The 2008 R-ISEW (Regional Index of Sustainable Economic Well-Being) for all the English regions

A joint report for the East Midlands Development Agency, North West Development Agency, Yorkshire Futures, Advantage West Midlands, the South West Regional Development Agency and the South East of England Development Agency

Saamah Abdallah, Nic Marks and Tim Jackson of nef (the new economics foundation)

October 2008

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This report is dedicated to Nat McBride, who has contributed so much to the development of the R-ISEW, and sadly passed away at the beginning of this project, in summer 2008.

Written by Saamah Abdallah, Tim Jackson and Nic Marks
centre for well-being
nef (the new economics foundation)

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Executive summary

The English Regional Development Agencies are tasked with the challenge of encouraging sustainable development in their regions, with the ultimate aim of achieving high levels of social and economic well-being within environmental limits. Measuring progress towards that vision is no simple matter. Indicators exist for various aspects of this challenge, but without a cogent framework for bringing them together, assessing overall progress is difficult. A framework is also required to enable inevitable trade-offs to be assessed.

One year ago, **nef** (the new economics foundation) produced the first complete set of Regional Indices of Sustainable Economic Well-Being (R-ISEWs) for the nine Government Office Regions of England. R-ISEW is a measure of how much a region's economic activity contributes to, and detracts from, well-being, and how sustainable this activity is. It is an adjusted economic indicator which attempts to incorporate costs and benefits not traditionally measured in monetary terms. By monetising social and environmental issues, it brings them into a single analytic framework with economic ones, allowing us to explore trade-offs, and to assess whether economic well-being is really increasing sustainably in a given region. As a monetary figure, the R-ISEW can be compared with Gross Value Added (GVA), and other economic indicators. At the same time, exploring the R-ISEW's 20 separate components helps us to understand a fuller story of how economic well-being varies over time.

This year's results reveal that 10 years of improving sustainable economic well-being between 1994 and 2004 have come to an end and that, for England as a whole, and for most regions, sustainable economic well-being was on the decline by 2006, well before GDP growth for the UK halted in September 2008. The R-ISEW per capita for England for 2006 was £10,578, some £8,503 below GVA per capita for that year, and £145 per capita below the 2004 R-ISEW (a drop of 1.3%). The principal reasons for this decline appear to be slowing growth in consumer expenditure, an economic model which has invested less and less in its own capital stocks, growing trade deficits, rising long-term environmental damage, and continuing resource depletion.

Looking between regions, the South West continues to have the highest R-ISEW, though its lead over the North West has declined. The South East and East of England now have the lowest R-ISEWs of any region, having been overtaken by Yorkshire and the Humber. Meanwhile, the fastest improvement is seen for the East Midlands, whose R-ISEW has grown at a rate of 6% per annum over the last three years.

As the methodology for calculating R-ISEWs matures, its potential as an alternative measure of progress for the English regions is becoming more apparent. Calculating the R-ISEW for all English regions using a fixed methodology for three years will be an important step in the indicator's development process. We expect to use these calculations, as well an analysis of the policy process, to inform future development of the indicator.

1. Introduction

One year ago, **nef** produced the first complete set of R-ISEWs for the nine Government Office Regions (GORs of England. The results showed that, whilst the R-ISEWs for all GORs have been growing from 1994 to 2005, they remain substantially lower than GVA, the dominant measure of economic progress. Furthermore, there was a suggestion of a slowing of the growth in R-ISEW in recent years, and a concomitant widening of the gap between the R-ISEW and GVA.

This report presents new data calculated in 2008 for the years 1994–2006. The latest data, which also includes the updating of several sets of figures which previously had to be estimated for 2005, show that a 10-year increase in R-ISEW since 1994 has come to a halt, and that R-ISEW per capita actually began declining between 2004 and 2006 despite increasing GVA. Whilst it has only been since September 2008 that people looking at standard national accounts have reported the UK entering recession, the R-ISEW reveals that growth in sustainable economic well-being, even based on the conservative estimates made here, had actually ground to a halt sometime between 2004 and 2005.

As in our previous report,[1] we here present the R-ISEW story in numbers. After looking at the overall picture, we explore patterns in the R-ISEW from component to component, looking at the pattern for England, as well as for a few GORs where interesting results can be found. Next, we look at each GOR in turn, noting how key components have determined their results. This section is concluded with a brief exploration of variation across GORs. Lastly, we consider how the results differ from last year's calculations – as a result of new data, and adjustments to the methodology. Numerical results are included in table form in Appendix 1.

This report is the first of three annual updates that we will be carrying out using the current methodology. By 2010, we will have calculated a consistent time-series of R-ISEWs for all GORs from 1994 to 2008 inclusive.

1.1 Overall patterns

The total England R-ISEW in 2006 stood at £537 billion, which is 45% below the total GVA of £969 billion. Per capita, the figures are £10,578 per person and £19,082 per person (Figure 1). This represents a gap of £8,503. The total R-ISEW rose by 36% over the 12-year period from 1994, compared with a 40% growth in GVA. However, perhaps more meaningful are the increases in *per capita* R-ISEW and GVA – 29% and 33% respectively. These figures represent mean annual growth rates of 2.1% per year and 2.4% per year respectively. Whilst GVA grew most rapidly between 1996 and 1998, the R-ISEW grew most rapidly between 2000 and 2002 (at about 5% per year – Figure 2). As noted earlier, the last two years have seen *negative* growth rates in the R-ISEW. Based on the revised data we have available now, the R-ISEW reached a high point in 2004 of £10,723 per capita. The latest figure, for 2006, is lower than the per capita figure for 2003.

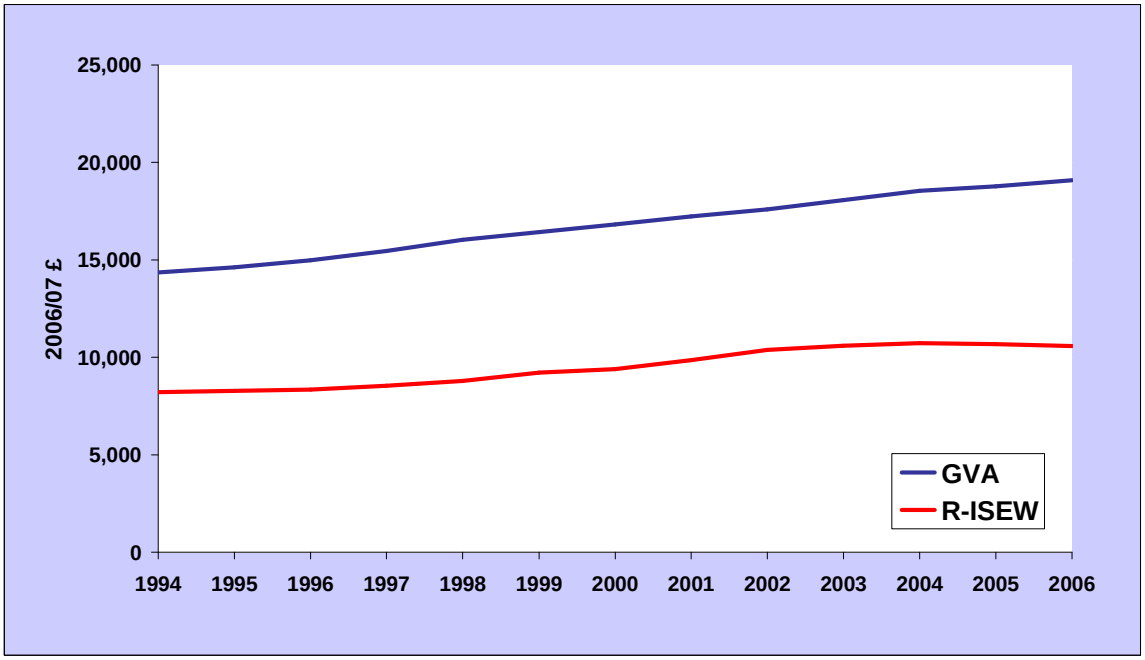


Figure 1: R-ISEW and GVA for England per capita.

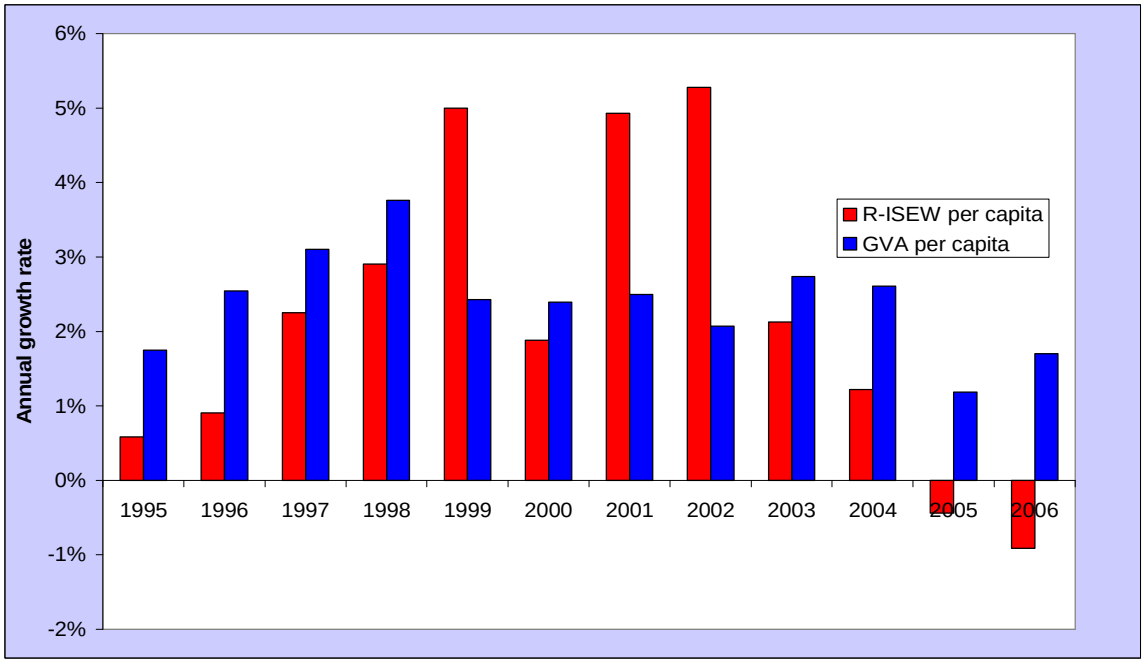


Figure 2: R-ISEW and GVA per capita year-on-year growth in England.

