Regional Industrial Research Report 41

The Index of Knowledge Economies in the European Union: Performance Rankings of Cities and Regions

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Summary

This report conducts for the first time an analysis of the city and regional distribution of the 'Knowledge Economy' in the European Union. Developing the research methodology whereby, in a previous report, we showed major disparities in 'knowledge economy indices' in Britain, re-analysis of data published by the EU statistical division *Eurostat* shows similar major disparities between north and south in the EU. Specifically, the top twenty 'Knowledge Economies' in Europe are accounted for by Sweden (seven locales), the UK (six locales), Germany (2 locales), Belgium (2 locales), France and Italy (1 each). By contrast the bottom twenty consist of Greece (12 locales), Portugal (4 locales) and Spain (4 locales). Since it is widely argued that knowledge economies hold the secret of future economic growth potential, it is clear that northern, especially Swedish and UK settings are absolutely advantaged in this respect, while southern European (EU 'Cohesion Fund') regions and cities are lagging well behind. Thus the EU's top knowledge economy performer, Stockholm, displays an index number (EU = 100) of 169.5 that is nearly five times that of the lowest performer, Notio Aigiao (Southern Aegean Islands) at 36.7. The definition of 'knowledge economy' follows that officially adopted by the OECD in 1999 as share of high technology manufacturing and 'knowledge-intensive services' in total employment. These results have serious implications for the future growth and economic integration of the EU's cities and regions and policy requires adjusting in anticipation of demands for new rounds of support for areas seeking to play a fuller part in the industrial activities of the future.

1. Introduction

It is increasingly widely-accepted that we have entered the 'Knowledge Economy' and that this is different from the 'Information Age' because it refers to specific assets that consist in knowledge 'how to', 'who to' and 'what to' deploy to create value. It is an active economic practice rather than a passive information space, upon which it nevertheless depends, but in ways that express value through the scarcity of 'knowledgeable' expertise. Manuel Castells (1996) speaks of the knowledge economy being one in which productivity derives from the interaction of knowledge upon knowledge rather than upon raw materials. Nonetheless, it is wrong to dismiss traditional or 'old economy' economic activity as not belonging to the knowledge economy, as for example the OECD does. Rather we can also usefully speak of 'pure' and 'applied' knowledge economy activity; the first captured in genomics, software and, for example, 'futures' or derivatives trading in financial services, or conceptual art. The second is in many other sectors that conduct or use R&D even though it is applied to, for example, food production, fashion design, or fire insurance.

A key reason for believing that a significant shift has occurred taking us into a Knowledge Economy is that data suggest this to be true. Thus the book value of intangible assets compared to raw materials has shifted from 20:80 in the 1950s to 70:30 in the 1990s. It is now routine (and controversial) for firms to include the value of such intangibles as 'Goodwill' in their balance sheets (Dunning, 2000). A dot.com business recently had to reduce its balance sheet asset value by $30 billion because of the downturn in the value of the sector's 'Goodwill' compared to during the boom. Goodwill in those times was associated fundamentally with being seen as inhabiting a knowledge-intensive sector of the economy. We have seen many other firms in the 'knowledge' or 'new economy' sectors having to reduce their book value because of the over-valuation of such intangibles as perceived from the bottom of the growth curve as distinct from the top.

One contributory reason why General Electric grew so fast under Jack Welch in the 1990s is because through its Six Sigma programme it successfully measured and entered into company accounts the contribution made to productivity by knowledge compared to the old measure – new equipment. The value of 'Brands' is also routinely accounted for; as of course is Intellectual Property like patents, copyrights and licences. Some of this was informally recognised in the past; now it contributes to the bottom line.

The Knowledge Economy, even more than the Information Society (where there is still much discussion about 'digital divides' in the possession of the means of *consumption* to enable full participation) is uneven in its geographical incidence. Cities on average are twice as advantaged by their knowledge intensity over towns and rural areas compared to their already existing advantages from agglomeration economies. Thus if a city scores 50% above the mean in GDP per capita it is likely to score 100% above it in terms of its knowledge-based industry. Knowledge poverty is thus a new kind of disadvantage, different from Digital Divides in access to information, and causing much more regional imbalance accordingly. Even poor parts of a large city like London score above the country's mean for possession of knowledge-based employment opportunity, whereas peripheral areas score below half (Cooke, Clifton & Huggins, 2001). Thus there is more chance of knowledge economy employment in the city than the country, a major contributory factor in the renewed migration of young people from rural to urban areas in many economies.

This report builds on the earlier one just cited, which concentrated on the Knowledge Economy as defined by the OECD to include high technology manufacturing and knowledge-intensive services employment shares for the UK alone. In this report a similar exercise is conducted for the whole of the European Union. However, it is important to make one *caveat* regarding definitions. In the OECD (1999) work the automotive industry was excluded from the definition of 'high technology manufacturing'. This could be subject to justifiable criticism given the increasing knowledge-intensivity of many key components and systems of modern land transportation equipment. Certainly semiconductors, computers, software and the like are standard components of contemporary vehicles of all kinds. In a study of the, admittedly advanced, motor sports segment of the industry Henry & Pinch (1998) showed that motor racing vehicles habitually embody aerospace technologies and take such technology transfers as active suspension, aerodynamics, carbon fibre, construction composites, computerised telemetry, fly-by-wire throttle control and aerodynamic spoilers as standard. Some of these have entered or will do so before long into standard vehicle production (Cooke, 2002). The OECD defines aerospace as a high technology manufacturing industry. In partial recognition of the changed nature of the automotive industry, but also unquestionably for political reasons too, the EU likes to include automotives in the 'Knowledge Economy'. It echoes Europe's technological competitive advantage against the US, in particular, in this older industry, compensating for the latter's superiority in newer sectors like information (but not

communication) technologies. Thus, while we do not wish to be seen pandering to the English comedian Vic Reeves' observation that 96.3% of statistical evidence is 'made up', we think it essential to explain the politics and even ideologies that may underlie apparently prosaic information such as that just discussed.

In what follows we shall say rather more about the nature of the so-called 'Knowledge Economy' before discussing the methods and results of the analysis of published *Eurostat* data, stressing the originality of our interrogation of that data. As it stands the *Regions: Statistical Yearbook 2001* report (CEC, 2001) is a useful document providing a panoply of indicators of geographical variation in economic indicators. However, it neither goes the extra step in combining indicators of 'high tech manufacturing' and 'knowledge-intensive services' to give a 'knowledge economies' portrayal, nor do its maps facilitate inspection of the fine grain local variation embedded in the statistics that have been mobilised to generate them. To its credit, though, the report includes as EXCEL databases on CD-ROM raw data for NUTS 2 regions (the lowest workable level) for both 'high tech manufacturing' and 'knowledge-intensive services'. NUTS 2 is represented by Spanish, French and Italian regions, for example, and UK county groups like Berkshire-Buckinghamshire-Oxfordshire, East Anglia or East Wales. These are not simply random concoctions but can have relevance either to economic geography (Berkshire-Buckinghamshire-Oxfordshire is a reasonable proxy for the 'M4 Corridor') or meaning in terms of administrative boundaries and economic policy (thus East Wales has both, correct territorially and also the area <u>not</u> in receipt of EU Objective 1 Structural Funds, thus economically significant as possessing a higher GDP than that of its Structural Funds beneficiary Welsh sister-region of West Wales & the Valleys, designated as such because of falling below 75% of EU GDP). It is clear that the V.Reeves problem hovers just over the horizon throughout an exercise of this kind. Nevertheless, data such as those to be discussed have power in that business and policy perceptions with often profound implications rest upon their apprehension and interpretation. In this case the databases used are publicly available to be re-analysed by anyone, and every effort is made to be clear methodologically about how they have been assembled and cognitively about what they signify. On this basis, the last section of the report draws out what to us seem to be the key implications both of what is observed for high performing and less accomplished locales and what policy measures would be relevant to assisting markets and governments to give a better chance for the less favoured areas to improve.

