68.6	3.2%	32	0
33	Hong Kong	63.7	63.7	3.2%	33	0
34	South East	61.9	55.3	9.2%	35	1
35	Uusimaa (suuralue)	60.6	56.6	6.8%	34	-1
36	Kanagawa	43.9	42.3	5.2%	36	0
37	London	41.4	41.5	3.1%	37	0
38	Singapore	33.6	32.2	5.4%	38	0
39	Eastern	29.6	27.5	7.1%	39	0
40	Luxembourg	12.3	12.5	2.6%	40	0

Table 2.18: Index of Secure Servers per Capita

Rank	Region	Index of Secure Servers	Rank 2001	Change in Rank
1	US	257.8	1	0
2	Australia	168.5	2	0
3	Canada	162.4	3	0
4	Switzerland	157.8	4	0
5	Luxembourg	119.3	5	0
6	Finland	115.4	8	2
7	Sweden	113.1	6	-1
8	UK	112.4	7	-1
9	Singapore	99.3	15	6
10	Austria	93.1	10	0
11	Norway	91.6	9	-2
12	Denmark	83.9	11	-1
13	Germany	70.8	12	-1
14	Netherlands	58.5	13	-1
15	Japan	35.4	16	1
16	Belgium	32.3	14	-2
17	France	28.5	17	0
18	China	0.0	18	0

Table 2.19: Index of Internet Hosts per Capita

Rank	Region	Index of Internet Hosts	Rank 2001	Change in Rank
1	US	280.4	1	0
2	Finland	188.0	2	0
3	Canada	186.5	3	0
4	Sweden	181.6	5	1
5	Norway	133.0	4	-1
6	Netherlands	121.2	6	0
7	Denmark	100.9	9	2
8	Australia	92.7	8	0
9	Austria	86.3	12	3
10	Switzerland	75.6	11	1
11	UK	71.3	13	2
12	Belgium	61.2	14	2
13	Germany	51.7	16	3
14	Japan	49.4	15	1
15	Luxembourg	47.1	17	2
16	Singapore	45.0	10	-6
17	France	28.1	18	1
18	China	0.1	7	-11

3. SUB-REGIONAL ANALYSIS OF SOUTH EAST ENGLAND'S KNOWLEDGE ECONOMY

3.1. This chapter benchmarks the local knowledge economies within South East England. This benchmarking analysis has been undertaken at the level of the eleven Economic Partnerships within South East England. This required the building and aggregating of some data from local authority boundary levels. The eleven Economic Partnerships consist of:

- Thames Valley Economic Partnership (incorporating the local authorities of West Berkshire, Reading, Wokingham, Windsor and Maidenhead, Bracknell Forest and Slough).
- West Sussex Economic Forum.
- Buckinghamshire Economic Partnership.
- Surrey Economic Partnership.
- East Sussex Economic Partnership.
- Isle of Wight Partnership.
- Milton Keynes Economic Partnership.
- Oxfordshire Economic Partnership.
- Kent Economic Forum (includes Medway Towns).
- Hampshire Economic Partnership (incorporating the local authorities of Hampshire, Southampton and Portsmouth).
- Brighton and Hove Regeneration Partnership.

3.2. The benchmarking draws together eleven indicators available at the local level that are appropriate measures of the core concepts representing the model of the regional knowledge economy established within the analytical framework. The core concepts consist of: (1) knowledge capital – the capacity for creating new ideas; (2) innovation capacity – the capacity for transforming new ideas into commercial values; (3) knowledge sustainability – the conditions for knowledge reinvestment; (4) knowledge economy outputs; and (5) knowledge economy outcomes. The eleven indicators consist of the following:

- **Economic Activity** – percentage of economically active individuals.
- **Unemployment** - ILO unemployment rates.
- **Gross Domestic Product** – GDP per capita.
- **Earnings** – Average gross weekly full-time earnings.
- **Business Density** – Number of business per capita.
- **Knowledge-based Businesses** – Proportion of businesses operating in knowledge-based defined sectors.
- **Knowledge Workers** – Proportion of managerial, professional and technically occupied workers within the employed workforce.

- **Research and Development and Higher Education Workers** – Proportion of the workforce employed in higher education and R&D establishments.
- **Productivity** – Proportion of domestic product per employee.
- **Compulsory Educational Attainment** – Percentage of pupils in last year of compulsory schooling with 5 or more A*-Cs at GCSEs.
- **Advanced Educational Attainment** – Average A/AS level points score.

3.3. The representation of this data for analysis consists of: (1) the creation of a series of indices for each of the individual factors; (2) an index of the overall knowledge economy within each locality; and (3) two indices produced through factor analysis that highlight the key conditions underlying knowledge-based growth and development, and their relative strength within each Economic Partnership area. The following sections analyse these findings. In each case the indices have been calculated from a base of the UK as a whole equating to a score of 100. The tables illustrate the changes in both index score and rank between this 2003 and the original 2001 report.

KNOWLEDGE CAPITAL

3.4. Knowledge capital – or the capacity to generate new ideas – has been analysed through an assessment of three core variables. Firstly, levels of economic participation as measured by the economic activity rate. Second, the proportion of employees situated within higher education and research and development establishments. Finally, the proportion of knowledge workers, measured by the proportion of managerial, professional and technically occupied workers within the employed workforce.

3.5. Table 3.1 represents the index of economic activity across South East England, and indicates Milton Keynes EP remains top of the index despite a fall of 1.5%, while Oxfordshire remains in second despite also recording a fall of 0.4%. These falls reflect the possibility of a labour shortage existing in these sub-regions when economic activity remains so high. Indeed, skills shortages are also a key issue, both for the South East as a whole and at a sub-regional level. Both Buckinghamshire and Surrey record 1.5% rises, whilst Brighton and the Isle of Wight continue to struggle and are now well below the national average with the agriculture and manufacturing sectors facing further decline.

Table 3.1: Index of Economic Activity within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Economic Activity 2003	Rank 2001	Economic Activity 2001	Change in Index Score	Change in Rank
1	Milton Keynes EP	108.9	1	110.4	-1.5	0
2	Oxfordshire EP	108.5	2	108.9	-0.4	0
3	Surrey EP	108.4	3	106.9	1.5	0
4	Buckinghamshire EP	107.3	6	105.8	1.5	2
5	Thames Valley EP	107.2	4	106.8	0.4	-1
6	West Sussex EP	106.6	8	105.0	1.6	2
7	East Sussex EP	106.0	5	106.4	-0.4	-2
8	Hampshire EP	105.2	7	105.1	0.1	-1
9	Kent EP	104.9	10	103.7	1.2	1
10	Isle of Wight EP	97.7	11	102.2	-4.5	1
11	Brighton and Hove EP	97.3	9	104.4	-7.1	-2
	South East	106.0		105.7	0.3	
	UK	100.0		100.0		

3.6. Table 3.2 illustrates the index of employment in higher education and research and development. Not surprisingly, Oxfordshire stands clear of the other sub-regions with a rating over three times the UK average at 323.2, and this despite falling back 43.9 points since 2001. Brighton and Hove posted the largest fall of 46.9 but remains in second position in the index with a score of 171.1. Thames Valley climbs 3 positions in the rankings, whilst Milton Keynes falls back 3, dropping to 73.2, well below the UK average and indicating a major decline in research employment in the area. The lack of higher education institutions in West Sussex and the Isle of Wight accounts for their very poor ratings, the Isle of Wight propping up the index with a score of just 7.6.