The gap between GVA and the R-ISEW has grown steadily in absolute terms (having started at £6,141 per capita). As a proportion of GVA, the picture is a little more complex – with the gap rising between 1994 (when it was 43% of GVA) and 1998, before falling to a low point of 41% of GVA in 2002, only to rise again to 45% in 2006 (Figure 3).

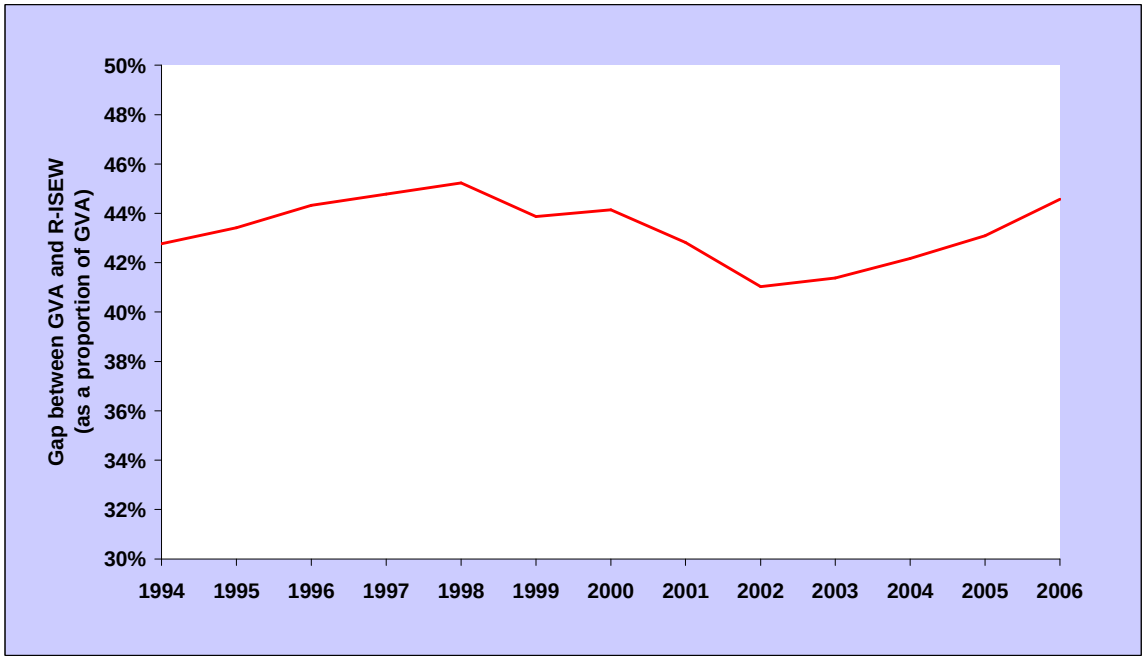


Figure 3: Gap between GVA and R-ISEW for England, as a proportion of the GVA.

1.2 Regional patterns

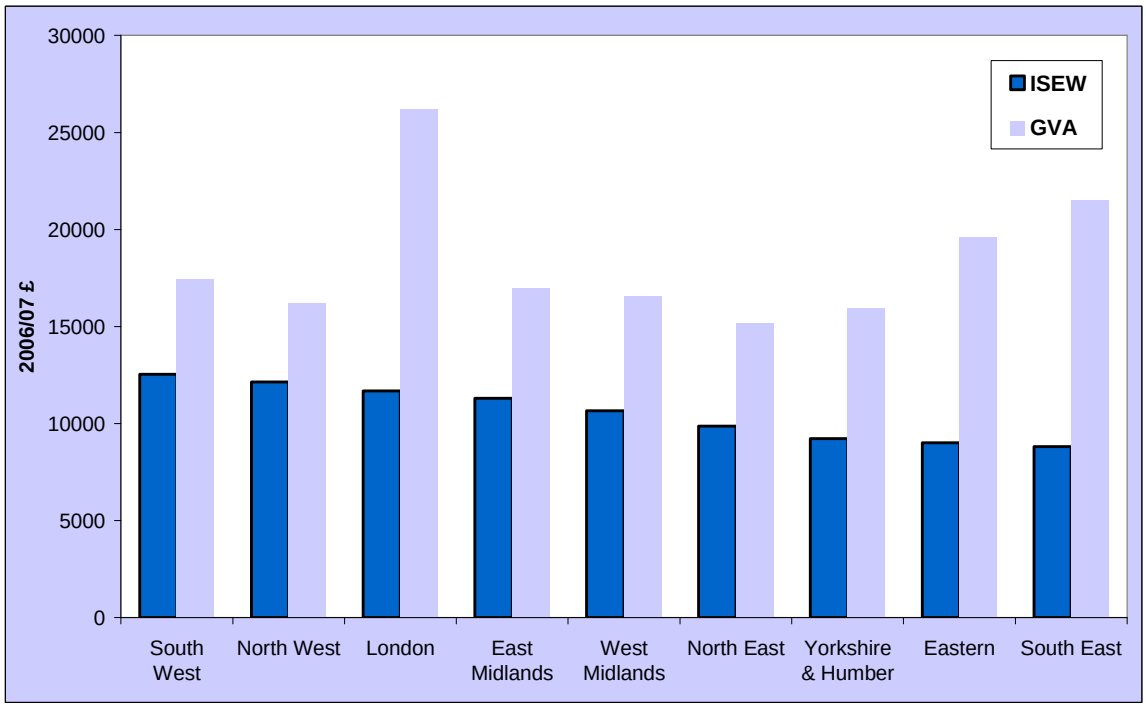


Figure 4: Per capita R-ISEWs and GVAs by GOR in 2006.

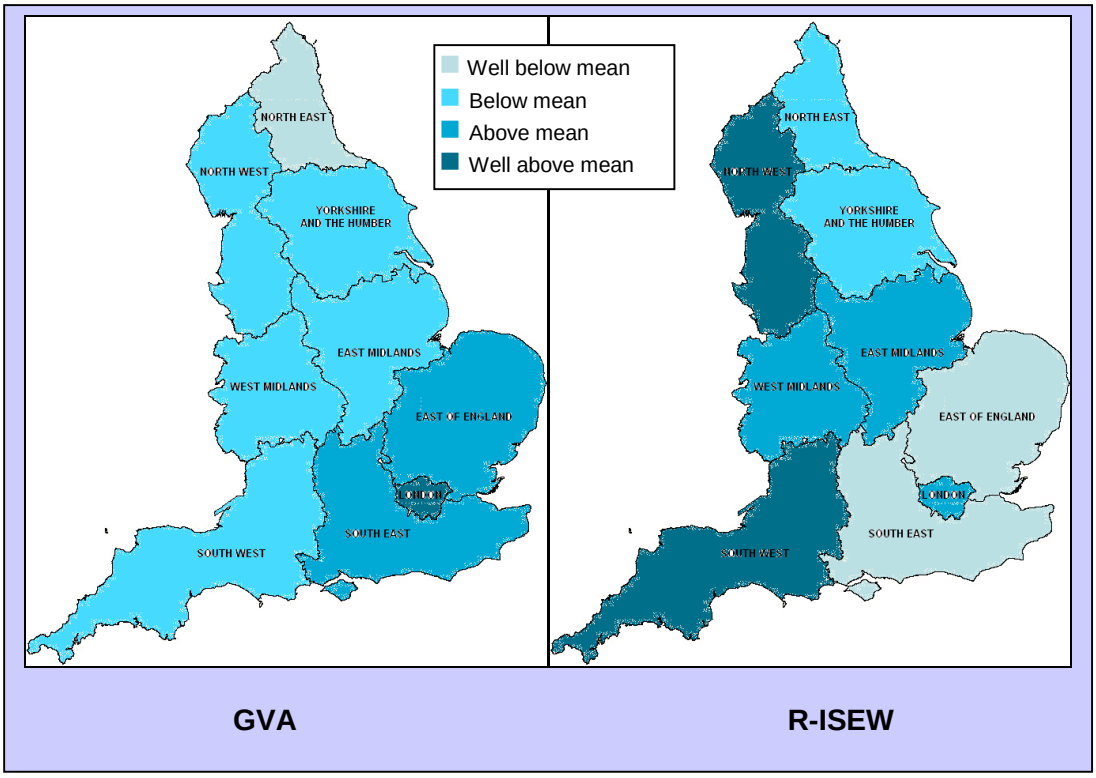


Figure 5: Per capita R-ISEWs and GVAs by GOR in 2006. [2]

Looking across GORs, the R-ISEW tells a very different story to GVA. Whereas the top GORs in terms of GVA per capita are concentrated around London and the Home Counties (the South East and the East of England), the R-ISEW in 2006 was highest in the North West and South West, with London only making it to third place (Figures 4 and 5). For the North West, in particular, this represents a marked difference from GVA, which has it as the third-poorest GOR in England. Whilst London doesn't perform quite as well in terms of the R-ISEW as it does in terms of GVA (coming third instead of first in 2006), it certainly outperforms its neighbouring GORs, with the East of England dropping to eighth place and the South East now falling to last place.

The Midlands emerge in the middle of the rank order both in terms of GVA and R-ISEW, with the East Midlands outperforming the West Midlands on both counts in 2006. Meanwhile, on the north-east seaboard, Yorkshire and the Humber and the North East swap positions, whilst both move ahead of more southerly GORs.

These patterns have not stood unchanged in the 12 years from 1994 to 2006. Of course R-ISEW increases have been seen across England, but these have not been equal (Figures 6 and 7). The most substantial increases were found in the East Midlands (from £6,509 to £11,291 per capita – a 73% increase), Yorkshire and the Humber (£5,844 to £9,211 – a 58% increase), and London (£7,630 to £11,672 – a 53% increase). Conversely, the smallest increases were found in the South East (7%), and West Midlands (11%).

As a result of these changes, London has moved up the R-ISEW table from fifth place in 1994 to third place in 2006 (with the most rapid increase between 2000 and 2002); the East Midlands has moved from eighth to fourth, and Yorkshire and the Humber, over the last couple of years has moved from bottom to third from bottom. The main fallers have been the West Midlands (from second to fifth), and the South East (from fourth to bottom). Figure 8 and Table 1 shows these results in more detail.