To flag up one obvious conclusion that the data on the top and bottom rankings reveal: just as in the UK analysis, some key features of which are included for comparison, places that score highly tend to contain, be privileged parts of, or be wholly composed of capital cities that are also leading national or international media and financial centres or major automotive or ICT engineering/manufacturing cities or regions. The lower scoring places on the knowledge economy index are possessed of beautiful land and seascapes, they are frequently islands, and all are rural and tourism-inclined and relatively remote from the aforementioned dynamo cities. They are without exception warm or hot temperature locales while the 'successes' (from a knowledge economy perspective) are universally cool-temperate (even in Italy). This is not meant to be an exercise in environmental determinism, otherwise how could the 'knowledge economy' success of California be explained? Rather it draws attention to the apparent neglect of the importance of 'knowledge economy' economic activity by both local and supralocal decision-makers in rural and insular tourism areas. There is scope for markets and policies to act in anticipation of this position, but it is incumbent on both to do so in ways that do not transgress sustainability norms in the narrow (environmental, resource-based) sense, but that enhance sustainability in the broad sense (sustainable economic, social, cultural as well as environmental).

2. What, If Anything Is the 'Knowledge Economy'?

It is important to say straightforwardly that the deployment of knowledge in economic affairs is not a new thing. Making a fire is clearly a knowledgeable and, in the deep past, powerful, knowledge-based skill, as the Prometheus myth testifies. Hunting, farming, smelting copper, bronze and iron, later steel are knowledge-based activities. In turn these knowledges became the basis for science and its application in early industrial technology. From coal-mining grew coal tar production, the origin of the German dyestuffs industry whose aniline products led to branching into pharmacology, the (re-) discovery by the Bayer corporation of Aspirin and the birth of modern pharmaceuticals. This industry is now shifting from its synthetic chemistry origins into post-genomics and other variants of molecular biology and the science-based biotechnologies of the future.

In the process, this gives us a clue about the possible core differences between the contemporary and future knowledge economy compared to the era when Aspirin was first marketed, which is often referred to as the 'Industrial Age'. In the Industrial Age, industry was

centrally concerned with the recovery from nature of raw materials that could be processed into usable products like textiles, steel, ships, drugs and so on. To a large extent the sources for these natural resources determined the location of industrial activity. Thus Bayer is located at Leverkusen, across the Rhine from Cologne with its established university training and research skills, and a short train ride from the Ruhr coalfields. The location was thus good for high-skilled labour recruitment and an ideal transhipment point for raw material inputs (coal tar and other coal-derived chemicals) and finished product outputs up or down the Rhine and via the extensive railway network centred in the Ruhr-Rhine region.

To stay with Aspirin for a while, when Bayer chemists first processed it industrially, it was thought to be best marketed as a fever treatment, not a painkiller since it had shown in trials some success in that regard. It was only by chance that patients later reported its effectiveness as a painkiller and this lead to refinement of its target market. Surprisingly, it was as late as the 1990s that its powers as a supplement with positive effects upon blood flow and value as a therapeutic in cardiac health were discovered. Even more recently certain negative effects upon young people have also been discovered for the tiny minority prone to Rea's disease, and its properties as a wonder drug have been slightly undermined. The reason for this diversion into the evolution of Aspirin and its uses is to emphasise the 'chance discovery' element that normally accompanied scientific and technological progress in the Industrial Age. Even though Bayer and other German chemicals companies pioneered the concept of the in-house central R&D laboratory, an idea taken up highly effectively by American corporations like Dupont, AT&T and General Electric, research was and remains expensive and somewhat 'hit-and-miss' under the chance discovery method.

In the knowledge economy, natural resources are no longer the key locational magnet they once were. Except that is for 'knowledge capital', the key input to modern economic activities involving high technology manufacturing and knowledge-intensive services. This is formed in universities that have greatly expanded their research capabilities in the latter years of the twentieth century and early years of the twenty-first. Massive flows of, principally, public research funding pass through elite research universities every year.

Institution	Rank (1994)	Amount ($million)
Program Resources Inc., Reston VA	1	$98.0
Westat Inc., Rockville, MD	2	$50.0
Adv. Biosc. Lab Inc, Kensington, MD	3	$30.6
U. of Alabama, Birmingham, AL	4	$16.2
Research Triangle Institute, RTC Park, NC	5	$15.1
Johns Hopkins U., Baltimore, MD	6	$14.6
ROW Sciences Inc, Rockville, MD	7	$14.5
Harvard U., Cambridge, MA	8	$13.2
Southern Research institute, Birmingham, AL	9	$12.9
U. of Texas Health Science Centre, Houston, TX	10	$11.3

Table 1: Top Ten National Institutes of Health Funded Institutions, 1994
Source National Institutes of Health

Rank	**Institution**	**Funding 2000**
1	Johns Hopkins University	$419.3 million
2	University of Pennsylvania	$321.2 million
3	University of Washington	$302.5 million
4	U. of California, San Francisco	$295.2 million
5	Washington U., St Louis	$279.5 million
6	University of Michigan	$260.4 million
7	Harvard University	$250.4 million
8	UCLA	$243.5 million
9	Yale University	$242.7 million
10	Columbia University	$226.6 million

Table 2: Top Ten National Institutes of Health Funded Research Institutions, 2000
Source: National Institutes of Health

An indication of the scale of health research funding allocated to leading US university research centres and medical schools, and an indication of how much more dominant universities became over private research firms between 1994 and 2000 is shown in Tables 1 & 2 above.

Three key things are of profound importance in the comparison of these results over a brief six-year period. First the scale of funding increased more than fourfold, such that the leader in 1994 received $98 million while by 2000 it was $419 million. More significantly, the tenth highest recipient won $11 million in 1994 against $221 million in 2000, evidence of a greater deepening of the funding throughout the health research system. This reflects the shift that occurred in US research funding priorities during the Clinton regime from defence expenditure

and away from ‘The Crusade Against Communism’ towards health research expenditure and ‘The Crusade Against Cancer’.