Table 3.2: Index of Employment in Higher Education and Research & Development within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Employment in HE & R&D 2003	Rank 2001	Employment in HE & R&D 2001	Change in Index Score	Change in Rank
1	Oxfordshire EP	323.2	1	367.1	-43.9	0
2	Brighton and Hove EP	171.1	2	218.0	-46.9	0
3	Thames Valley EP	133.6	3	128.5	5.1	0
4	Surrey EP	116.6	7	105.8	10.8	3
5	Hampshire EP	116.1	4	118.9	-2.8	-1
6	Kent EP	88.1	8	86.9	1.2	2
7	Buckinghamshire EP	81.2	5	113.3	-32.1	-2
8	East Sussex EP	74.6	9	78.3	-3.7	1
9	Milton Keynes EP	73.2	6	112.5	-39.3	-3
10	West Sussex EP	38.9	10	38.7	0.2	0
11	Isle of Wight EP	7.6	11	4.9	2.7	0
	South East	118.8		125.2	-6.4	
	UK	100.0		100.0		

3.7. Table 3.3 illustrates the index of knowledge workers, and highlights that Surrey EP has climbed to the top of the index with a rating of 137.6, and is one of only 3 sub-regions to record a growth in knowledge workers since 2001. The other two are Milton Keynes and the Isle of Wight, which have increased by 7.1 and 11 points respectively. Buckinghamshire, which headed the index in 2001 fell back 12 points to 122 and is now ranked fourth across the South East. The biggest loss in knowledge-based workers since 2001 was recorded in Kent, which drops to the bottom of the rankings at 91.1. These losses across most of the sub-regions of the South East reflect the slight decline in knowledge-based businesses (as shown later) and suggest that the sub-regions are not reaching their full potential, as most have high knowledge-based human capital potential.

Table 3.3: Index of Knowledge Workers within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Knowledge Workers 2003	Rank 2001	Knowledge Workers 2001	Change in Index Score	Change in Rank
1	Surrey EP	137.6	2	131.8	5.8	1
2	Brighton and Hove EP	124.6	4	124.8	-0.2	2
3	Thames Valley EP	122.6	3	126.1	-3.5	0
4	Buckinghamshire EP	122.0	1	134.1	-12.1	-3
5	Oxfordshire EP	116.8	5	122.8	-6.0	0
6	Milton Keynes EP	109.0	10	101.9	7.1	4
7	Hampshire EP	107.3	7	114.6	-7.3	0
8	West Sussex EP	101.7	6	118.1	-16.4	-2
9	East Sussex EP	96.3	9	111.3	-15.0	0
10	Isle of Wight EP	95.6	11	84.6	11.0	1
11	Kent EP	91.1	8	114.1	-23.0	-3
	South East	111.0		121.8	-10.8	
	UK	100.0		100.0		

INNOVATION CAPACITY

3.8. Innovation capacity – or the capacity for transforming new ideas to commercial values - has been measured by analysing the business strength of an area, in terms of the actual levels of businesses operating within an area – business density – and the number of these firms situated within knowledge-based sectors. We are obviously aware that innovation capacity may equally exist within more traditional sectors. However, in this case we consider that the mass of knowledge-sectored firms within an area does provide an interesting measure of the potential capacity to undertake innovation. These knowledge-based sectors have been drawn from the current Standard Industrial Classification (not the best means of identifying such firms, but currently the only accessible framework) and consist of:

- Pharmaceuticals
- Office machinery and computers
- Aerospace
- Precision instruments
- Electrical/Electronic engineering
- Telecommunications
- Financial intermediation, except insurance and pension funding
- Insurance and pension funding, except compulsory social security
- Activities auxiliary to financial intermediation
- Computer & related activities
- R&D
- Other business activities
- Motion picture and video activities
- Radio & television activities.

3.9. The index of business density, as shown by Table 3.4, sees Buckinghamshire remain out in front with a rating of 160.0, almost twice that of the lowest performing sub-region (Isle of Wight). Buckinghamshire's excellent communication links and accessibility to key UK and global markets as well as the availability of venture capital means that it is the most successful sub-region in the South East which itself is at a level well above the national average. At the other end of the scale Brighton and Hove and the Isle of Wight both record falls which highlights the lack of infrastructure for business support and retention within these sub-regions.

3.10. Surrey heads the index of knowledge-based businesses – Table 3.5 - with a rating of 146.6, marginally ahead of Thames Valley, which has fallen back by 8.9 points since 2001. Elsewhere, there have been no major fluctuations

in the index since 2001, with 8 out of the 11 sub-regions containing more knowledge-based businesses than the UK average, despite a slight decline or general stagnation in percentage terms. Milton Keynes, Buckinghamshire and Hampshire continue to perform strongly, whilst at the other end of the index, the Isle of Wight slips back slightly with a score of 58.1.

Table 3.4: Index of Business Density within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Business Density 2003	Rank 2001	Business Density 2001	Change in Index Score	Change in Rank
1	Buckinghamshire EP	160.0	1	158.9	1.1	0
2	Surrey EP	144.2	2	143.3	0.9	0
3	Thames Valley EP	127.7	3	128.3	-0.6	0
4	Oxfordshire EP	127.3	4	119.6	7.7	0
5	West Sussex EP	112.6	5	109.0	3.6	0
6	Milton Keynes EP	110.7	7	106.1	4.6	1
7	East Sussex EP	104.8	6	107.1	-2.3	-1
8	Hampshire EP	99.3	8	98.6	0.7	0
9	Kent EP	96.1	9	95.2	0.9	0
10	Brighton and Hove EP	87.4	10	91.1	-3.7	0
11	Isle of Wight EP	84.4	11	89.0	-4.6	0
	South East	114.5		113.4	1.1	
	UK	100.0		100.0		

Table 3.5: Index of Knowledge-Based Business within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Knowledge Businesses 2003	Rank 2001	Knowledge Businesses 2001	Change in Index Score	Change in Rank
1	Surrey EP	146.6	2	148.3	-1.7	1
2	Thames Valley EP	145.3	1	154.2	-8.9	-1
3	Milton Keynes EP	141.9	3	141.9	0.0	0
4	Buckinghamshire EP	135.4	4	137.4	-2.0	0
5	Hampshire EP	123.2	5	121.7	1.5	0
6	Brighton and Hove EP	120.4	6	119.8	0.6	0
7	West Sussex EP	116.5	7	116.9	-0.4	0
8	Oxfordshire EP	110.7	8	111.5	-0.8	0
9	East Sussex EP	92.5	10	92.7	-0.2	1
10	Kent EP	91.2	9	93.0	-1.8	-1
11	Isle of Wight EP	58.1	11	59.9	-1.8	0
	South East	121.2		122.8	-1.6	
	UK	100.0		100.0		

KNOWLEDGE ECONOMY OUTPUTS

3.11. Knowledge economy outputs are measured by labour productivity and GDP per capita. Table 3.6 shows that Thames Valley remains comfortably at number one in the productivity index with a 5.4% growth level. The index is most notable for the 16.8% fall suffered by Milton Keynes. Over one-half of

the South East's sub-regions scored under the UK average in terms of productivity, and this remains the major concern for the South East's economy. Sectors such as financial services remain concentrations of high productivity, but the other service and distribution sectors struggle to match this.