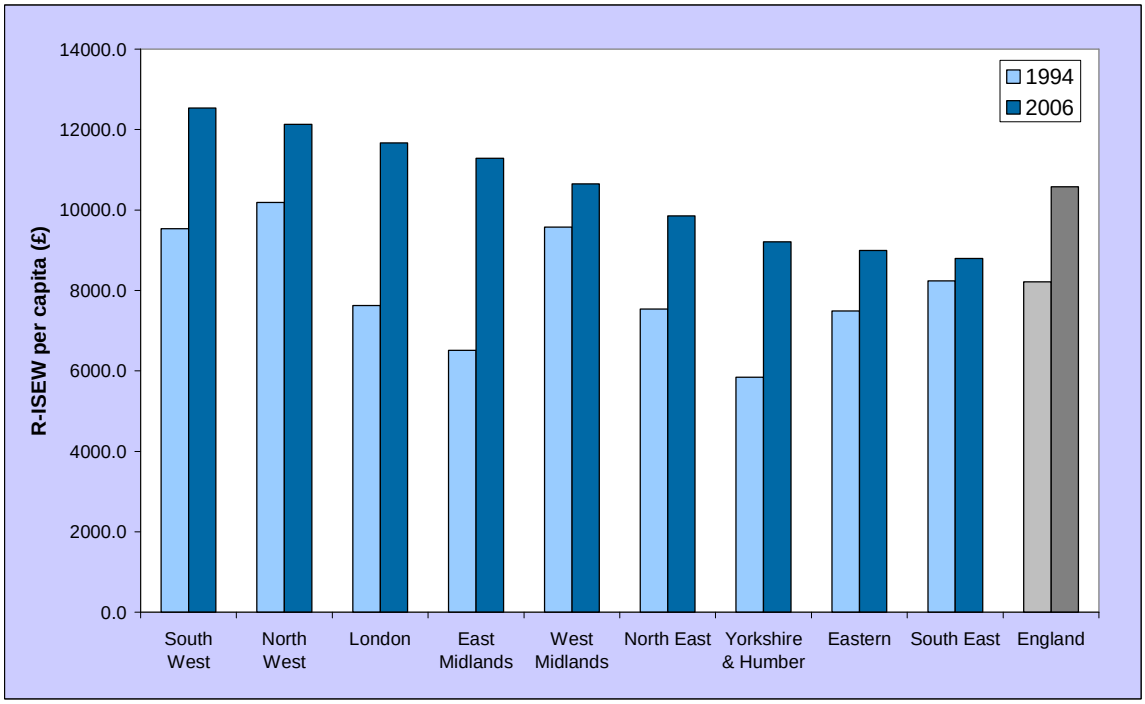


Figure 6: Increases in the R-ISEW from 1994 to 2006 across the GORs.

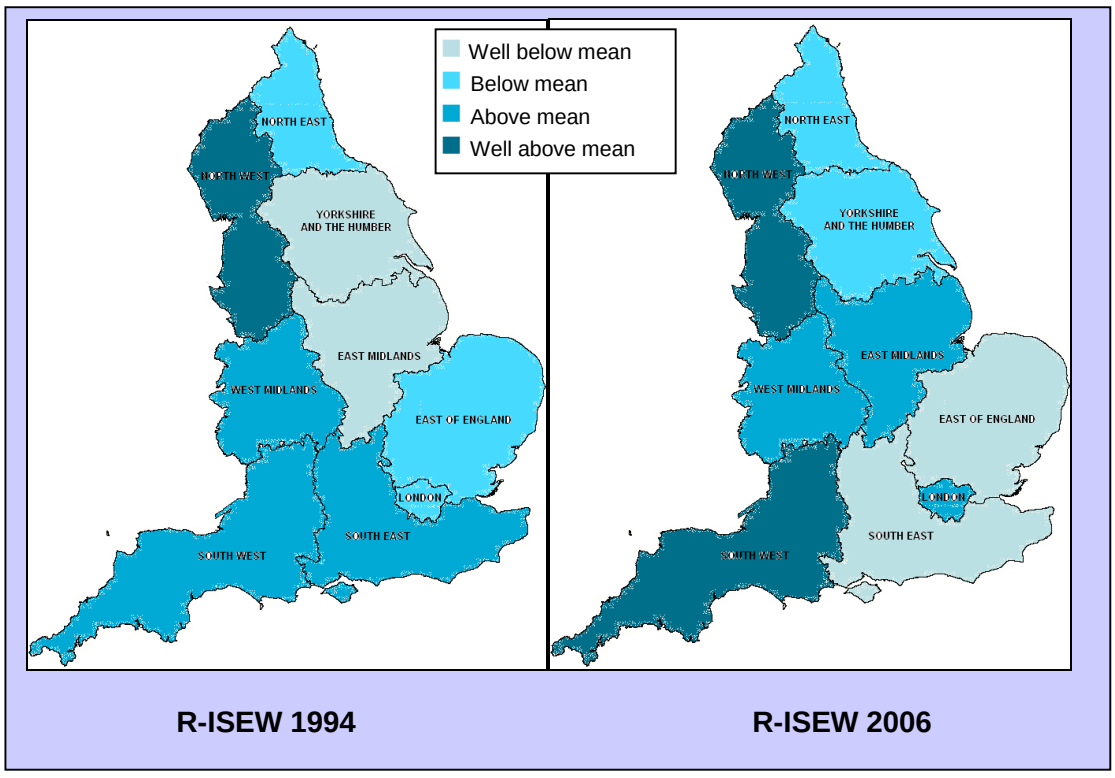


Figure 7: Per capita R-ISEWs for 1994 and 2006 (see endnote 2).

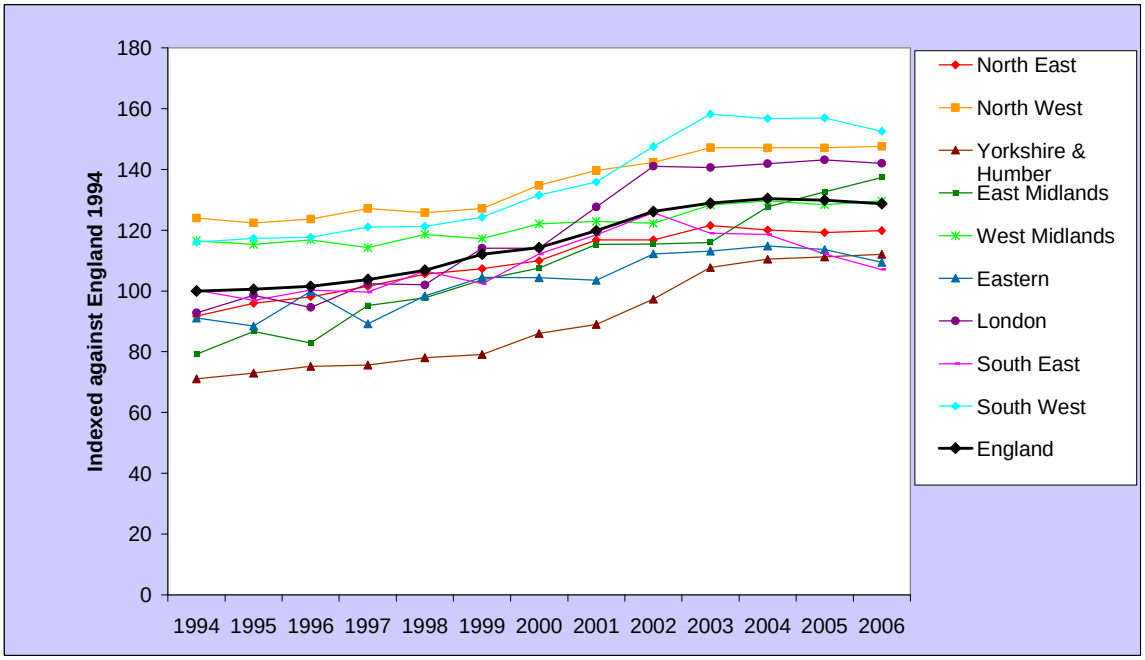


Figure 8: R-ISEWs per capita indexed against England's R-ISEW for 1994, for all the English GORs.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
North East	6	6	6	5	5	5	6	6	6	5	6	6	6
North West	1	1	1	1	1	1	1	1	2	2	2	2	2
Yorks	9	9	9	9	9	9	9	9	9	9	9	9	7
East Mid.	8	8	8	7	8	7	7	7	7	7	5	4	4
West Mid.	2	3	3	3	3	3	3	4	5	4	4	5	5
Eastern	7	7	5	8	7	6	8	8	8	8	8	7	8
London	5	4	7	4	6	4	4	3	3	3	3	3	3
South East	4	5	4	6	4	8	5	5	4	6	7	8	9
South West	3	2	2	2	2	2	2	2	1	1	1	1	1

Table 1: R-ISEW per capita rankings for each region from 1994 to 2006.[3]

1.3 Component patterns

The R-ISEW takes consumer expenditure as a starting point – which reached a total of £672 billion for England in 2006. The two other main positive components are services from household labour and volunteering, and public expenditure on health and education (Figure 9). Whilst services from household labour and volunteering have been steadily declining from 1994 to 2006 (starting at £210 billion but dropping to £181 billion), public expenditure on health and education has almost doubled – growing from £77 billion to £137 billion.