The second striking feature of the two tables is the relative absence of elite university medical schools from the 1994 list (with the two exceptions of relatively lowly placed Johns Hopkins and Harvard) and their total dominance by 2000. Five of the lead recipients in 1994 were private companies, either conducting research or sub-contracting to other firms or institutions (possibly including universities). By 2000 their role had been completely effaced from the top ten, and Johns Hopkins had gained first place while Birmingham, Alabama had lost its two research institute entrants. Harvard retained its moderate position in the top ten but increased its budget for its efforts from $13 million to $250 million. Many of the large State and Ivy League universities had vaulted into the upper echelons by 2000.

Finally, it is noticeable how the ‘system’ of NIH allocations and successful applicants had changed over the brief period. It seems to have moved from a set-up in which research grant seeking firms located on the NIH doorstep near Bethesda, Maryland (e.g. Rockville, Kensington, Reston) and Southern research institutions like those in Birmingham, Alabama; Houston, Texas; and Raleigh-Durham, North Carolina benefited, probably through lobbying and/or the so-called ‘pork-barrel’ and ‘log-rolling’ system of Washington D.C. politics. With massively increased budgets and a more professional, entrepreneurial approach from universities with serious ambitions and capabilities regarding the new bioscientific and biotechnological approaches to medicine that followed the ‘molecular biology revolution’ set in train from about 1992 (Orsenigo et al., 2001; Henderson et al., 1999) elite universities dispersed from East to West Coasts now scooped the pool. Only Johns Hopkins and Harvard of ‘the old boys’ retained their top ten NIH allocations membership. ‘Rational drug design’ with genetic sequencing and high throughput screening has become common.

While statistics such as these are less readily available for Europe, research conducted under contract to the EU showed that EU life sciences funding was running at around half the level of that in the US during a comparable period. That is some $10 billion compared to $20 billion annually. By 2003 the Bush administration’s budget appropriation for NIH was $27.3 billion. In 2000 the UK spent some £3.3billion on university research, of which roughly one third (including Wellcome Trust funding, uniquely targeted at life sciences and medical research) went to life sciences. Germany spent around $1 billion at the same time. Hence, including the

rest of the EU member-states a rough total of $10 billion was reached by Senker and Van Zwanenberg (2001). This is largely spent in universities. The other main source of R&D funding in the health/biosciences segment of the knowledge economy is large pharmaceuticals firms, who spent in 2001 a total of $28 billion worldwide. According to EU statistics about $10 billion of this was spent in the EU in the late 1990s (CEC, 1997). A substantial portion of private (Business R&D, or BERD) pharmaceuticals R&D expenditure is now spent in universities and smaller dedicated biotechnology firms (DBFs), and though the overall division between intramural and extramural pharmaceuticals BERD is presently unknown., it seems to have remained constant in the UK through the 1990s at some £700 million.

This detour through life sciences to try and specify the nature of the knowledge economy in relation to earlier stages in the development of economic activity now reaches its last step. Modern biosciences, and more specifically biotechnology, was born when venture capitalist Robert Swanson convinced recombinant DNA bioscientist Robert Boyer that biotechnology knowledge was a new kind of information theory/technology, as a part consequence of which Genentech, the first such firm, was set up. Software, encryption, de-coding and encoding in data voice and imagery – all can be seen as part of a digital value chain, to which at the point when Swanson and Boyer met in the early 1970s, biotechnology was added. By 2000, the Human Genome had been decoded as a 30 million entry genetic code transmittable globally on the World Wide Web. As information then, such data are at the heart of knowledge economy transactions. They are their own 'raw material'. They are not 'natural resources'. And working upon them adds value almost as Leadbeater (1999) puts it from 'thin air' or as Alan Greenspan referred to such sectors, 'sources of light GDP'.

In software, code is written for a purpose, to engage in the control of some process ranging from a PC operating system to the logistical control of traffic in a large airport or harbour. In multimedia digitised content is manipulated to recreate extinct reptile species. Archive material is digitised for translocation into a contemporary film or video-streaming exercise. In genetics the code is researched, a mutant gene is identified, its chemical composition is analysed at the molecular level and an inhibiting molecule to correct the deficiency is identified or even in some cases synthesised as a new entity. The key value-adding element in all these examples is knowledge. Knowledge takes three forms; there is *exploration* knowledge of the kind described above as occurring in R&D. Then there is *examination* knowledge by which trials, testing and development or refinement are conducted. And then there is *exploitation* knowledge that takes

the discovery or invention to market as a commercial innovation. Here scientific and technological skills interact intimately with legal, management accounting, consultancy and venture capital skills coming together for the project in hand.

This concatenation of distinctive skills explains why sectors such as those exemplified operate in industry clusters, gathered around research (classically biotech and ICT) or client organisations (as in media, for example) often in cities. They do this to access knowledge of different types, like the 3E's listed but also because of three basic conditions, which enable firms to thrive. We may call these the 3 I's – *intelligence* (from *exploration* knowledge), *insurance* (from *examination* knowledge), and *investment* (from *exploitation* knowledge). At the intersection of the three E's and three I's crucial business transactions occur between entrepreneurs and scientists or client commissioners, but also there are perceived to be localised *knowledge spillovers.* These give firms three kinds of *spillover* or possible 'free rider' advantage. The first is *anticipatory* 'a glimpse into the future' or foresight. The second is *participatory* - firms can engage in the value creating process because 'forewarned is forearmed'. The third is *precipitatory* – whereby foresighted and forearmed firms may get in early to precipitate action and 'make it happen'. This analysis is summarised in Fig. 1 below.

Fig.1: Varieties of Knowledge Spillover in Knowledge Economy Value Chains

Processes / **Knowledge**	***Intelligence***	***Insurance***	***Investment***
Exploration	***Anticipation Spillovers*** (e.g. 'foresight')	***(Ethics)***	***(R&D, patents)***
Examination	**(*Trials/Tests)***	***Participation Spillovers*** (e.g. likely approvals)	***(Trial Leadership)***
Exploitation	***(Risk Assessment)***	**(*Syndication)***	***Precipitation Spillovers*** (e.g. funding rounds/IPO)

There now remains one key distinction to deal with before we leave this theoretical discussion of what constitutes the 'Knowledge Economy'. What has been focused on thus far are what we can call 'Pure Knowledge Economies'. As described, these are where knowledge works upon knowledge to create value, as it was put by Manuel Castells (1996). However, it would be a mistake to exclude from relevance to the Knowledge Economy, industries in which such knowledge was applied even though they themselves remain essentially 'Industrial Age' industries. Thus Australia exports A$10 billion worth of coal each year but it also exports A$2 billion of coal plant management software. Some of the software is produced in 'big, old'

mining companies, some in smaller dedicated software houses. It is unclear whether some of this output may not remain classified as coal and how much escapes statistically into the 'computer services and software category'. We are back in Vic Reeves territory. Alternatively, the food production process is ancient, even pre-industrial, but research has shown that R&D is used and in some cases developed in the food value chain. Smith (2000) found that up to thirty different stages of food production involved interaction with private, university or government research laboratories. So the food industry, like the coal industry is intimately involved in the Knowledge Economy, but in *knowledge applications* to improve the efficiency of their exploitation of natural resources. So if software and biotechnology may be referred to as Pure Knowledge Economy sectors, food and coal are examples of Applied Knowledge Economy sectors. They may embody aspects of pure knowledge economies but they are not fundamentally 'knowledge economy' industries but resource-based industries.