Table 3.6: Index of Productivity within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Productivity 2003	Rank 2001	Productivity 2001	Change in Index Score	Change in Rank
1	Thames Valley EP	136.1	1	130.7	5.4	0
2	Milton Keynes EP	112.3	2	129.1	-16.8	0
3	Surrey EP	111.0	3	114.0	-3.0	0
4	West Sussex EP	103.2	4	104.5	-1.3	0
5	Hampshire EP	100.8	5	102.1	-1.3	0
6	Buckinghamshire EP	99.2	6	97.5	1.7	0
7	Oxfordshire EP	94.3	7	97.0	-2.7	0
8	Kent EP	88.2	8	90.2	-2.0	0
9	Brighton and Hove EP	74.0	9	77.9	-3.9	0
10	Isle of Wight EP	71.7	10	75.9	-4.2	0
11	East Sussex EP	65.2	11	67.3	-2.1	0
	South East	100.2		101.8	-1.6	
	UK	100.0		100.0		

3.12. Similarly, Thames Valley remains by some way at number one in the index of GDP per capita at 152.4 (Table 3.7). None of the sub-regions have changed positions since 2001 although Milton Keynes and the Isle of Wight fell by 3.3 and 2.9 respectively. Most of the sub-regions in the South East are well above the national average although the Isle of Wight and East Sussex remain below the national average, again highlighting the disparities between sub-regions across the South East as a whole.

Table 3.7: Index of GDP per Capita within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	GDP per Capita 2003	Rank 2001	GDP per Capita 2001	Change in Index Score	Change in Rank
1	Thames Valley EP	152.4	1	151.0	1.4	0
2	Milton Keynes EP	136.7	2	140.0	-3.3	0
3	Surrey EP	128.0	3	127.0	1.0	0
4	Oxfordshire EP	113.8	4	111.0	2.8	0
5	Hampshire EP	111.5	5	111.0	0.5	0
6	Buckinghamshire EP	110.7	6	110.0	0.7	0
7	West Sussex EP	108.7	7	109.0	-0.3	0
8	Kent EP	92.7	8	93.0	-0.3	0
9	Brighton and Hove EP	84.0	9	81.0	3.0	0
10	Isle of Wight EP	64.1	10	67.0	-2.9	0
11	East Sussex EP	62.6	11	63.0	-0.4	0
	South East	109.9		109.0	0.9	
	UK	100.0		100.0		

KNOWLEDGE ECONOMY OUTCOMES

3.13. Knowledge economy outcomes are measured by levels of earnings and unemployment (reversed). The index of earnings shown by Table 3.8 illustrates that Surrey is ranked highest with a rating of 127.6 closely followed by Thames Valley with 125.9. In contrast East Sussex and the Isle of Wight have extremely low scores, both suffering falls to 80.1 and 74.8 respectively. These low scores indicate these sub-regions are still struggling to attract successful companies to the area and that employment remains largely centred around low-wage jobs in sectors such as agriculture and low-tech manufacturing.

Table 3.8: Index of Earnings within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Earnings 2003	Rank 2001	Earnings 2001	Change in Index Score	Change in Rank
1	Surrey EP	127.6	2	119.4	8.2	1
2	Thames Valley EP	125.9	1	124.5	1.4	-1
3	Buckinghamshire EP	112.8	3	117.1	-4.3	0
4	Milton Keynes EP	112.4	4	103.4	9.0	0
5	Oxfordshire EP	107.0	7	102.9	4.1	2
6	Hampshire EP	104.5	5	103.4	1.1	-1
7	West Sussex EP	96.5	6	103.0	-6.5	-1
8	Kent EP	92.5	8	95.9	-3.4	0
9	Brighton and Hove EP	92.0	10	88.4	3.6	1
10	East Sussex EP	80.1	9	89.0	-8.9	-1
11	Isle of Wight EP	74.8	11	81.0	-6.2	0
	South East	106.6		106.1	0.5	
	UK	100.0		100.0		

3.14. As shown by Table 3.9, Thames Valley EP heads the index of (reversed) unemployment with a rating of 103.1, despite a slight fall on the 2001 figures. Buckinghamshire rises 5 places to second on the back of a 0.9% increase. These two leading regions have, along with Surrey, kept their status as the main employment creating sub-regions in the South East, and remain well above the UK average. Most encouraging was the performance of the Isle of Wight which rose 4 points to 98.0 although it remains below the national average and points to continuing disparities across the region as a whole.

Table 3.9: Index of (Reversed) Unemployment within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Unemployment 2003	Rank 2001	Unemployment 2001	Change in Index Score	Change in Rank
1	Thames Valley EP	103.1	2	104.2	-1.1	1
2	Buckinghamshire EP	103.1	7	102.2	0.9	5
3	Surrey EP	103.1	3	103.8	-0.7	0
4	West Sussex EP	103.0	5	102.9	0.1	1
5	Oxfordshire EP	103.0	1	104.3	-1.3	-4
6	Hampshire EP	102.4	6	102.3	0.1	0
7	East Sussex EP	102.0	8	101.0	1.0	1
8	Milton Keynes EP	101.9	4	103.5	-1.6	-4
9	Kent EP	100.7	9	100.6	0.1	0
10	Brighton and Hove EP	99.2	10	98.4	0.8	0
11	Isle of Wight EP	98.0	11	94.0	4.0	0
	South East	102.1		102.3	-0.2	
	UK	100.0		100.0		

KNOWLEDGE SUSTAINABILITY

3.15. Knowledge sustainability – or the conditions for knowledge reinvestment – are measured by compulsory education attainment and Advanced level attainment. As shown by Table 3.10, Buckinghamshire continues to lead the rankings in the index of compulsory education with a rating of 127.3, this despite a slight fall of 1.7 since 2001. There are no changes to the rankings of the sub-regions, however Oxfordshire’s fall of 1.5% takes it below the UK average at 99.8. The Isle of Wight experienced the largest drop since 2001, losing 5.1 points to a score of 89.2. Despite remaining at the bottom of the index, Milton Keynes stands out as the only sub-region to improve its performance since 2001, rising slightly to 85.3. The gap between the best and worst performing sub-regions has narrowed since 2001, and yet the 42 point difference between Buckinghamshire and Milton Keynes still points to a considerable gulf in educational attainment across the South East.

3.16. As with the index of compulsory education, Buckinghamshire EP remains at number 1 in the rankings of index of Advanced level educational attainment at 115.2 (Table 3.11), despite being only one of two sub-regions to record a slight fall in A-Level attainment since 2001. However the most remarkable change occurred in Brighton and Hove, which posted a 27.1 point increase to rise from eleventh to second position in the South East rankings. Brighton and Hove EP now has a rating of 109.1, well above the UK average. Hampshire and Surrey also improved their levels of attainment to rise above the national average, as did the South East region as a whole.