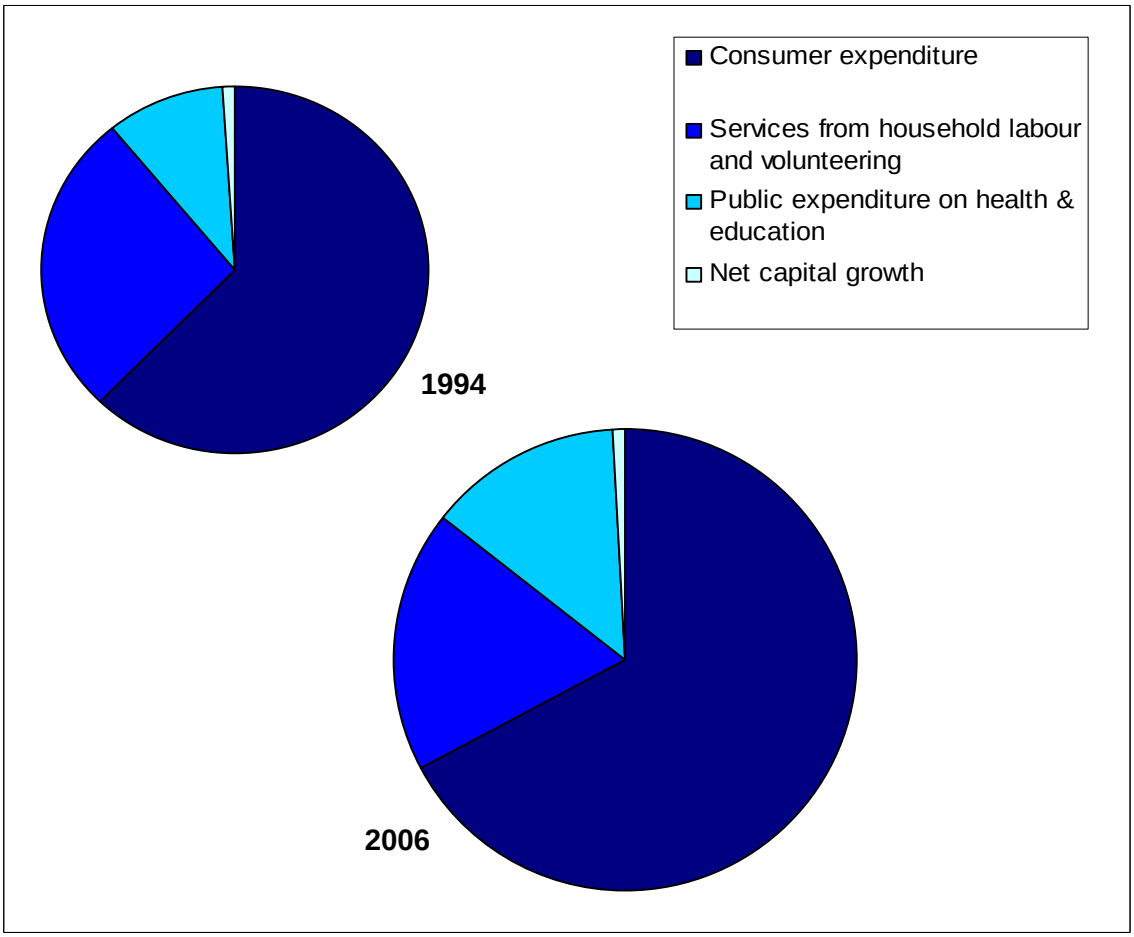


Figure 9: Positive components of England's R-ISEW in 1994 and 2006.

The picture for costs subtracted from the R-ISEW is rather more complex (Figure 10). Environmental costs represent the biggest two components here – long-term environmental damage (£116 billion in 2006) and depletion of non-renewable resources (£96 billion in 2006) – with the local costs of air pollution also representing a substantial cost (£21 billion in 2006). The two largest social costs are the adjustment for income inequality (which took £86 billion off England's R-ISEW in 2006) and the cost of commuting (£29 billion in 2006). Lastly, the main negative economic cost – net international position– represented a loss of £49 billion.

Over the 12 years for which data is available, the biggest changes have been the increase in the costs of long-term environmental damage and resource depletion (which represented 46% of the R-ISEW costs in 2006, compared with 40% in 1994), and the *decrease* in the costs of air pollution (only 5% of the R-ISEW costs in 2006, compared with 16% in 1994). The costs of income inequality and net international position have also increased over the 12 years since 1994.

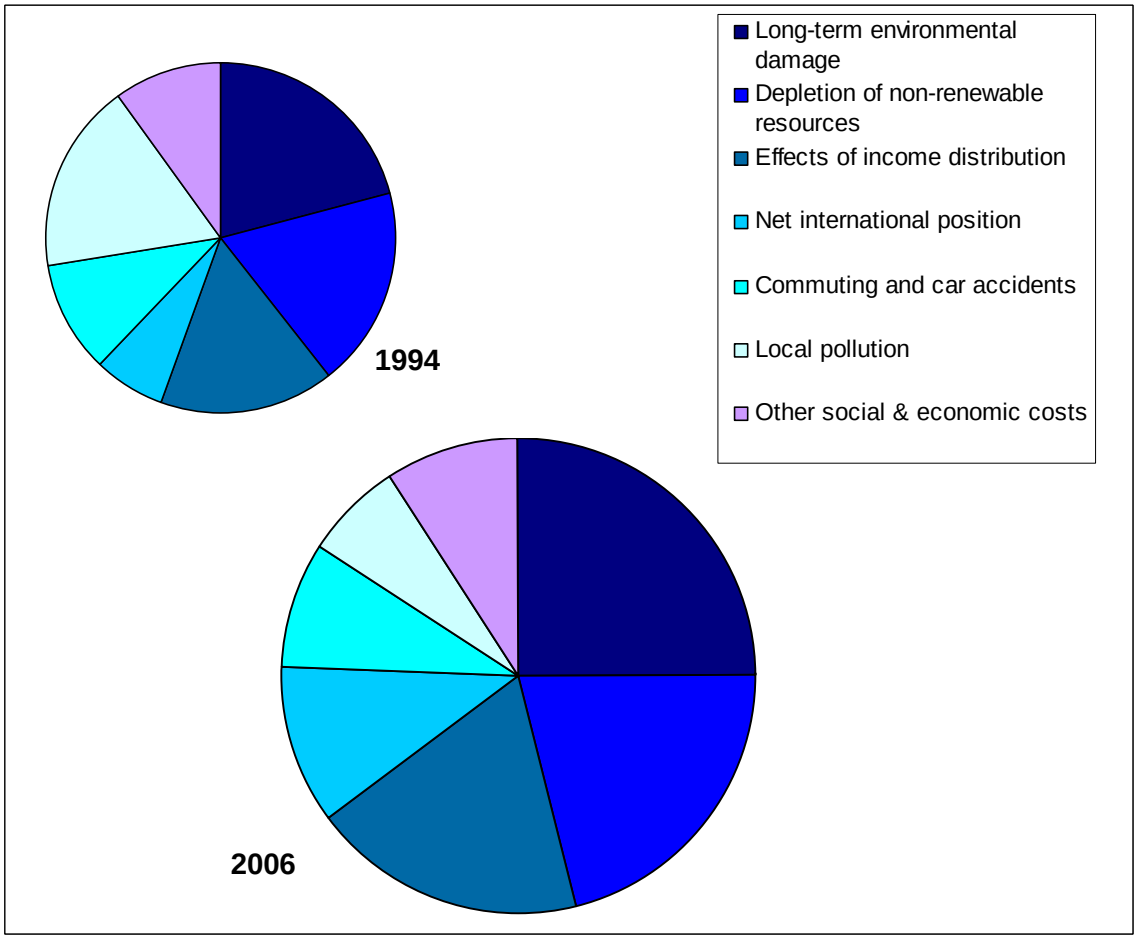


Figure 10: Negative components of England's R-ISEW in 1994 and 2006.

2. The R-ISEW – by component

Adjusted measures of economic well-being start from an account of economic consumption (as for GDP). This basis is then adjusted to incorporate various economic, social and environmental factors which are not included in the conventional measure. In the following section we discuss key findings and trends over time in each of the component factors of England's R-ISEW, as calculated for the period 1994–2006. Here, we provide short descriptions of each component – more detail on how each component is calculated, including references, can be found in Appendix 4 of the previous report,[4] and in the forthcoming technical report, to be released later this year.[5]

A full discussion of all the results for all GORs is beyond the scope of this report; instead we focus on particularly interesting or outstanding patterns. For brief region-by-region analyses refer to Section 3 of this report.

Throughout this Section, we shall report per capita figures, rather than totals. Typically this has the tendency to reduce the apparent size of changes over time, as total figures do not control for the increase in population in England over the 12 years in this time-series – from 48 million in 1994 to 51 million in 2006. For each component, the percentage in brackets in the title represents its value in 2006 for England, relative to the final R-ISEW score for that year, as well as the direction in which the component takes the R-ISEW (positive or negative). As we go through the Section, we shall provide a running update of the effect the incorporation of each set of components has.

2.1 Economic factors

The baseline for the R-ISEW is regional consumer expenditure. It is recognised that this is a contested proxy for well-being for a number of reasons, but it at least provides an indication of the value of goods and services consumed and is therefore a reasonable estimate of the 'standard of living' during the period. From this basis, the R-ISEW makes several economic adjustments to account for factors which are vital to the long-term sustainability of the regional and global economies.

Consumer expenditure (+125%)[6]

Household final consumption expenditure. National figures from the ONS Blue Book, which is based primarily on information from retailers. Estimated regional figures derived using data from the Expenditure and Food Survey.

Per capita regional consumer expenditure for England grew by 32% in real terms over the period 1994–2006, from £10,048 in 1994 to £13,231 in 2006, which is a marginally smaller increase than that in GVA per capita (which tracked a 33% increase, from £14,361 to £19,082).[7] Unsurprisingly, there are quite large differences between GORs, with per capita expenditure in the South East (£14,894 in 2006) a full 32% higher than that in the North East (£11,244). These differences have increased slightly in absolute terms since 1994, but

decreased as proportions (consumer expenditure having been 33% higher in the South East than in the North East in 1994).

Looking at how different GORs have fared over the 12 years, the East Midlands has fallen below the mean for England – whereas it used to be above the mean in 1994 and 1995;the South West and the East of England have risen above the mean. Meanwhile, London and the South East have swapped places as the wealthiest GOR in England several times, with London recording large increases between 1996 and 2000, but then a sustained fall in consumer expenditure between 2000 and 2004.

Interestingly, none of this movement can be seen when looking at regional GVAs, which have grown steadily in every GOR, with little change in position. For example, whilst consumer expenditure was relatively low in the East of England in 1994 (7% lower than the England mean), its GVA was, compared with rest of England, more or less the same as it is now (7% above the mean in 1994, 3% above the mean in 2006). Meanwhile, London's GVA has remained consistently and considerably higher than that of the South East, and has not declined since 2000, as consumer expenditure has. Figure 11a maps consumer expenditure across the GORs for 2006.