3. Where Is the European Knowledge Economy?

As was shown in the Introduction, official definitions of the Knowledge Economy incline towards the Pure Knowledge Economy type of definition, typically 'high technology manufacturing' and 'knowledge-intensive services'. Little has been said thus far about the largest component of the latter, which is advanced financial services. For key parts of current currency, equity and, especially, futures and options exchange this is highly appropriate. When Scholes, Black and Merton won the Nobel Prize foe Economics in 1997 it was for inventing the algorithm, adapted from early Chaos Theory (then known as turbulence theory, from hydraulics science), that enabled 'futures' to be predicted with far less uncertainty than hitherto. The fact that such innovation lay at the root of the demise of both Barings Bank in London and the firm Merton set up in Connecticut, *Long-Term Capital Management* should not blind us to the magnitude of their contribution to modern financial management or the calibre of the knowledge generation in which they engaged. Many workers in the sizeable financial services firms in leading cities owe their positions to top knowledge such as this. Naturally, not all of them can perform the differential calculus of turbulence that the top mathematical financial analysts can, so even more than software and biotechnology, the bulk of the workforce is engaged in knowledge application. Nevertheless financial services of these kinds are generally knowledge intensive and employ large numbers of graduates accordingly. Thus, statistically, this sector makes a large numerical contribution to the knowledge-intensive services component of the calculations conducted below. Otherwise such industries as

software, research, media and the varieties of high tech manufacturing make their smaller but nevertheless telling contributions.

One reason why they are telling is that the two sub-categories of high technology manufacturing and knowledge-intensive services do not naturally overlap geographically. Take Silicon Valley, which has 6,000 firms, most of which are in ICT, some of which are in biotechnology and a few of which are venture capitalists. It is essentially a high technology manufacturing cluster. As such it might be outweighed as a 'knowledge economy' by San Francisco, which has relatively less of the high tech manufacturing but lots of 'knowledge-intensive services'. However, in the data on European 'knowledge economies', the higher scorers tend to have relatively high incidences of both, although Inner London is something of an exception, dominated as it is by financial services and other knowledge-intensive services like software and media rather than high tech manufacturing. Outer London scores high for the reverse of this characteristic.

Before proceeding to the data and a discussion of their interpretation, drawing considerably on Table 4, which contrasts the top and bottom twenty, some words are necessary to explain the methodology. As hinted already, it is simple and fundamentally non-technical. The source data are found in the European Commission (2001) *Eurostat* report entitled *Regions: Statistical Yearbook 2001.* The accompanying CD-ROM provides the source data at NUTS 2 level (as described in this report's Introduction). This is provided for numerous regional indicators, but of interest here are the source data for 'high technology manufacturing' and knowledge-intensive services' employment shares of total employment by member state for the EU 15 as of 1998, the year for which the data are available. The sectors included are NACE Rev. 1 24 and 29 to 35. Knowledge-intensive Services are NACE Rev. 1 61, 62, 64-67, 70-74, 80, 85 and 92. These data were added for each NUTS region for which they existed. In the case of Greece, 'high tech manufacturing' was only provided at NUTS 3 level, the next one up in scale. So NUTS 2 level estimates were made based on NUTS 3 entries and added to the NUTS 2 level data for knowledge-intensive services (which are provided at NUTS 2 level). A comparable exercise was performed for the Algarve (Portugal) and Estremadura (Spain) regions, based on means taken from comparison with neighbouring regions. This completed the continental EU regional picture. No data were available for the insular EU (e.g. Madeira, Guadeloupe). Totals for each region (NUTS 2) were then normalised to an EU Mean. This was a sample mean taken from summing the upper and lower twenty scores and calculating the mean accordingly.

Finally the scores were normalised to an index where the mean was equal to 100 and each score was transformed into a percentage >100 or <100 that is represented in the tables that follow. In the report we use the sample mean approach to analyse the data because the data are more 'stretched' between end points in the distribution. The downside is that the mean is inflated by about 6 percentage pints. For readers who prefer to use the more compressed 'full mean index' the data are provided in the final column of Appendix 1.

As a partial check on the validity of this exercise comparison was made of these scores with those arising from an earlier exercise to calculate a Knowledge Economy index for the UK. The top and bottom ten are shown from a total long list of 145 localities (unitary local authorities), thus the spatial units are smaller than NUTS 2, but the calculation of shares of employment are comparable (drawn from UK national statistics for the censuses of employment) except that automotive engineering is excluded from this (UK) analysis (Table 3).

High	Index	Low	Index
Bracknell (SE)	202.6	Western Isles (S)	32.1
Wokingham (SE)	197.5	Orkney Isles (S)	35.6
W. London (SE)	182.1	Argyll/Bute (S)	38.7
Windsor (SE)	165.9	Shetland I. (S)	40.2
Surrey (SE)	157.3	Borders (S)	41.3
Reading (SE)	152.5	Anglesey (W)	41.5
Milton Keynes(SE)	148.9	Caerphilly (W)	41.9
UK	100.0	E. Ayrshire (S)	42.3

Table 3: Knowledge Economy Variations in UK, 1999

Immediately noticeable are the concentrations of knowledge economy localities in the M4 Corridor area of South East England, and that of lesser knowledge-intensive areas in remote parts of Scotland and to a lesser degree, Wales, where former coalfield localities also appear. These latter are typically areas that may find themselves in EU Structural Funds Objective 1 zones, defined by having a GDP close to or below (to qualify) the 75% of EU GDP level. A second noticeable feature is the large disparity at this localised level (municipalities and counties) between high and low index entrants. Thus Bracknell, at double the UK rate scores more than six times higher than Scotland's Western Isles in possession of the requisite knowledge economy sectors. As will become clear and has already been indicated for the

comparison of EU knowledge economies, many areas with low knowledge economy scores would score very highly on an index of landscape and cultural accomplishment. Exceptions might be older coalfields, although increasingly as they are cleaned up, they possess industrial archaeology and other attractions, though often lacking an appropriate visitor attraction infrastructure.

Moving to the EU scale, it is worth noting when considering the validity of the transfer of the UK-based methodology to the EU level that one entry (Surrey) produces a similar score in both exercises. This is despite the caveats regarding different scales upon which the data are inscribed (local authority cf. NUTS 2 regions), and the inclusion in EU 'high technology manufacturing' of automotive engineering, excluded in the UK analysis. It so happens that Surrey is relatively unaffected by the inclusion or exclusion of automotives.