Table 3.10: Index of Compulsory Education Attainment within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	5 or more A-Cs at GCSE 2003	Rank 2001	5 or more A-Cs at GCSE 2001	Change in Index Score	Change in Rank
1	Buckinghamshire EP	127.3	1	129.0	-1.7	0
2	Surrey EP	116.9	2	119.7	-2.8	0
3	West Sussex EP	110.4	3	113.5	-3.1	0
4	Thames Valley EP	109.1	4	109.7	-0.6	0
5	Kent EP	103.9	5	105.8	-1.9	0
6	Hampshire EP	102.4	6	103.6	-1.2	0
7	East Sussex EP	101.0	7	104.9	-3.9	0
8	Oxfordshire EP	99.8	8	101.3	-1.5	0
9	Isle of Wight EP	89.2	9	94.3	-5.1	0
10	Brighton and Hove EP	86.7	10	89.0	-2.3	0
11	Milton Keynes EP	85.3	11	83.5	1.8	0
	South East	106.0		108.2	-2.2	
	UK	100.0		100.0		

Table 3.11: Index of Advanced Level Education Attainment within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Advanced Level Educational Attainment 2003	Rank 2001	Advanced Level Educational Attainment 2001	Change in Index Score	Change in Rank
1	Buckinghamshire EP	115.2	1	116.9	-1.7	0
2	Brighton and Hove EP	109.1	11	82.0	27.1	9
3	Kent EP	104.8	2	102.6	2.2	-1
4	Hampshire EP	104.7	4	99.9	4.8	0
5	Surrey EP	103.0	5	98.9	4.1	0
6	Thames Valley EP	100.8	3	100.1	0.7	-3
7	West Sussex EP	97.6	7	91.6	6.0	0
8	East Sussex EP	96.3	10	88.8	7.5	2
9	Milton Keynes EP	95.1	9	89.3	5.8	0
10	Oxfordshire EP	93.9	8	90.4	3.5	-2
11	Isle of Wight EP	93.3	6	94.9	-1.6	-5
	South East	103.0		100.0	3.0	
	UK	100.0		100.0		

SOUTH EAST ENGLAND'S SUB-REGIONAL KNOWLEDGE ECONOMY INDEX

3.17. Table 3.12 illustrates the overall Index of the Knowledge Economy within South East England, and indicates that Surrey has risen one place to the top of the Index, with a score of 126.2 - a 4.8% increase. Surrey, Buckinghamshire and Thames Valley all record increases suggesting that the growth of a knowledge economy is continuing in these sub-regions. However, the picture at the end of the index shows the huge gulf between the knowledge economy powerhouses of Surrey, Bucks and Thames Valley and the poor performing sub-regions of East Sussex and the Isle of Wight. These sub-regions record

falls in their index scores, displaying a lack of the necessary economic conditions and institutional infrastructure within which the knowledge economy can thrive.

Table 3.12: Index of the Knowledge Economy within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Knowledge Economy Index 2003	Rank 2001	Knowledge Economy Index 2001	Change in Index Score	Change in Rank
1	Surrey EP	126.2	2	121.5	4.8	1
2	Buckinghamshire EP	124.8	3	120.7	4.1	1
3	Thames Valley EP	124.0	1	121.8	2.2	-2
4	Oxfordshire EP	113.1	4	116.2	-3.2	0
5	Milton Keynes EP	111.4	5	110.4	1.1	0
6	West Sussex EP	109.5	6	108.8	0.7	0
7	Hampshire EP	109.4	7	108.5	0.9	0
8	Kent EP	100.5	8	103.2	-2.7	0
9	Brighton and Hove EP	97.2	9	102.9	-5.7	0
10	East Sussex EP	97.0	10	100.4	-3.4	0
11	Isle of Wight EP	82.3	11	85.8	-3.5	0
	South East	111.4		111.7	-0.2	
	UK	100.0		100.0		

3.18. The above table gives a clear indication, for the first time, of the overall knowledge economy trajectories of the various sub-regions of South East England. For instance, we can that in relative terms, whilst Surrey has improved its relative position, the Thames Valley has suffered during the current economic conditions. As in the 2001 report, we look at the indices for the two key factor conditions underlying the composition of the composite knowledge economy index: (1) business conditions and (2) human capital conditions.

BUSINESS CONDITIONS

3.19. Although Thames Valley remains top of the index of business conditions for knowledge-based growth with a rise of 4.4%, this is lower than the increase of 6.2% recorded for Surrey – Table 3.13. The top three regions of Surrey, Buckinghamshire and Thames Valley again demonstrate that they have the best business conditions in the South East for establishing knowledge-based growth. Business density is an important factor for the creation of knowledge-based agglomerations. At the other end of the scale the Isle of Wight and East Sussex continue to slide, well below the national average, with a lack of business density plus low skill levels resulting in these two sub-regions continuing to struggle.

HUMAN CAPITAL CONDITIONS

3.20. As shown by Table 3.14, Surrey tops the index of human capital conditions – displacing Buckingham - with a rating of 128.0, rising 8.5%. Thames Valley records a similar rise, while Buckinghamshire is now ranked 2nd after a rise of only 1.8%. These three regions scored highly in terms of knowledge based workers and in terms of compulsory education, creating the right environment for suitably qualified human capital. All three regions also scored highly in the index of earnings, indicating that they have the capacity to attract highly qualified workers from across the South East and beyond. Most of the South East's sub-regions scored strongly in this index and were above the UK average indicating that the region as a whole has the human capital potential to sustain its knowledge growth.

Table 3.13: Index of Business Conditions for Knowledge-Based Growth within the Economic Partnership Areas of South East England

Rank 2003	Economic Partnership Area	Business Conditions 2003	Rank 2001	Business Conditions 2001	Change in Index Score	Change in Rank
1	Thames Valley EP	126.4	1	122.0	4.4	0
2	Surrey EP	123.3	2	117.1	6.2	0
3	Buckinghamshire EP	115.7	4	112.9	2.8	1
4	Milton Keynes EP	115.6	3	115.8	-0.2	-1
5	Oxfordshire EP	111.2	5	109.4	1.8	0
6	Hampshire EP	107.9	6	106.6	1.3	0
7	West Sussex EP	106.8	7	106.3	0.5	0
8	Kent EP	96.9	8	99.3	-2.4	0
9	Brighton and Hove EP	95.7	9	95.7	0.0	0
10	East Sussex EP	90.4	10	93.1	-2.7	0
11	Isle of Wight EP	81.0	11	84.9	-3.9	0
	South East	109.0		100.8	8.2	
	UK	100.0		100.0		

Table 3.14: Index of Human Conditions for Knowledge-Based Growth within the Economic Partnership Areas of South East England