Net international position (-9%)

For the UK, this is the balance of payments, adding exports and income, subtracting imports, and adjusting for current account transfers. Regional estimates of each region's contribution to the UK's net international position are determined using a combination of regional trade data, consumer expenditure on services, and sectoral GVA.

England has suffered an increasing deficit across the time-series, increasing its impact on the R-ISEW from £540 per capita in 1994, to £975 per capita in 2006. This is predominantly due to imports of material goods far exceeding exports, a deficit that is not compensated for by the surplus in trade in services. Three GORs have consistently bucked this trend – the East Midlands, North East and North West. The North East and North West both started the period with particularly high surpluses (£1,279 and £819 per capita respectively), peaking in 1997, but then declining slightly – particularly in the case of the North West. Meanwhile, the East Midlands started the period with only a marginal surplus (£109 per capita) which has risen steadily to £1,092 per capita in 2006. All these GORs have maintained a surplus in goods trade, with that for the East Midlands having increased by a factor of 5 since 1994.

Meanwhile, the biggest deficits were seen in the South East, London and the East of England. London has cut its deficit quite dramatically from £3,102 per capita in 1994 to only £963 per capita in 2006. On the other hand, its neighbouring GORs have seen their deficits grow, reaching £2,785 per capita in the East of England, and £3,704 in the South East. Again, these deficits are driven by the balance of goods trade, with deficits for the South East and the East of England having shot up since 1994 (for example that for the South East has increased from £1,376 per capita in 1994, to £4,998 in 2006). Whilst these GORs have also seen increases in their services surplus, this does not compensate for the goods deficit. Figure 11b maps net international position across the GORs for 2006.

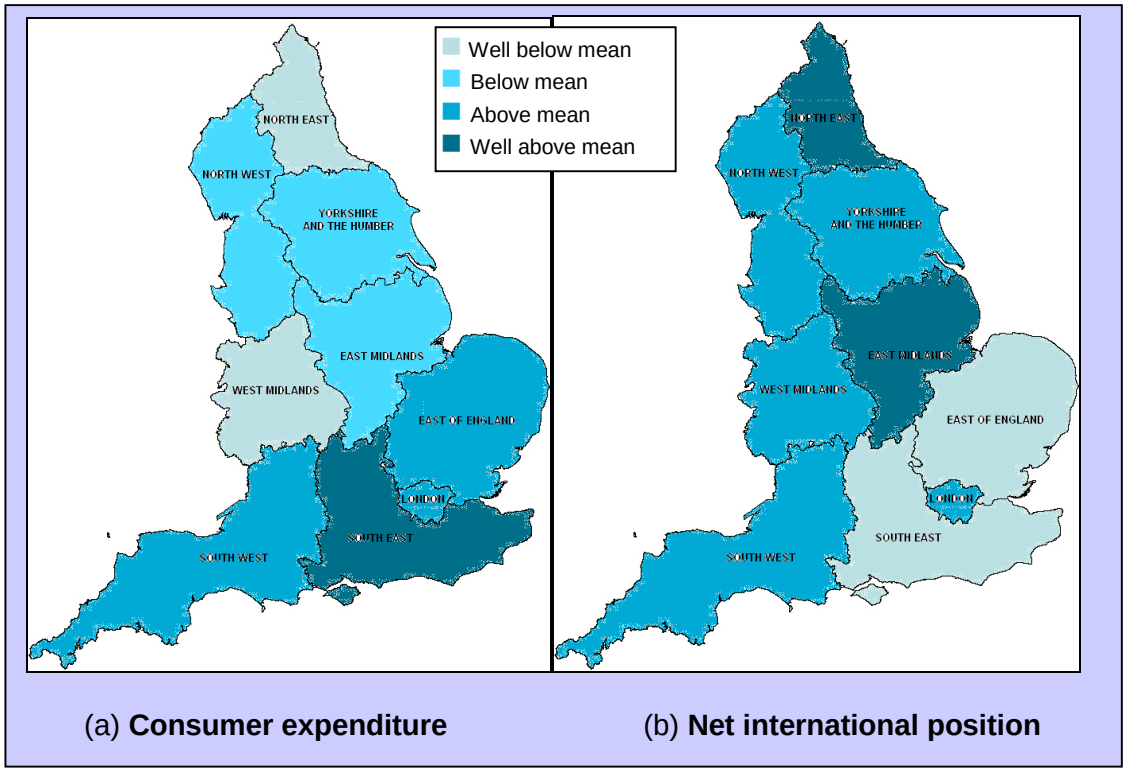


Figure 11: Per capita consumer expenditure and net international position in 2006 (see endnote 2).

Net capital growth (+1%)

Growth in capital stocks net of labour force growth. Estimated, based on change in UK capital stocks from the ONS, and regional net capital expenditure figures from the Annual Business Inquiry.

The net effect of this adjustment can vary substantially, depending on the balance between capital investment and workforce growth in a given GOR. For England as a whole, this component has a relatively small, but positive impact on the R-ISEW. Its greatest annual contribution was of £349 per capita in 2002. Since then it has declined steadily, to £150 per capita in 2006, though this is still above the low point of only £41 per capita in 1997.

Across the GORs, however, this component has a more significant effect. The North East is the only GOR to have been consistently in deficit during the 12-month period, with this deficit taking off as much as £532 from its per capita R-ISEW in 2006, and £604 per capita in 2005. Meanwhile, several GORs have consistently turned out a positive figure for net capital growth – namely the East Midlands, Yorkshire and the Humber, the North West, and the West Midlands – areas traditionally recognised as the industrial hub of England. However, even amongst these GORs, huge variation can be seen. Whilst net capital growth has fallen in Yorkshire and the Humber from a peak of £883 per capita in 2003 to only £542 per capita in 2006, it has increased dramatically in the East Midlands, reaching £964 per capita in 2006 – a pattern which mirrors the improvement in net international position for this GOR.

It should be noted that the key driver of variation between GORs for this component is net capital *expenditure*, as recorded by the Annual Business Inquiry. R-ISEW calculations implicitly assume an equal rate of capital depreciation across GORs. What this means is that the R-ISEW may be under-estimating the amount of capital stock in regions where depreciation has been slow, and over-estimating the amount in those where depreciation has been fast. Regional figures for stocks would be necessary to resolve this problem.

Adjustment for consumer durables (-3%)

The purchase of durable goods such as washing machines provides a household with a flow of valuable services for some years, and not just the year in which they are purchased. To adjust for this, the difference between expenditure on and service flow from consumer durables is estimated, accounting for depreciation and obsolescence.

This component has a modest impact on the R-ISEW, subtracting 2.3% of the value of England's consumer expenditure (£301 per capita) in 2006. This represents a decrease from the high point of £413 per capita in 2001. Generally, the pattern is for this component to be largest when consumer expenditure on consumer durables is high, and to be lowest when expenditure is relatively low, but follows a period of high expenditure from which service flows can be recouped.

Comparing across regions, this component has been consistently the largest in affluent southern GORs (particularly the South East). The exception is London, which, in 2006, had one of the smallest values.

Step 1: Effect of economic adjustments

Applying these three economic adjustments to consumer expenditure is the first step to creating the R-ISEW. Doing so reveals stark differences with GVA (Figure 12). Whilst overall the adjusted expenditure indicator has tended to follow the steady rise of GVA for England (a 30% increase over the 12-year period, compared to a 33% increase in GVA), the flattening out of growth which the final R-ISEW reveals, can already be identified now. Even before social and environmental factors are taken into consideration, calculations reveal that true economic well-being did not increase between 2004 and 2006, and that economic decline had begun to take root in England sometime after 2004.

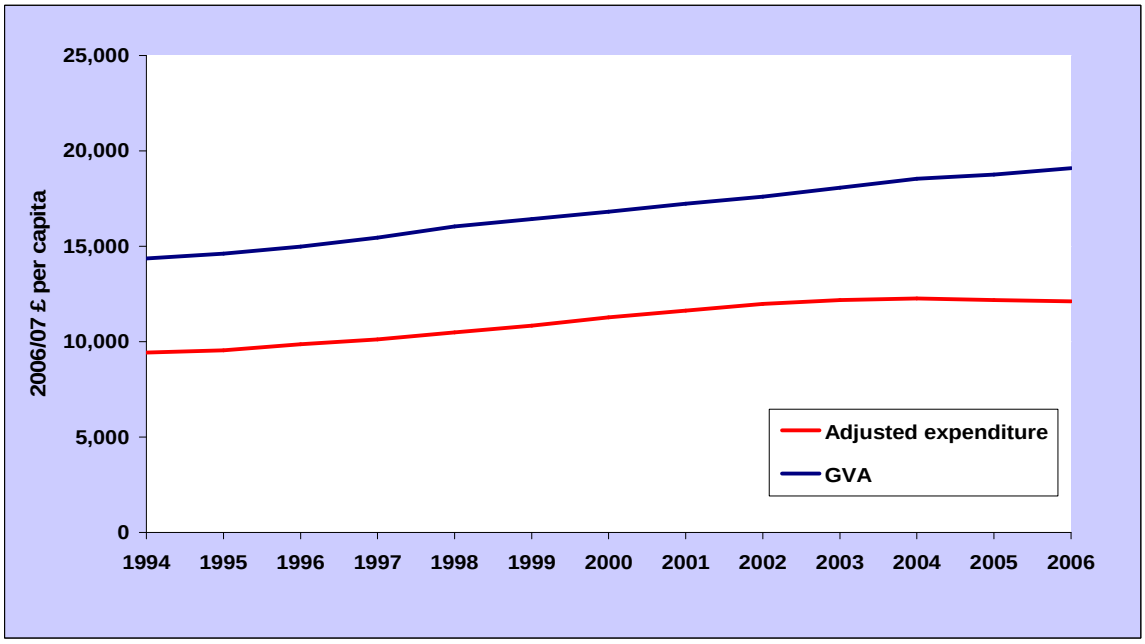


Figure 12: Adjusted consumer expenditure (after Step 1) vs GVA for England.