High	Index	Low	Index
Stockholm (S)	169.5	Notio Aigaio (Gr)	36.7
London In. (UK)	166.8	Sterea Ellada (Gr)	38.4
West Sweden (S)	155.2	Peloponnissos (Gr)	43.9
Surrey & Sussex (UK)	153.6	Anat-Maked-Thraki (Gr)	46.4
Brabant Wallonie (BE)	152.4	Norte (P)	50.2
London O. (UK)	151.6	Dytiki Ellada (Gr)	50.9
Piemonte (I)	150.7	Kriti (Gr)	50.9
Ostra Mellan Sweden (S)	150.0	Centro (P)	51.1
Berkshire-Oxford (UK)	149.0	Dytiki Makedonia (Gr)	51.6
Bedford-Hertford (UK)	148.9	Alentejo (P)	53.8
Uusima (Helsinki) (Fi)	148.8	Ionia Nissia (Gr)	53.9
Ovre Norrland (S)	148.4	Algarve (P)	54.7
South Sweden (S)	148.1	Thessalia (Gr)	55.2
Mellan Norrland (S)	147.6	Ipeiros (Gr)	59.6
Brussels (BE)	145.0	Castilla la Mancha (ES)	60.6
Paris (F)	144.9	Voreio Aigaio (Gr)	62.3
Norra Mellan (S)	143.3	Kentriki Makedonia (Gr)	62.7
Hampshire (UK)	141.6	Murcia (ES)	64.1
Stuttgart (G)	141.1	Estremadura (ES)	64.9
West Midlands (UK)	140.1	Balearics (ES)	65.3
EU		100.0	

Table 4. Knowledge Economies Index Numbers, European Union, 1998

Hence, the main differences between Tables 3 and 4 in pure statistical terms are that the disparities are rather narrower almost certainly because the spatial units in the EU study are geographically larger. Thus Surrey is joined with Sussex (similarly untroubled by the automotive industry) in the EU tabulation. However the score and position of both is similar (at 4th and 153.6 of the EU mean) to that of Surrey alone (at 5th and 157.3 of the UK mean).

Examination of Table 4 (full results in Appendix 1) shows 'knowledge economy' accomplishment associated with:

- highly urbanised financial, media and technology capital cities (Stockholm, London, Helsinki, Brussels and Paris),
- their metropolitan fringes (Surrey-Sussex, Brabant-Wallonie, Berkshire-Oxford, Bedford-Hertford etc.),
- industrial and research regions and cities (Piemonte-[Turin], W. Sweden-[Gothenburg], Ostra Mellan-[Linköping], Ovre Norrland-{Umea-Lulea], S.Sweden-[Malmö-Lund], Stuttgart, and West Midlands). In many of these, such as Turin (FIAT), Gothenburg (Volvo), Linköping (Saab), W. Midlands (Rover, Peugeot) and Stuttgart (Mercedes, Porsche) the automotive industry has some influence.

However, even in Stuttgart where 'high tech manufacturing' provides 20.4% of the total workforce, 'knowledge-intensive services' are greater, at 48.8%. In Piemonte, the former is 13.9% and the latter 52.2%, while in the Swedish automotive cases the ratios are some 10-11% to 52-54%. Hence, services always account for a greater part of the overall score than industry. It is also the case that the last-named group of regional cities are known for having close research-industry links, usually involving university-industry missions, and good interaction with government industry agencies, in line with the so-called 'Triple Helix' concept of Leydesdorff & Etkowitz (1997).

Regarding the locales with low 'knowledge economy' indicators - in spite of their frequent scenic and touristic assets, which, however it must be noted are not such great GDP earners as those economic activities identified with 'knowledge economies', hence their frequent Structural Funds designations – they fall into three categories as well:

- remote island regions like Notio Aigaio (Dodecanese and Cyclades), Kriti (Crete), Voreio Aigaio (Lesvos/Samos), Balearics and Ionia Nissia (Ionian Islands) near international frontiers thus a substantial distance away from member state capital cities
- agricultural regions with urban, industrial main cities focused on traditional production related to exploitation of primary raw materials, such as Sterea Ellada (Corinth-Thebes), Anatolia-Makedonia-Thraki (Komotini - tobacco), Dytiki (Western) Macedonia (Kozani – leather, furs), Thessaly, Ipeiros, Central Macedonia (Thessaloniki – textiles), Norte (Braga – textiles, leather), Centro (Aveiro-Coimbra – ceramics, metallurgy), Alentejo (cork), Castilla y la Mancha (food) and Estremadura (food)
- tourism and agricultural regions on the mainland such as Peloponnese, Alentejo, Algarve, Thessaly, Epirus and Murcia

Thus the low 'knowledge economy' regions are universally engaged in sectors with lower productivity, innovation and gross value added, hence GDP. They are squarely in the Applied Knowledge Economy category to the extent science or technology play a part in economic activity, and knowledge-intensive services like software, research financial services and media are largely absent. Nevertheless, such regions frequently possess universities that may act as focal points for knowledge economy development. Moreover, there are arguments that could favour decentralisation or development of new research centres in food, oceanography, agricultural bioscience, textiles, design and tourism that would assist these economies to become more knowledge-intensive, albeit in traditional sectors. Interestingly, where a policy of establishing national research centres in a remote island setting was implemented with a view to evolving a 'local Silicon Valley' effect, namely Crete, this has had little evident effect in raising that island much above Thraki, near the Turkish frontier, in terms of its 'knowledge economy' index number (Crete 50.9, Thraki 46.4).

To complete this data analysis section, it is worth devoting a little space to interpretation of results for the next 20 regions beneath or above the ones just described. This is because, on the one hand, the second tier of accomplished 'knowledge economies' may aspire reasonably in some cases to displacing some of those above them, while, on the other, those more accomplished than the least high scorers may display characteristics their 'inferiors' might seek to emulate adapt or at least learn from. Table 5 displays these two 'middling' regional groupings. Key things to notice here are the much greater bunching of scores among quite

distinctive regions and cities as the mean is approached a step more closely. Moreover, in the EU comparative context, some cities or regions that might be thought of as less favoured, and indeed to have warranted that designation by receipt of Structural Funds Objective 1 status, nevertheless score relatively highly on the 'knowledge economy' index. An obvious case is the UK's Merseyside. Reflection on that positioning draws attention to the national factor at work to some extent, as many UK areas score relatively highly because of the greater 'post-industrial' character of most cities and indeed, much of the economy, compared to many other EU member-states. Nevertheless, Merseyside possesses long-established financial services, pharmaceuticals and (automotive) engineering activities that raise it rather higher than might be expected, compared particularly with its near-neighbour Greater Manchester. However, it is worth noting that the percentage point difference between the two is only approximately 6.