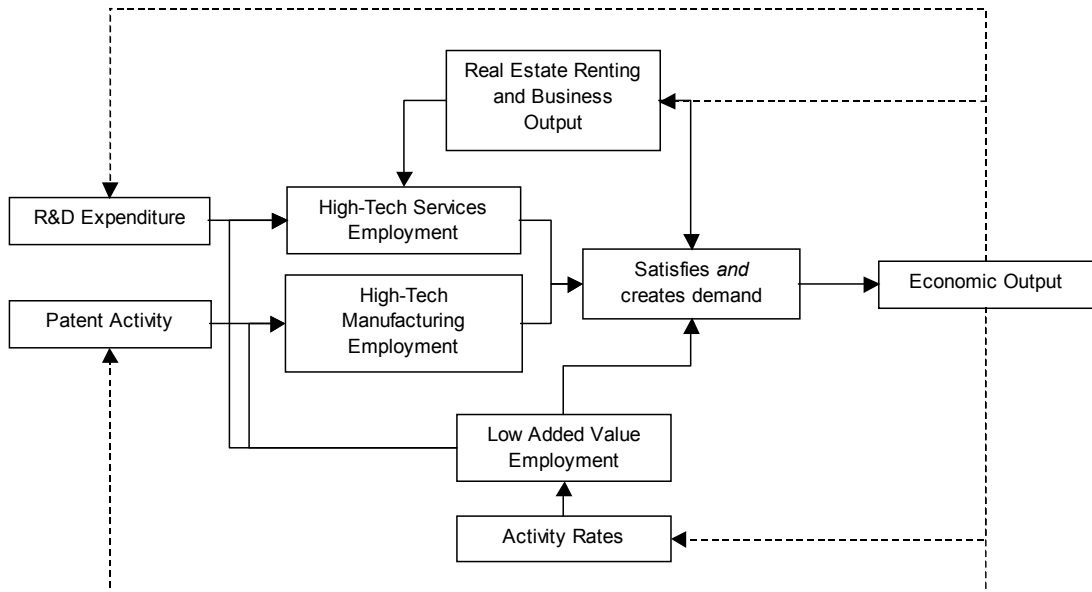
Rank 2003	Economic Partnership Area	Human Capital Conditions 2003	Rank 2001	Human Capital Conditions 2001	Change in Index Score	Change in Rank
1	Surrey EP	128.0	2	119.5	8.5	1
2	Buckinghamshire EP	127.6	1	125.8	1.8	-1
3	Thames Valley EP	125.0	3	116.6	8.4	0
4	Oxfordshire EP	117.7	6	104.6	13.1	2
5	West Sussex EP	114.3	4	106.9	7.4	-1
6	Milton Keynes EP	113.3	8	99.3	14.0	2
7	Hampshire EP	111.0	5	104.8	6.2	-2
8	Kent EP	103.3	7	102.2	1.1	-1
9	East Sussex EP	103.0	9	98.6	4.4	0
10	Brighton and Hove EP	92.6	10	93.7	-1.1	0
11	Isle of Wight EP	82.8	11	87.7	-4.9	0
	South East	113.7		108.7	5.0	
	UK	100.0		100.0		

4. THE ECONOMIC FUTURE OF SOUTH EAST ENGLAND: A EUROPEAN KNOWLEDGE ECONOMY MODEL

- 4.1. This section focuses on analysing the future economic prospects of South East England utilising a new form of econometric forecasting. The *European Knowledge Futures* model developed by Robert Huggins Associates is based on our analysis that knowledge-based activities are leading the way in terms of mapping the future performance of nations and regions. However, due to data compatibility the model has initially been developed for Europe's nations and regions – therefore the analysis in this section draws upon the European high-performing regions contained in the global benchmarking undertaken in Chapter 2.
- 4.2. It is clear that regions with high levels of employment within knowledge-based sectors tend to have high-income levels, and it is this knowledge-based high value-added activity that distinguishes one European region from another. It is our consideration that traditional economic growth models are becoming less relevant as the importance of the knowledge residual within the output growth of economies continues to rise. Also, as the level of economic interaction between both regions and nations continues to rise, it is becoming increasingly difficult to use national, and more specifically macroeconomic, data to analyse future changes across Europe's economy.
- 4.3. The *European Knowledge Futures* model differs from other national and regional economic forecasting models in that it is rooted within an analysis of the relationship between endogenous knowledge-based factors and economic returns. These key knowledge-based factors include: corporate and public investment in research and development activities; innovation as measured by patent activities; and employment within both knowledge-based manufacturing and service sectors. In other words, the model represents a bottom-up approach to forecasting regional and national economic growth, as opposed to many existing models that make extrapolations from economic data at a more macro geographic-level. The key factor linkages within the model are illustrated by Figure 4.1, which can be summarised as follows:
- Activity within knowledge-based sectors, measured by employment within high-technology manufacturing and services sectors.
 - Levels of employment in these sectors are measured through predicted growth in patenting and R&D investment.
 - Activity within the business services sector is included in the model as it is found to have a significant relationship with overall output at the regional level.

- Also, past levels of output serve as an input as it drives the investment in R&D, patenting and other knowledge-based activities.

Figure 4.1: Summary of the *European Knowledge Futures Model*



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4.4. Operationalising the model for Europe’s high-performing regions allows us to establish GDP per capita forecasts up to 2010, as shown by Tables 4.1 and 4.2. In summary, these forecasts suggest the following:

- Brussels is forecast to stay in the top position throughout the 2000-2010 period, despite a 5% forecast fall in its index.
- The second, third and fourth ranked regions, Luxembourg, Hamburg and Île de France are also forecast to maintain the same rankings over the period.
- There will be more movement further down the rankings:
 - The forecasts predict that Stockholm, London, Hessen, Norway, Switzerland, Ostösterreich and Denmark will all fall within the rankings.
 - Uusimaa, Bayern, West-Nederland, Baden-Württemberg, the South East, Zuid-Nederland and Eastern are all expected to gain higher rankings.
- The South East, along with the Eastern region, are expected to make significant gains, with both regions forecast to rise 8 places.

Table 4.1: Forecast Change in GDP per Capita across Europe's High-Performing Regions– European Average = 100

	GDP per Capita 2000	GDP per Capita Rank (2000)	GDP per Capita 2010	GDP per Capita Rank (2010)	% Change in Index	Change in Rank
Brussels, Belgium	215.3	1	204	1	-5%	0
Luxembourg	193.2	2	203.9	2	6%	0
Hamburg, Germany	179.5	3	176.2	3	-2%	0
Île de France, France	156.6	4	162.3	4	4%	0
Stockholm, Sweden	145.5	5	143.4	6	-1%	-1
London, UK	145.4	6	136.2	7	-6%	-1
Uusimaa, Finland	141.6	7	153	5	8%	2
Hessen, Germany	128	8	111.8	14	-13%	-6
Norway	127.6	9	115.9	12	-9%	-3
Switzerland	123.4	10	106.3	16	-14%	-6
Bayern, Germany	122.6	11	119.6	9	-2%	2
West-Nederland, Netherlands	122.1	12	118.7	11	-3%	1
Ostösterreich, Austria	121.8	13	99.2	18	-19%	-5
Baden-Württemberg, Germany	120.7	14	112.8	13	-7%	1
Denmark	117.3	15	104.4	17	-11%	-2
South East, UK	109.4	16	128.6	8	18%	8
Zuid-Nederland, Netherlands	104.8	17	111.3	15	6%	2
Eastern, UK	102.8	18	119.5	10	16%	8
Berlin, Germany	94.6	19	87	19	-8%	0

Table 4.2: Year-by-Year Forecast Change in GDP per Capita across Europe's High-Performing Regions– European Average = 100