Comparing GORs also reveals important differences (Figures 13, and 14 for selected GORs). London's significant lead in terms of GVA disappears, and it is relegated to a position little above the average for England. The figures for the South East and the East of England, meanwhile, are the lowest for any region at £10,850 and £10,631 per capita in 2006 (10% and 12% below the England average respectively). Meanwhile, GORs such as the South West, the North West and Yorkshire and the Humber reveal economically

adjusted figures that are higher than one would expect based on GVA. But it is the East Midlands which has the highest economically adjusted expenditure by far – at £14,241 per capita this is 18% above the England average, and over £1,200 above the next highest GOR (the South West). This lead has particularly increased over the last couple of years as the region has improved its net international position and capital growth.

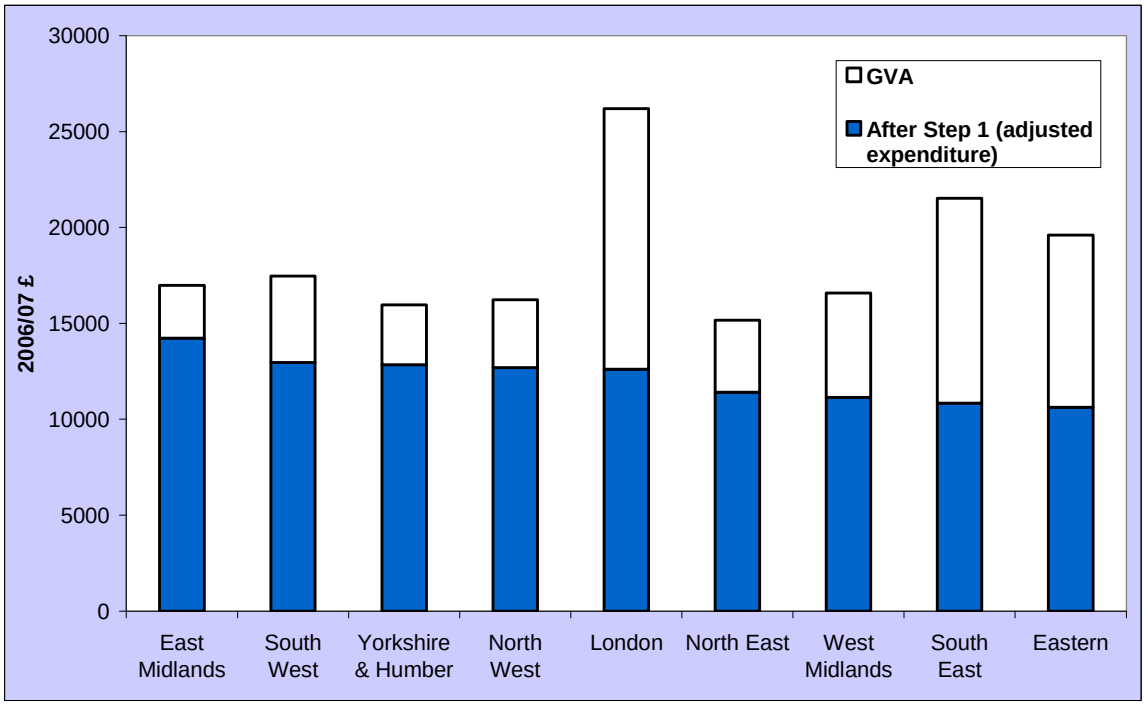


Figure 13: Adjusted per capita consumer expenditure vs. total GVA for each GOR in 2006.

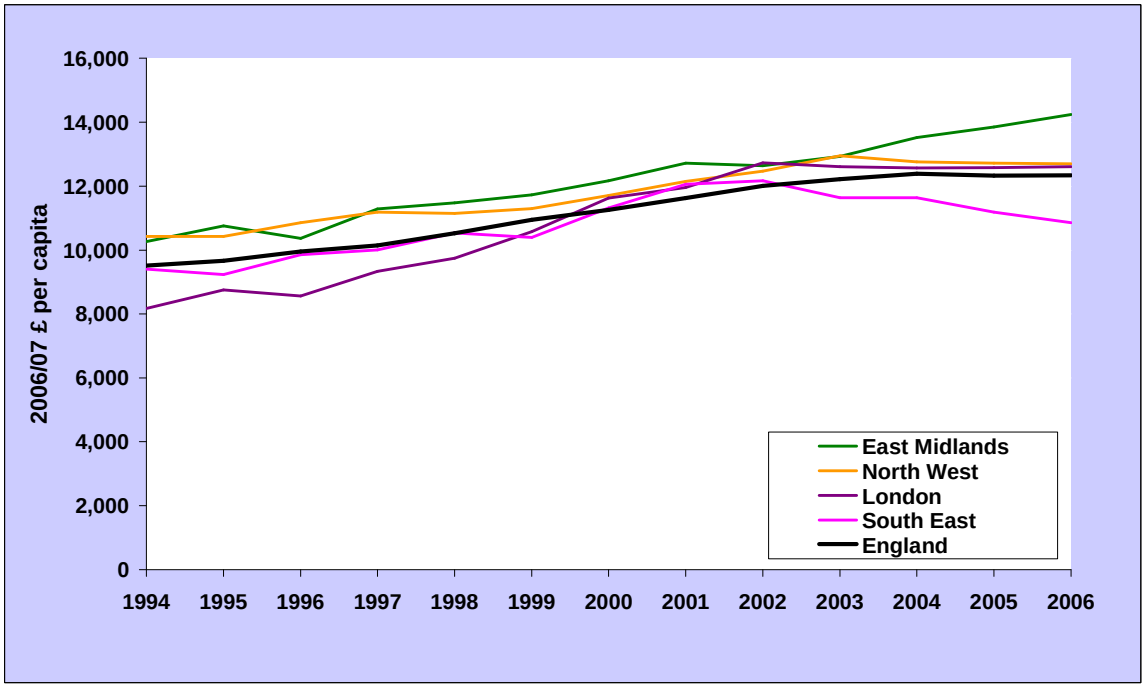


Figure 14: Adjusted consumer expenditure per capita for selected GORs.

It is worth noting that, relative to GVA, adjusted consumer expenditure serves to reduce inequalities between GORs. The £11,018 per capita gap between London and North East in terms of GVA, is reduced to a mere £3,610 gap per capita between the GORs with the highest and lowest adjusted consumer expenditure figure (East Midlands and East of England respectively).

2.2 Social factors

The R-ISEW incorporates several adjustments to account for social aspects of the economy which are vital to sustainability, but which would normally be excluded from conventional economic accounts. Two of these adjustments are positive ones: services to the economy provided by unpaid labour from households and volunteers; and public expenditures on health and education. Social costs – crime, divorce, commuting and accidents on the road and in the workplace – are then accounted for.

Services from domestic labour and volunteering (+34%)

Productive contribution of total time spent on domestic labour and volunteering, based on Time Use Survey data, and valuing a unit of time equally across GORs and over time.

Time use trend data reveal that people in England are spending less and less time on domestic labour and only marginally more on volunteering. On average, people spent approximately 18.2 hours per week on domestic labour, and 73 minutes per week on volunteering in 1995. In 2005, the figures were 14.7 hours per week for domestic labour and 100 minutes per week for volunteering. Based on this trend, the total *value* of this time use for England, using appropriate national wage rates, declines from £4,345 per capita in 1994, to £3,561 in 2006 (as noted in Section 1.3) – a drop of 18%.

Comparing across GORs, the South East and South West enjoy the highest per capita figures, whilst London and Yorkshire and the Humber have the lowest – the gap between these two pairs of GORs was around £400 per capita in 2006. Changes in the regional pattern over time are unlikely to be detected as the time use trend data does not have such sensitivity.

Public expenditure on health and education (+26%)

All public expenditure on health and education is included (defensive health spending due to crime, car accidents and pollution is subtracted elsewhere)

Public expenditure on health and education has increased across England by 70% from 1994 to 2006 – from £1,589 per capita to £2,706 per capita. The increase applies to both health and education spending, though it has been more significant for the former. This pattern of increase has been roughly the same across the country. As such, differences between the GORs have been more or less preserved. Throughout the time period, London has had the highest per capita public expenditure – 15% above the English average in 2006. Meanwhile, the East of England, South East, South West and East Midlands have had the lowest spending per capita – all between 7 and 10% below the English average.

Step 2: The impact of incorporating social benefits

The overall impact of incorporating positive social benefits (the value of domestic labour and the value of public expenditures on health and education) to economically adjusted expenditure measure is shown in Figure 15.

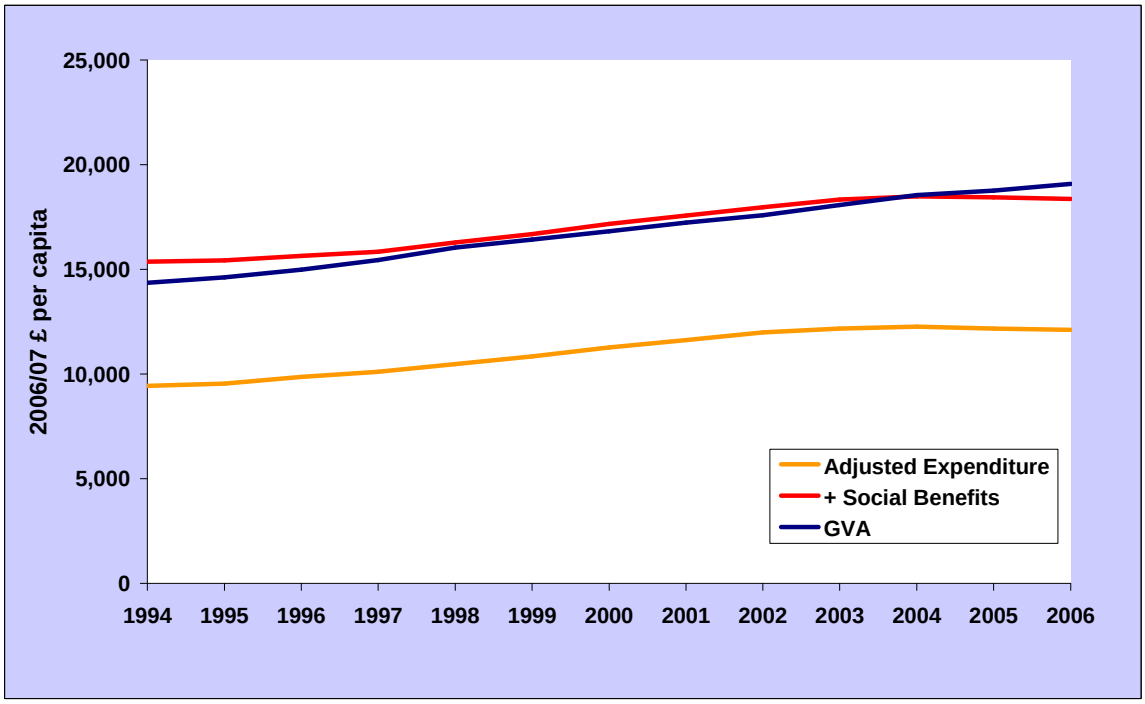


Figure 15: Adjusted consumer expenditure (after Step 1) combined with social benefits (Step 2), vs GVA.