The entrants in the higher index part of Table 4 are mostly more urban and industrial, but with an emphasis on mid-size entrepreneurship in the non-metropolitan locations. Thus places like Småland in Sweden are in this category, as is Karlsruhe in Germany, Essex (UK) Gloucestershire-Wiltshire-N. Somerset in UK, Cheshire (UK) and Hereford-Worcester-Warwickshire (UK). Alternatively, some large cities , some restructuring, others quite buoyant

Region	Higher Index	Region	Lower Index
Merseyside (UK)	**138.5**	**Galicia (ES)**	**66.80**
Essex (UK)	**137.9**	**La Rioja (ES)**	**66.83**
Darmstadt (G)	**137.7**	**Asturias (ES)**	**66.85**
South West Scotland	**137.5**	**Valencia (ES)**	**71.9**
Karlsruhe (G)	**137.4**	**Andalucia (ES)**	**75.3**
Utrecht (NL)	**137.2**	**Puglia (I)**	**77.9**
Denmark	**137.1**	**Castilla y Leon (ES)**	**78.6**
Vlaams Brabant (BE)	**136.8**	**Umbria (I)**	**80.5**
Vienna (A)	**136.1**	**Trentino-Alt Ad. (I)**	**82.6**
East Scotland	**135.9**	**Basilicata (I)**	**82.7**
Smaland (S)	**135.7**	**Sardinia (I)**	**82.8**
Gloucs-Wilts-N. Somerset (UK)	**134.9**	**Burgenland (A)**	**83.3**
Berlin (G)	**134.6**	**Abruzzo (I)**	**83.4**
Cheshire (UK)	**134.4**	**Styria (A)**	**83.6**
Noord-Holland (NL)	**134.3**	**Marche (I)**	**83.7**
Hamburg (G)	**134.2**	**Lisbon (P)**	**83.9**
Oberbayern (G)	**133.1**	**Mecklenburg (G)**	**84.9**
Hereford-Worcs-Wr'ckshire (UK)	**132.9**	**Sicily (I)**	**85.0**
Northumb'lnd-Tyne & Wear (UK)	**132.8**	**Cantabria (ES)**	**85.7**
Greater Manchester	**132.4**	**Tuscany (I)**	**85.9**

Table 5. Mid-Upper and Lower EU Knowledge Economy Index Numbers, 1998

are to be found here. Thus Liverpool, Manchester, Newcastle, Glasgow, Edinburgh (all UK), Amsterdam and Utrecht (NL), Vienna (A), Berlin, Hamburg and Munich (G) are present. This signifies the importance, already drawn attention to, of cities as repositories of 'knowledge economy' activities.

By contrast, relatively few major cities are found in the part of Table 5 referring to mid-lower index number regions. The obvious exception is Lisbon, possibly Valencia, Cantabria (Santander), Palermo (Sicily) and Seville (Andalucia). But these are scarcely in the scale or tradition in manufacturing or services added value of even the lesser cities just discussed. They are mostly serving regional or in limited ways national markets rather than major export markets, for example. Elsewhere, the regions in this list are often pleasant, touristically attractive and well developed infrastructurally to absorb large numbers of visitors. Their cultural and gastronomic appeal is often internationally respected. Here are found such regions as Tuscany, Sicily, Marche, Sardinia, Trentino-Alto Adige, Umbria and Puglia in Italy. Also found in this segment are Galicia, La Rioja, Andalucia, Castilla y Leon and Cantabria in Spain – both sets of regions containing mountainous and coastal touristic areas and abundant facilities. Without labouring the obvious point at length, these regions are largely smaller-scale light industry, including classic 'industrial districts', high quality agricultural and viticultural, and touristic regions, many attracting more specialised and culturally oriented as well as mass tourism.

4. What Are Policy Implications Arising From the Knowledge Economy Analysis?

It will be clear that the data and analysis offered thus far raise many questions, possibly more than they answer. In simple terms, the 'knowledge economy' as defined officially by OECD and moderated not insignificantly in some cases by the EU's inclusion of automotive engineering, possibly justifiably, in the requisite statistical category, is an urban, even metropolitan or 'primate city' phenomenon on the one hand, and a regional 'high performance engineering' and related or complementary high value-added services city or region-wide phenomenon, on the other. By contrast, the lesser 'knowledge economy' regions are, at the extreme, remote, insular (i.e. often island in nature), rural, agricultural and above all, beautiful and touristic. When moving to the next categories of 'knowledge economy' it can be said that a milder version of those stylisations apply except the cities are less dynamic, industry tends to

be smaller, semi-rural in location on occasions, the agriculture is more up-market and viticultural, the tourism of a gentler, more rustic kind and involving mountain as well as coastal resorts.

If, as has been argued, the 'knowledge economy' is to be an important and growing part of the economic prosperity that will prevail in future as industry and services become, to varying degrees, more science-based and science-utilising, then it is probable that regional disparities between, crudely, the tourist regions and the 'knowledge economy' regions will multiply. The former will lose population, as many indicators show they already are, as young people especially migrate to knowledge economies for education and then stay there for subsequent employment. The latter will become more congested, over-priced for housing and ill-supplied with personnel to staff basic services like utilities, welfare and security. In policy terms, therefore, the hard thinking has to be focused on how, without destroying what makes them attractive places to visit, the lesser 'knowledge economy' regions can make themselves better capable of retaining and attracting industry that is likely to offer better, higher value-adding, more knowledge-intensive jobs for their own youth and attract others in as well.

The first institutional category to come into focus is the university. Many lower knowledge economy regions and cities have universities. Modern thinking, along 'Triple Helix' lines is that universities should be motors of their regional economy, especially the regional knowledge economy. More imaginative courses, more research, greater interaction between training and research with the economic base are essential requirements. More innovation around the agricultural, cultural, gastronomic and cultural base needs to be secured.

A second essentially public function often present, sometimes at substantial scale in such areas is healthcare. Modern healthcare, as was shown, frequently brings university and medical school training and research together with patient healthcare. Health tourism is another way in which the facilities of tourist areas can be usefully utilised, especially off-season. For example attracting overseas patients (including those funded by their national health systems, as in Norway, Denmark, Germany and so on) to centres specialising in spa-services, osteopathy, homeopathy and detoxification come to mind as capable of being provided in such places. Developing such competences will increasingly vary the local labour market and raise the knowledge-intensivity of economic activities.

Cultural, agro-tourism, gourmet tourism, sustainable tourism, sports tourism, industrial archaeology and so on are growing niches in the burgeoning tourism market. Some tourist areas have strategies to provide a wide array of say, water or marine-based tourism including intensive training and coaching activities related to particular sports niches. Thus one area specialises in, say wind-surfing and its training, another in snorkelling, another in sailing, and so on. Linkage with schools means the activities are not simply summer only but all year round with secure employment for knowledgeable trainers. This can clearly be extended, and is in accomplished, forward-thinking areas, to mountain tourism, rural tourism, cultural tourism, musical etc. tourism and so on.

Finally research institutes relevant to such areas whether oceanographic, viticultutal, gourmet cuisine and more general food technology, mountain environments, cultural specificities (language, arts, ethnicity, industrial heritage) and bioscience applications to agricultural, environmental and healthcare spheres may all have a justification for decentralisation or new establishment in the kinds of locations presently bereft of knowledge economy activities.