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Brussels, Belgium	215.3	215	214.2	213.4	212.4	211.2	209.9	208.5	207.1	205.5	204
Luxembourg	193.2	197.5	200.9	203.5	205.3	206.5	206.9	206.8	206.2	205.2	203.9
Hamburg, Germany	179.5	178.7	178.1	177.6	177.2	177	176.8	176.7	176.6	176.4	176.2
Île de France, France	156.6	157.2	157.8	158.4	159.1	159.7	160.4	161	161.5	161.9	162.3
Stockholm, Sweden	145.5	146.6	147.7	148.4	148.8	148.8	148.5	147.7	146.6	145.2	143.4
London, UK	145.4	144.3	143.3	142	140.8	139.5	138.4	137.5	136.8	136.3	136.2
Uusimaa, Finland	141.6	142.6	143.9	144.9	145.9	146.9	148	149.1	150.3	151.6	153
Hessen, Germany	128	126.8	125.5	124.1	122.7	121.1	119.4	117.7	115.8	113.8	111.8
Norway	127.6	125.5	123.4	121.6	120	118.7	117.7	116.9	116.3	116	115.9
Switzerland	123.4	123.8	123.4	122.5	121.1	119.2	117	114.5	111.9	109.1	106.3
Bayern, Germany	122.6	122.4	122.3	122.2	122	121.8	121.6	121.3	120.8	120.3	119.6
West-Nederland, Netherlands	122.1	123.1	123.8	124	123.9	123.5	122.9	122	121	119.9	118.7
Ostösterreich, Austria	121.8	120.5	118.9	117	114.9	112.5	110	107.4	104.7	101.9	99.2
Baden-Württemberg, Germany	120.7	120.1	119.5	119	118.4	117.7	117	116.1	115.2	114.1	112.8
Denmark	117.3	116.6	115.9	114.9	113.9	112.6	111.2	109.7	108	106.3	104.4
South East, UK	109.4	110.1	111.1	112.4	114	115.9	118	120.3	122.9	125.7	128.6
Zuid-Nederland, Netherlands	104.8	106.2	107.3	108.4	109.2	109.9	110.5	110.9	111.1	111.3	111.3
Eastern, UK	102.8	103.3	104.1	105.2	106.5	108.1	109.9	112	114.3	116.8	119.5
Berlin, Germany	94.6	93.9	93.2	92.6	92	91.4	90.8	90.1	89.2	88.2	87.0

4.5. Using the model to establish GDP per capita forecasts up to 2010 for the UK's regions yields the results captured in Table 4.3. In summary, the forecasts suggest:

- London will stay in the top position throughout the 2000-2010 period, despite a forecast 6% fall in its index.
- The second and third ranked regions, the South East and Eastern are also forecast to maintain the same rankings over the period.
- The South East is forecast to witness the most significant increase in its index value, rising 18% over the period.
- There will be more movement in the middle of the rankings:
 - The forecasts predict that Scotland, the East Midlands and Yorkshire and the Humber will all fall within the rankings.
 - The West Midlands, the South West and the North West are all expected to gain higher rankings.
- Wales, Northern Ireland and the North East are expected to stay in the same positions at the bottom of the index.

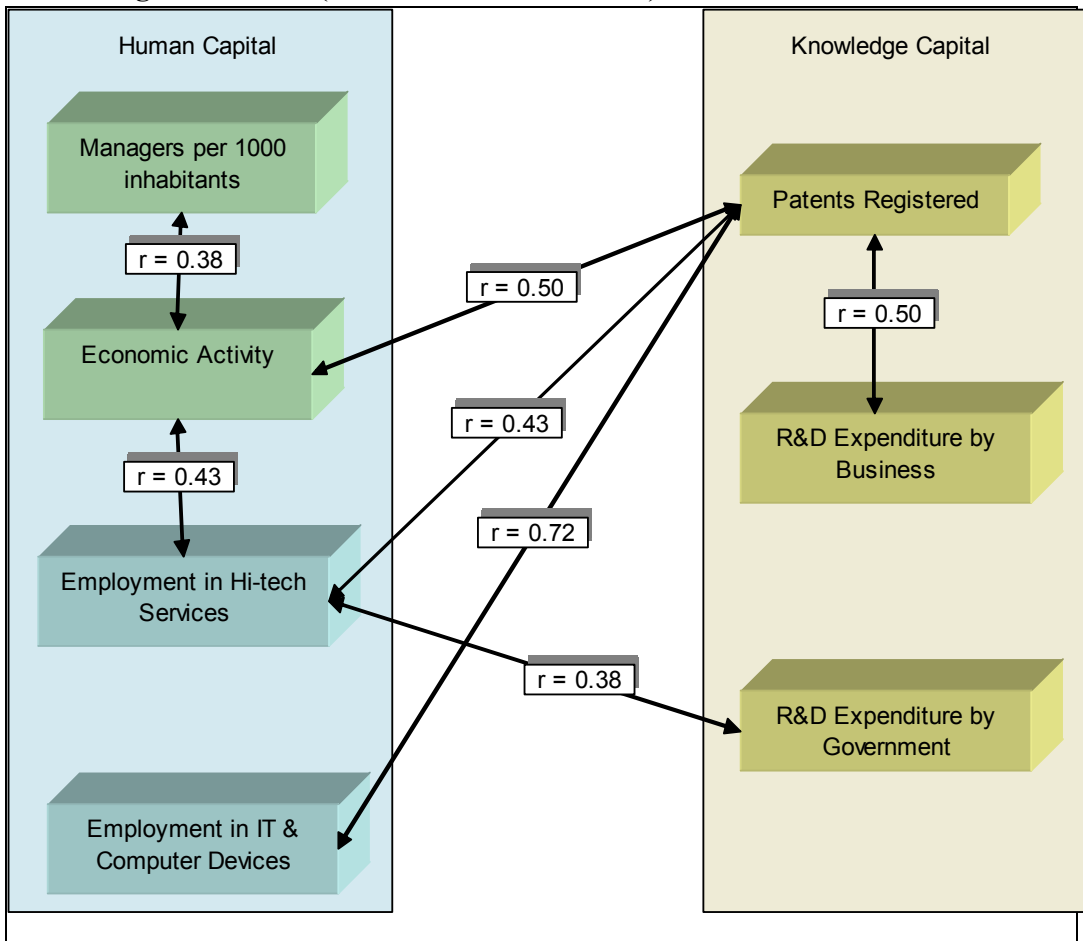
Table 4.3: Forecast Change in GDP per Capita across the UK's Regions—European Average = 100

Region	GDP per Capita 2000	GDP per Capita Rank (2000)	GDP per Capita 2010	GDP per Capita Rank (2010)	% Change in Index	Change in Rank
London, UK	145.4	1	136.2	1	-6%	0
South East, UK	109.4	2	128.6	2	18%	0
Eastern, UK	102.8	3	119.5	3	16%	0
Scotland, UK	96.2	4	94.6	7	-2%	-3
East Midlands, UK	92.8	5	100.1	6	8%	-1
West Midlands, UK	91	6	100.5	5	10%	1
South West, UK	90	7	101.7	4	13%	3
Yorkshire and The Humber, UK	87.2	8	86.6	9	-1%	-1
North West, UK	86.2	9	91.2	8	6%	1
Wales, UK	79.7	10	78.4	10	-2%	0
Northern Ireland, UK	76.9	11	76.8	11	0%	0
North East, UK	76.6	12	73.9	12	-3%	0