As in Figure 12, Figure 15 shows the adjusted index for England on a per capita basis. It is interesting to note that adding public expenditure on health and education and services from household labour serves to return the adjusted index to a level similar to that of GVA. Whilst GVA continued to rise steadily between 1994 and 2006, however, the drop seen in Figure 12 between 2004 and 2006 is not compensated for by the addition of these two social benefits.

Meanwhile, the regional pattern appears not to have changed significantly (Figure 16). The East Midlands remains the GOR with the highest running total (£20,327 per capita in 2006), followed by the South West and now the North West (which overtakes Yorkshire and the Humber, and London). Meanwhile, the same four GORs have the lowest adjusted indicators – the East of England, South East, West Midlands and North East.

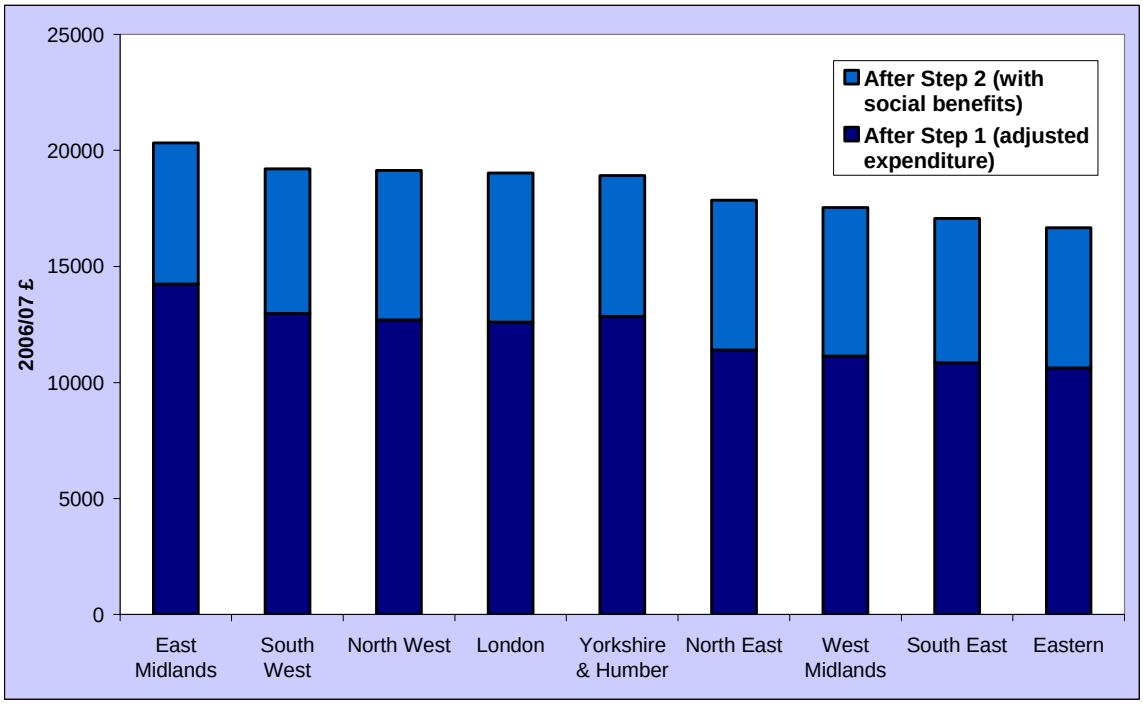


Figure 16: Adjusted consumer expenditure (after Step 1) combined with social benefits (Step 2) for each GOR in 2006.

Costs of income inequality (-16%)

This attempts to adjust unequal consumer expenditure so as to reveal the total associated utility, recognising that increased expenditure has different marginal utility at different expenditure levels. Atkinson Indices are calculated for each GOR, from household income data from the Family Resources Survey, so as to determine the appropriate amount to be subtracted from total consumer expenditure for that region.

Using an ε parameter value of 0.8,[8] the costs of income inequality in England come to £86 billion or £1,696 per capita in 2006. This represents a full 13% of the value of consumer expenditure, making this one of the largest costs factored into the R-ISEW. As a proportion of consumer expenditure, the value of this component has remained relatively stable since 1994. This stable proportion equates to a steadily increasing absolute value as consumer expenditure grows. However, the data reveal two sharp peaks in 1998 and 2000, when this cost reached 15% of consumer expenditure.

Looking across the GORs, differences are large (Figure 17a). London has by far the largest cost of inequality at £2,465 per capita in 2006. It is interesting to note that the aforementioned peaks in the cost of inequality across England in 1998 and 2000 seem to have been driven predominantly by high inequality in London in those years (indeed the figure reached £3,414 per capita for London in 2000). After London, the two GORs with above-average costs of inequality are its neighbours: the South East and the East of England – the costs in both regions peaking in 2001 at £2,340 and £2,190 per capita respectively.

Meanwhile, the GORs with the lowest costs of inequality are generally those with lower consumer expenditure – the North East, the North West and West Midlands. However, these GORs are also joined by Yorkshire and the Humber, where consumer expenditure is only marginally below the average for England. This can be attributed to the fact that the GOR has seen a fall in its levels of inequality, as measured by the Atkinson Index, since the year 2000. Indeed, in 2006, its Atkinson Index was the lowest of any GOR. The other GOR which has seen a steady fall in its Atkinson Index is the North East. The East Midlands had

also seen a fall, but inequality jumped up in this GOR in the last two years of the time-series (2005 and 2006).

Costs of crime (-2%)

These are based on Home Office estimates of the social costs (including health costs) of individual crimes in different categories, and incidence rates mostly from the British Crime Survey, with additional data on vehicle crime and homicides from other Government sources. Some defensive expenditure by business is also included.

The costs of crime represent a modest fraction of the R-ISEW (£216 per capita). The cost was relatively low until the year 2000, when it began increasing steadily, peaking in 2004 at £231 per capita. As might be expected, the costs of crime are higher in GORs with large metropolitan areas – London, and Yorkshire and the Humber. The quite high levels of crime seen in the North West at the beginning of the millennium have dropped considerably. Meanwhile, costs are lower in predominantly rural GORs, particularly the East of England.

Over time, different GORs have seen very differing patterns. For example, whilst London has always had the highest costs, these dropped quite significantly in the last year of the time-series, from £284 per capita in 2005 to £251 per capita. London also failed to register the surge in the costs of crime which many GORs saw at the turn of the millennium, particularly Yorkshire and the Humber (where costs rose from a low point of £166 per capita in 2000, to £269 per capita in 2003), the South East, the South West and the East of England. The high cost recorded in the North West in 2002 is attributable to a single incident.[9] The biggest improver is the North East. The region had a fairly high cost of crime in the first three years of this time period (15% above the English average in 1994), but this dropped dramatically in 1997, and has remained below the English average since.

Costs of divorce (-1%)

Costs of divorce include defensive costs (identified in surveys commissioned by an insurance company) and the costs of increased risk of mortality for divorcees.

The costs of divorce represent a 1.4% reduction in the overall R-ISEW (some £147 per capita in 2006). This amount has remained relatively stable over the 12-year period, rising slightly in the early years of the new millennium (2001 to 2004) parallel with the costs of crime. However, the cost has come down in the last two years to reach its lowest point yet. In 2006 there were just over 137,000 divorces in England, compared with over 160,000 in 2002.

The distribution of the costs of divorce across regions does not match the distribution of other social costs. The highest per capita costs have been in the South West – consistently so since the year 2000. Here, divorce rates peaked at 3.7 per 1000 inhabitants in 2002, compared with, for example, 3 per 1000 inhabitants in the West Midlands. Meanwhile, the GOR with the lowest costs of divorce has been the East Midlands, where the divorce rate in 1998 was as low as 2.1 per 100 inhabitants. Interestingly, the only GOR to witness a significant change in the costs of divorce is London, where the cost in 2006 was a full 21% below that in 1994. Currently only the East Midlands has a lower per capita cost, whereas, in 1994, London had one of the highest rates of divorce.

Costs of commuting and car accidents (-7%)

The costs of commuting include the loss of leisure time through time spent commuting, and the direct spending costs of motoring and use of public transport. The costs of car accidents include the costs of damage to vehicles and property and the costs of ill-health and fatality. All data, including unit costs for commuting time, come from the Department for Transport.

Our continued dependence on a 'car culture' is not without its price. As people drive longer distances, the associated social costs from commuting and car accidents have, until recently, tended to rise nationally. Together, the two components take 7.3% off the overall

R-ISEW (5.3% attributable to the costs of commuting, and 2% attributable to the costs of car accidents).

Looking first at the costs of commuting, these have increased from £498 per capita in 1994 to £564 per capita in 2006, having peaked in 2004 at £587 per capita. The rank order of the GORs has remained fairly stable (Figure 17b), with London having by far the highest costs (37% above the English average), whilst the North East has the lowest costs. London is also the region where the most notable change in this component can be seen – the cost shot up from £672 per capita in 2003 to £792 per capita in 2004. This is largely due to the increased amount of time Londoners appear to have spent commuting in the last three years of the time-series. This is not because individual commutes are taking longer, however, but that the number of commuting trips reported to be made per person jumped up significantly between the two years in question. Further analysis is necessary to determine whether this is genuine effect.