These are just a few of the policy implications that arise from an analysis of the current situation experienced by accomplished regions and cities, the problems that arise from their unreflexive development, and the implications for a more equitable and sustainable future for all areas made possible through examining standard economic data through the lens of the 'knowledge economy' perspective. Further research is needed now to establish developmental profiles over time, since this is one of the best ways to observe how regions and cities develop or lose their knowledge economy capabilities.

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Appendix 1

Area	Code	HTM	HTM+KIS	Sample Mean Index	Full Mean Index
Stockholm	SE01	6.42	58.65	169.45	158.48
Inner London	UKI1	2.05	57.73	166.80	155.99
Vastsverige	SE0A	11.35	53.70	155.15	145.11
Surrey, East & West Sussex	UKJ2	6.98	53.17	153.62	143.67
Brabant Wallonie	BE31	7.11	52.76	152.44	142.57
Outer London	UK12	4.05	52.45	151.54	141.73
Piemonte	IT11	13.94	52.17	150.73	140.97
Ostra mellansverige	SE02	10.99	51.92	150.01	140.30
Berkshire, Buckinghamshire&Oxfordshire	UKJ1	9.37	51.55	148.94	139.30
Bedforshire & Herefordshire	UKH2	10.44	51.53	148.88	139.24
Uusimaa	FI16	7.38	51.51	148.82	139.19
Ovre Norrland	SE08	4.07	51.37	148.42	138.81
Sydsverige	SE04	8.35	51.24	148.04	138.46
Mellersta Norrland	SE07	6.31	51.07	147.55	138.00
Brussels	BE1	4.29	50.20	145.04	135.65
İle-de-France	FR1	6.72	50.17	144.95	135.57
Norra mellansverige	SE06	7.26	49.59	143.28	134.00
Hampshire & Isle of Wight	UKJ3	10.58	49.01	141.60	132.43
Stuttgart	DE11	20.44	48.84	141.15	131.97
W Midlands	UKG3	13.43	48.50	140.13	131.05
Merseyside	UKD5	6.92	47.94	138.51	129.54
Essex	UKH3	7.16	47.73	137.90	128.97
Darmstadt	DE71	14.43	47.66	137.70	128.78
South Western Scotland	UKM3	9.10	47.59	137.50	128.60
Karlsruhe	DE12	17.14	47.56	137.41	128.51
Utrecht	NL31	2.45	47.49	137.21	128.32
Denmark	DK	6.83	47.46	137.12	128.24
Vlaams Brabant	BE24	7.50	47.33	136.75	127.89
Wien	AT13	6.67	47.12	136.14	127.33
Eastern Scotland	UKM2	6.93	47.05	135.94	127.14
Smaland med oarna	SE09	9.06	46.99	135.77	126.97
Gloucestershire, Wiltshire&N Somerset	UKK1	9.33	46.71	134.96	126.22
Berlin	DE3	6.25	46.60	134.64	125.92
Cheshire	UKD2	12.02	46.52	134.41	125.70
Noord-Holland	NL32	2.52	46.50	134.35	125.65
Hamburg	DE6	6.74	46.45	134.20	125.51
Oberbayern	DE21	12.71	46.07	133.11	124.49
Herefordshire,W'ctershire&Warwickshire	UKG1	11.15	46.00	132.90	124.30
Northumberland & Tyne & Wear	UKC2	10.08	45.99	132.88	124.27
Greater Manchester	UKD3	8.17	45.81	132.36	123.79

Braunschweig	DE91	17.33	45.79	132.30	123.73
Tubingen	DE14	18.25	45.73	132.12	123.57
Cologne	DEA2	12.22	44.99	129.99	121.57
Zuid-Holland	NL33	3.48	44.97	129.93	121.52
Kent	UKJ4	6.01	44.96	129.90	121.49
Dorset & Somerset	UKK2	6.92	44.87	129.64	121.25
Groningen	NL11	4.67	44.82	129.50	121.11
Mittelfranken	DE25	15.49	44.80	129.44	121.06
Antwerp	BE21	10.45	44.65	129.00	120.65
Tees Valley and Durham	UKC1	11.15	44.51	128.60	120.27
Pohjois-Suomi	FI15	6.10	44.50	128.57	120.25
South Yorkshire	UKE3	6.44	44.15	127.56	119.30
East Wales	UKL2	8.35	43.91	126.87	118.65
Flevoland	NL23	4.43	43.76	126.43	118.25
Rheinhessen-Pfalz	DEB3	15.95	43.72	126.32	118.14
East Anglia	UKH1	7.85	43.70	126.26	118.08
Franche-Comté	FR43	15.62	43.20	124.81	116.73
Leicestershire, Rutland&N'hamtonshire	UKF2	8.64	42.96	124.12	116.08
Freiburg	DE13	15.24	42.94	124.06	116.03
W Wales & The Valleys	UKL1	9.38	42.87	123.86	115.84
West Yorkshire	UKE4	6.42	42.83	123.75	115.73
Hainaut	BE32	6.93	42.65	123.23	115.25
Haute-Normandie	FR23	11.68	42.61	123.11	115.14
Drenthe	NL13	6.89	42.44	122.62	114.68
Liège	BE33	4.95	42.28	122.16	114.25
Etelä-Suomi	FI17	8.34	42.25	122.07	114.17
Rhône-Alpes	FR71	8.86	42.22	121.98	114.08
North Yorkshire	UKE2	4.94	41.68	120.42	112.63
Limburg	BE22	11.97	41.46	119.79	112.03
Alsace	FR42	13.18	41.41	119.64	111.90
Kassel	DE73	11.35	41.37	119.53	111.79
Derbyshire & Nottinghamshire	UKF1	8.72	41.19	119.01	111.30
Limburg (NL)	NL42	8.55	41.17	118.95	111.25
Unterfranken	DE26	15.07	41.08	118.69	111.00
Itä-Suomi	FI13	4.09	40.91	118.20	110.54
Lancashire	UKD4	7.43	40.89	118.14	110.49
Midi-Pyrénées	FR62	6.42	40.82	117.94	110.30
Oost-Vlaanderen	BE23	7.47	40.62	117.36	109.76
Provence-Alpes-Côte d'Azur	FR82	4.01	40.57	117.22	109.63
Luxembourg (B)	BE34	3.12	40.54	117.13	109.54
Devon	UKK4	5.40	40.49	116.98	109.41
Comunidad de Madrid	ES3	6.90	40.42	116.78	109.22
Basse-Normandie	FR25	8.29	40.40	116.72	109.17
Bremen	DE5	9.98	40.21	116.18	108.65
Noord-Brabant	NL41	8.15	40.21	116.18	108.65
Southern & Eastern	IE02	7.58	40.18	116.09	108.57