5. CONCLUSIONS: KNOWLEDGE ECONOMY DRIVERS IN HIGH-PERFORMING REGIONS

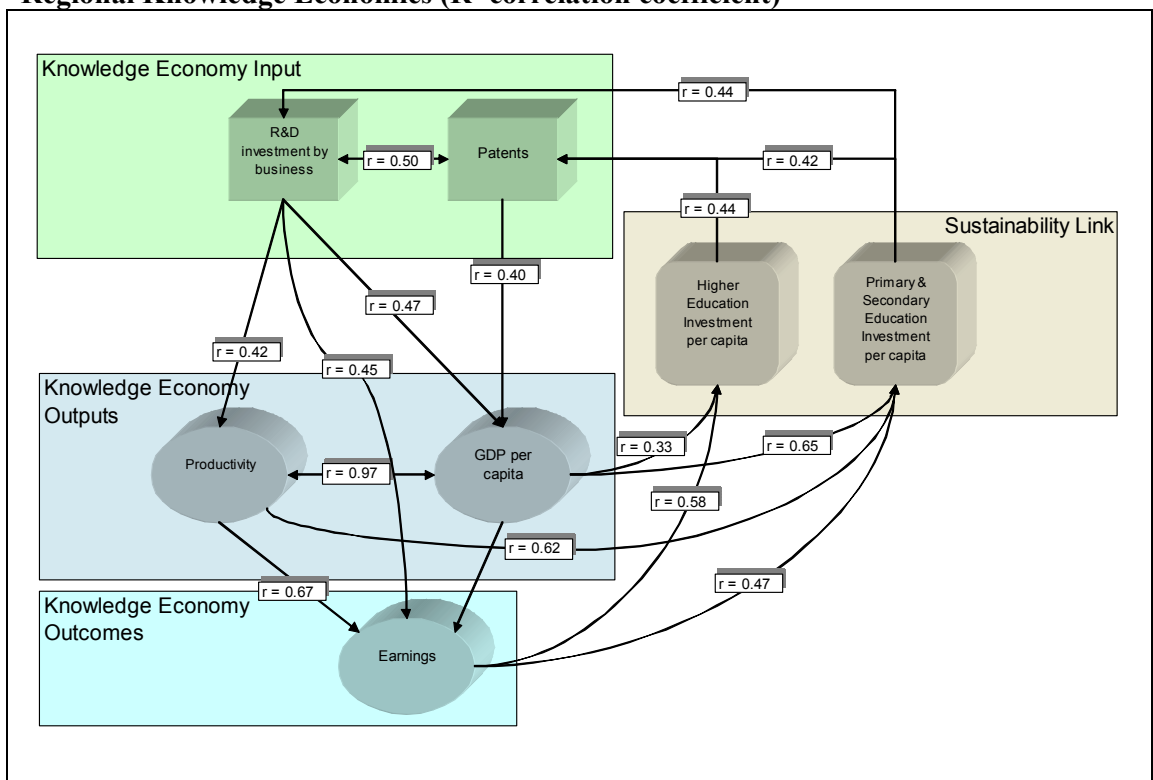
5.1. Figure 5.1 illustrates the relationship between human capital inputs and knowledge capital. Interestingly, the number of patents registered every year is highly correlated with employment in the two most innovative sectors: IT and High-Technology Services. This proves that despite the bursting of the IT bubble, these sectors are still the most dynamic sectors in the process of knowledge creation. Not surprisingly, R&D expenditure by business has a strong connection to the number of patents. However, we have found no significant link between government R&D expenditure and patents - government funded research tends to be fundamental research which is not easily transferred into commercial products. In addition, business funded R&D, by and large, plays a more important role than government R&D among the 40 regions benchmarked in Chapter 2.

Figure 5.1: Human Capital and Knowledge Capital in High-Performing Regional Knowledge Economies (R=correlation coefficient)



5.2. Figure 5.2 shows the significant correlation between input, output and sustainability factors. Among all the input factors, R&D expenditure by business and patents seem to have most direct effect on knowledge economy outputs, while human capital only demonstrates its importance by its interaction with knowledge capital. In particular, R&D expenditure by business has strong links with all three output or outcome indicators, namely, productivity, GDP per capita, and earnings, with correlation coefficient rates of 0.42, 0.47 and 0.45 respectively in the benchmarked economies. Not surprisingly, the three output and outcome factors - productivity, GDP per capita, and earnings - are strongly correlated with each other.

Figure 5.2: Input, Output and Sustainability Factors in High-Performing Regional Knowledge Economies (R=correlation coefficient)

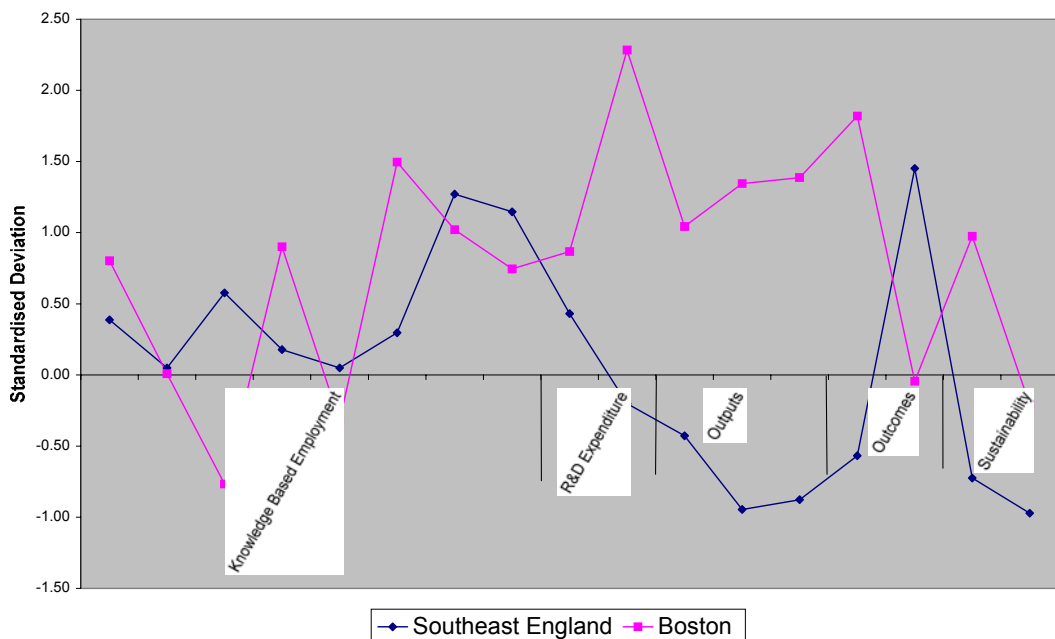


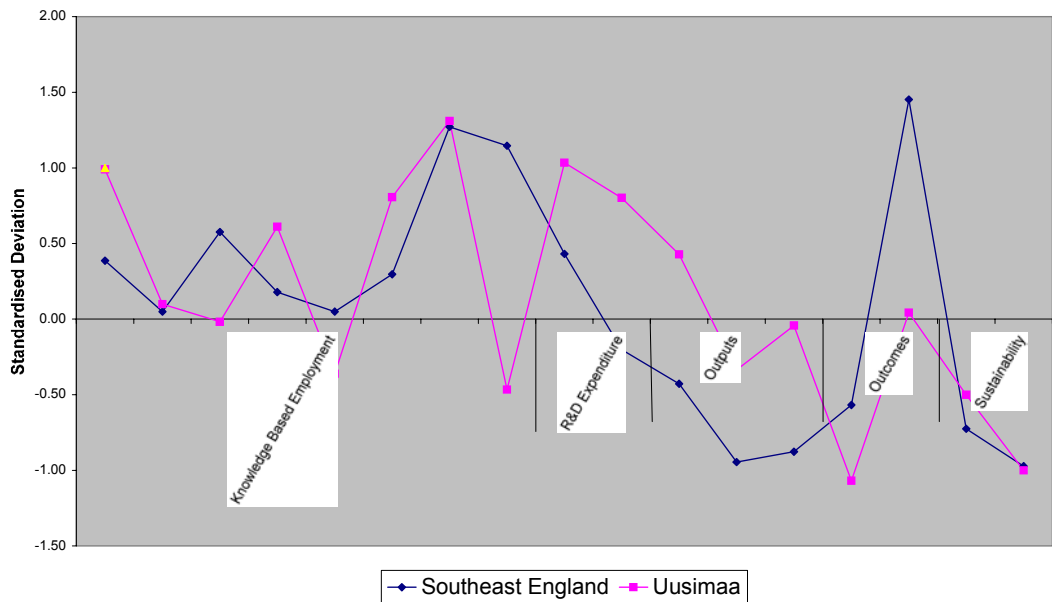
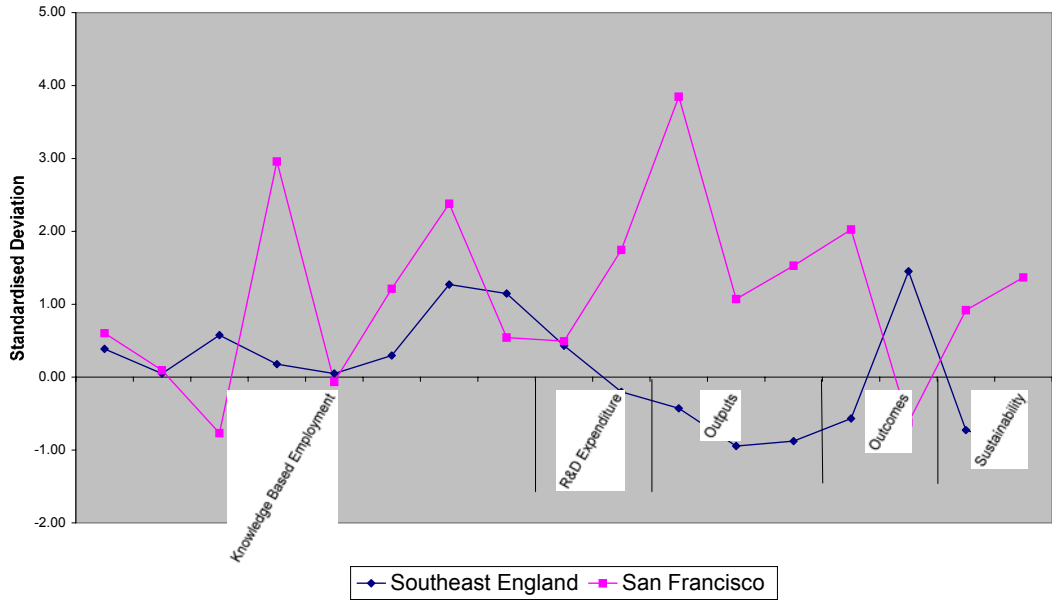
5.3. Figure 5.3 provides a comparison of the South East and its four US and European counterparts: Boston; San Francisco; Uusimaa and Stockholm. The points above the X-axis represent variables that are higher than the 40 regions' mean average, and vice versa. The key findings are:

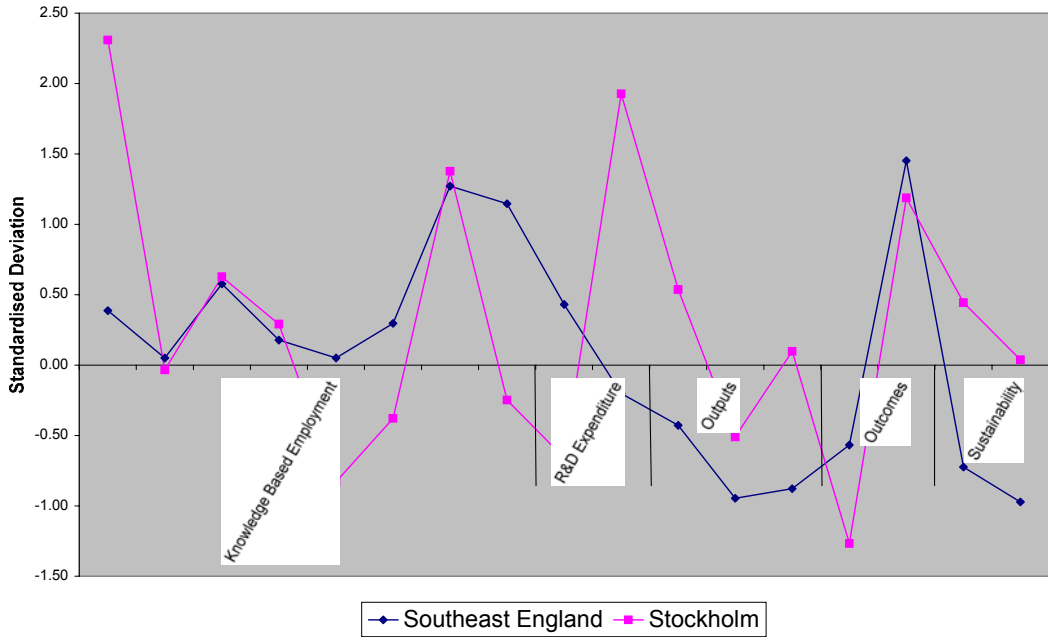
- The South East is very strong in terms of knowledge economy inputs. In fact, nine out of its ten input factors score higher than the average.
- Among these, some factors are particularly strong, such as employment in biotechnology and chemicals, employment in high-technology services and managers per thousand inhabitants.

- The only input factor that is below the average is R&D expenditure by business, in which the South East scores -0.2.
- The South East lags considerably behind its counterparts in terms of outputs such as patents, GDP per capita and productivity, despite its strong inputs.
- Boston and San Francisco are predominant in employment in IT and computer manufacturing, instrumentation and electrical machinery, and R&D expenditure by business. Consequently, significantly outperforming the South East in all outputs.
- Uusimaa and Stockholm to input less human capital than the South East while generating significantly higher outputs.
- The South East contributes relatively less investment in both primary and secondary education and higher education, which may harm its knowledge economy sustainability.

Figure 5.3: Comparing South East England with other high performing regions







5.4. The above emphasises the main weaknesses of the South East’s economy, namely its current inability to transform strong knowledge economy inputs into economic outputs, as well as having weak investment levels in knowledge economy sustainability.

5.5. Another relative weakness to be noted is the level of business investment in R&D. The other four regions have one factor in common: strong R&D investment by business. From our findings it can be strongly argued that R&D investment by business is the most direct and effective input factor into the knowledge economy.

5.6. Relatively low levels of education and training investment mean that labour productivity is affected, and the sustainability of the economy is weakened.

5.7. Figure 5.4 indicates the positive relationship between productivity growth and GDP per capita growth in the benchmarked regions. It shows that in general productivity growth accounts for the GDP growth in the 40 high-performing regions. The South East outperforms London in terms of both productivity growth and GDP growth. However, it is seen to generate slightly lower growth in productivity than Eastern England. All three UK regions are at medium performance level as far as the majority of 40 regions are concerned.

Figure 5.4: The relationship between Productivity Growth and GDP per capita Growth