Gelderland	NL22	4.59	39.99	115.54	108.06
Gießen	DE72	9.93	39.95	115.42	107.95
Cornwall & Isles of Scilly	UKK3	7.48	39.95	115.42	107.95
Limousin	FR63	5.15	39.73	114.79	107.36
Friesland	NL12	3.77	39.61	114.44	107.03
Shropshire & Staffordshire	UKG2	10.98	39.54	114.24	106.84
Lorraine	FR41	7.79	39.44	113.95	106.57
Bretagne	FR52	6.90	39.40	113.83	106.46
Düsseldorf	DEA1	10.18	39.37	113.75	106.38
Väli-Suomi	FI14	6.24	39.10	112.97	105.65
Nord-Pas-de-Calais	FR3	6.39	38.99	112.65	105.36
Schleswig-Holstein	DEF	7.41	38.95	112.53	105.25
Schwaben	DE27	13.95	38.56	111.41	104.19
Hannover	DE92	9.81	38.27	110.57	103.41
N Eastern Scotland	UKM1	8.00	38.09	110.05	102.92
Poitou-Charentes	FR53	5.64	37.94	109.62	102.52
Namur	BE35	2.62	37.70	108.92	101.87
Lombardia	IT2	11.38	37.55	108.49	101.47
Arnsberg	DEA5	10.58	37.41	108.09	101.09
Liguria	IT13	7.87	37.35	107.90	100.93
Northern Ireland	UKN	5.33	37.31	107.80	100.82
Lazio	IT6	4.34	37.16	107.36	100.41
Zeeland	NL34	6.88	37.15	107.33	100.38
Luxembourg (Grand Duché)	LU	1.62	36.95	106.76	99.84
Münster	DEA3	8.74	36.88	106.55	99.66
Languedoc-Roussillon	FR81	2.18	36.73	106.12	99.25
Pays de la Loire	FR51	7.02	36.70	106.03	99.17
West-Vlaanderen	BE25	5.82	36.64	105.86	99.01
Picardie	FR22	6.97	36.53	105.54	98.71
País Vasco	ES21	9.84	36.30	104.88	98.09
Bourgogne	FR26	7.17	36.10	104.30	97.55
Niederbayern	DE22	12.78	36.06	104.18	97.44
Sachsen	DED	7.17	35.97	103.92	97.20
Overijssel	NL21	6.04	35.94	103.84	97.12
Oberpfalz	DE23	12.66	35.92	103.78	97.06
Saarland	DEC	8.22	35.90	103.72	97.01
Champagne-Ardenne	FR21	5.14	35.67	103.06	96.39
Centre	FR24	7.58	35.60	102.86	96.20
Lüneburg	DE93	8.54	35.41	102.31	95.68
Aquitaine	FR61	4.62	35.24	101.82	95.22
Emilia Romagna	IT4	10.87	35.22	101.76	95.17
East Riding & North Lincolnshire	UKE1	6.09	35.07	101.32	94.76
Koblenz	DEB1	9.52	34.90	100.83	94.30
Lincolnshire	UKF3	6.26	34.77	100.46	93.95
Cumbria	UKD1	5.03	34.69	100.23	93.74
Highlands and Islands	UKM4	5.00	34.45	99.53	93.09

Upper Austria	AT31	9.56	34.28	99.0492.63
Trier	DEB2	6.39	34.14	98.6492.25
Attiki	GR3	4.20	33.79	97.6391.31
Oberfranken	DE24	10.17	33.70	97.3791.06
Cataluňa	ES51	9.69	33.48	96.7390.47
Weser-Ems	DE94	7.66	33.38	96.4490.20
Detmold	DEA4	8.53	33.09	95.6089.41
Thüringen	DEG	6.79	33.01	95.3789.20
Friuli-Venezia Giulia	IT33	8.50	32.79	94.7488.60
Veneto	IT32	9.66	32.38	93.5887.50
Kärnsten	AT21	6.18	32.11	92.7786.77
Halle	DEE2	6.00	32.06	92.6386.63
Communidad Foral de Navarra	ES22	11.21	32.06	92.6386.63
Salzburg	AT32	3.66	32.02	92.5186.52
Auvergne	FR72	3.34	31.82	91.9385.98
Aragón	ES24	10.04	31.63	91.3885.47
Vorarlberg	AT34	6.97	31.50	91.0185.12
Campania	IT8	4.75	31.42	90.7884.90
Calabria	IT93	1.29	31.29	90.4084.55
Molise	IT72	6.51	31.27	90.3484.50
Magdeburg	DEE3	5.11	31.00	89.5683.77
Niederösterreich	AT12	6.15	30.92	89.3383.55
Brandenburg	DE4	4.02	30.81	89.0283.25
Dessau	DEE1	6.81	30.68	88.6482.90
Border, Midland & Western	IE01	7.34	30.54	88.2482.52
Tyrol	AT33	4.94	30.06	86.8581.23
Toscana	IT51	6.19	29.75	85.9580.39
Cantabria	ES13	6.48	29.67	85.7280.17
Sicilia	ITA	2.44	29.42	85.0079.50
Mecklenburg-Vorpommern	DE8	2.88	29.41	84.9779.47
Lisboa e Vale do Tejo	PT13	4.34	29.04	83.9078.47
Marche	IT53	6.21	28.98	83.7378.31
Styria	AT22	5.12	28.96	83.6778.25
Abruzzo	IT71	5.93	28.86	83.3877.98
Burgenland	AT11	6.17	28.83	83.2977.90
Sardegna	ITB	2.73	28.68	82.8677.50
Basilicata	IT92	6.38	28.65	82.7777.42
Trentino-Alto Adige	IT31	3.65	28.60	82.6377.28
Umbria	IT52	5.10	27.87	80.5275.31
Castilla y León	ES41	5.09	27.20	78.5973.50
Puglia	IT91	3.55	26.97	77.9272.88
Andalucía	ES61	2.34	26.05	75.2670.39
Comunidad Valenciana	ES52	4.20	24.90	71.9467.28
Principado de Asturias	ES12	2.37	23.14	66.8562.53
La Rioja	ES23	5.29	23.13	66.8362.50
Galicia	ES11	4.57	23.12	66.8062.47

Islas Baleares	ES53	1.35	22.59	65.2761.04
Extremadura	ES43			64.9059.91
Regió de Murcia	ES62	2.34	22.17	64.0558.61
Kentriki Makedonia	GR12	1.59	21.69	62.6658.29
Voreio Aigaio	GR41	0.13	21.57	62.3256.64
Castilla-La Mancha	ES42	2.40	20.96	60.5655.83
Ipeiros	GR21	1.31	20.66	59.6951.64
Thessalia	GR14	1.59	19.11	55.2151.10
Algarve	PT15			54.7050.98
Ionia Nissia	GR22	1.31	18.68	53.9750.48
Alentejo	PT14	1.82	18.63	53.8250.34
Dytiki Makedonia	GR13	1.59	17.85	51.5748.23
Centro (P)	PT12	2.99	17.68	51.0847.77
Dytiki Ellada	GR23	1.31	17.65	50.9947.69
Kriti	GR43	0.13	17.65	50.9947.69
Norte	PT11	4.05	17.37	50.1846.94
Anatoliki Makedonia, Thraki	GR11	1.59	16.06	46.4043.40
Peloponnissos	GR25	1.31	15.20	43.9141.07
Sterea Ellada	GR24	1.31	13.29	38.3935.91
Notio Aigaio	GR42	0.13	12.70	36.6934.32