The pattern for car accidents is very different. Here a steady decrease has been recorded, from a starting cost of £308 per capita in 1994, to one of £221 per capita in 2006. This trend has been true for all GORs, but those starting the time-series with the largest costs have enjoyed the greatest gains. As a result the difference between the best-performing and worst-performing GORs has decreased from £157 per capita in 1994, to £62 per capita in 2006. At the beginning of this period, London had the highest costs (£368 per capita) followed by the East Midlands and the East of England, whilst the lowest costs were in the North East (£211 per capita) and the South West. The most dramatic change again can be observed in London, which now has a per capita cost below the English average – gains being made particularly between 2001 (when it was still the GOR with the highest per capita cost) and 2005. Overall the cost in London has fallen by 41%. As the costs in London fell, Yorkshire and the Humber, having started with below-average costs, has become the GOR with the highest per capita cost, particularly in the last year of the time-series.

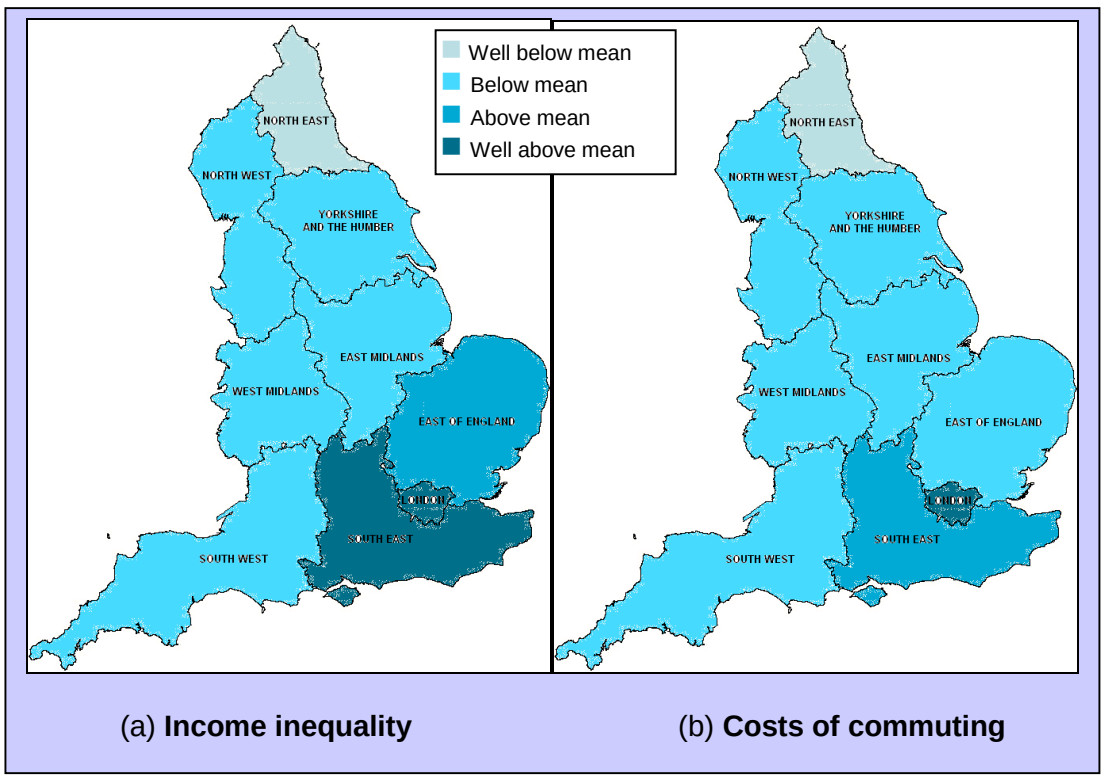


Figure 17: Costs of income inequality and commuting in 2006.

Costs of industrial accidents (-2%)

These are based on estimates of the costs of industrial accidents to UK society, and regional incidence rates from the Health and Safety Executive.

The costs of industrial accidents represent around 1.5% of the R-ISEW (£162 per capita in 2006). Data has only been available for this component since 2001 – the lack of variation in previous years is only an artefact of the estimation methodology. In the time period for which actual data is available, costs have fallen marginally, by 6%, since a high point in 2003. Variation between GORs is fairly large, with the East Midlands and then the South West suffering the highest per capita costs (26% and 19% above the English average respectively); whilst the North West and London have the lowest costs (30% and 17% below the average respectively). These patterns have remained relatively static, though three GORs have enjoyed gentle decreases in this cost – Yorkshire and the Humber, the East Midlands and particularly the North East. Meanwhile, a sharp jump was recorded in the West Midlands between 2005 and 2006.

There are no apparent structural reasons for differences, such as the proportion of regional population employed in particular sectors. This may be an area which merits more detailed investigation of the underlying data.

Step 3: The combined impact of social and economic factors

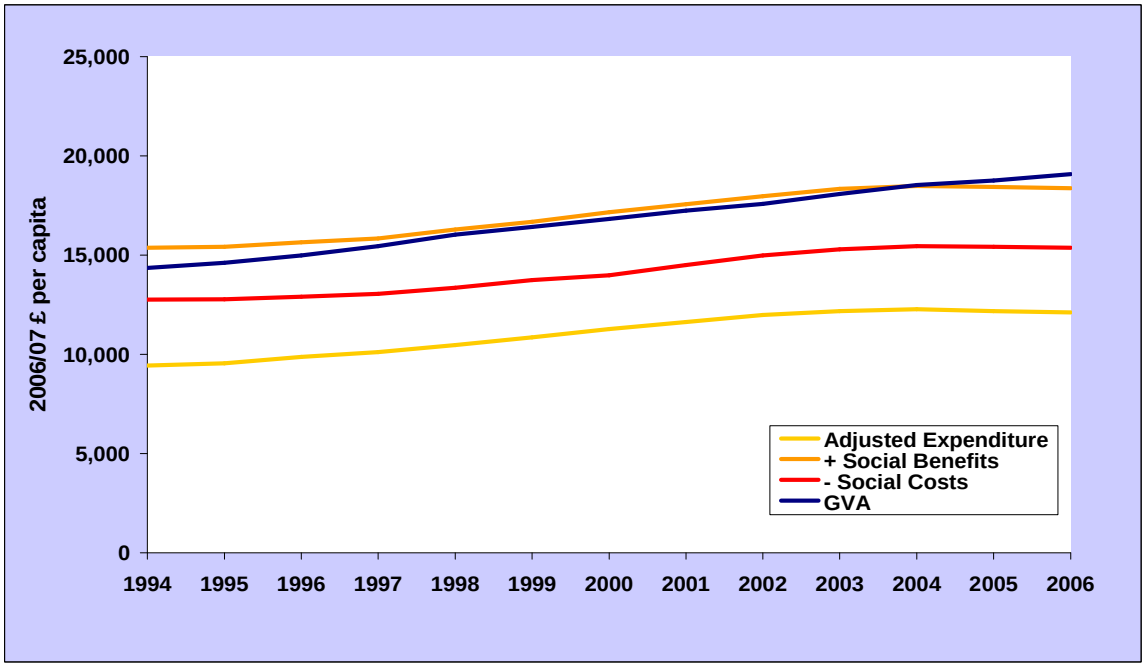


Figure 18: Steps 1 to 3, v. GVA.

Throughout the time period, subtracting social costs takes between 16% and 19% off the total after Step 2. This impact peaked marginally in the year 2000 driven by the increased costs of inequality, and has since been at its lowest. However, the decline in social costs since 2000 is not sufficient to re-invigorate the adjusted indicator such that the decline following 2004 that was observed in Step 2 can be compensated for (Figure 15).

Looking across the GORs, we can see larger costs for London and the South East, and smaller costs for northern GORs, particularly the North East (Figure 19). The result is to alter the order of the GORs. The North West edges ahead of the South West; London drops two places falling below the English average; whilst the South East drops into last place behind the East of England. Looking back over time, we can see that London was even further below the average in 1994, whilst the South East's drop remains a more recent

event. Compared to Figure 14, (before social costs and benefits had been included), the East Midlands' lead has been diminished slightly and occurs later in the time-series.

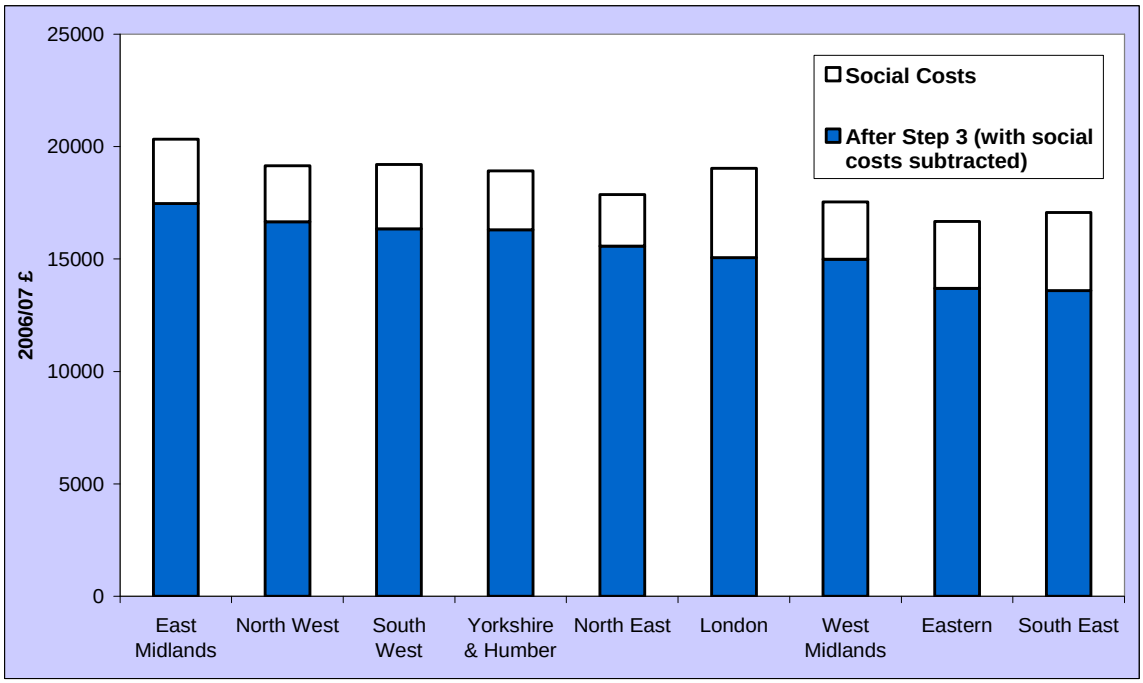


Figure 19: Subtraction of social costs per capita for each GOR in 2006 (Step 3)

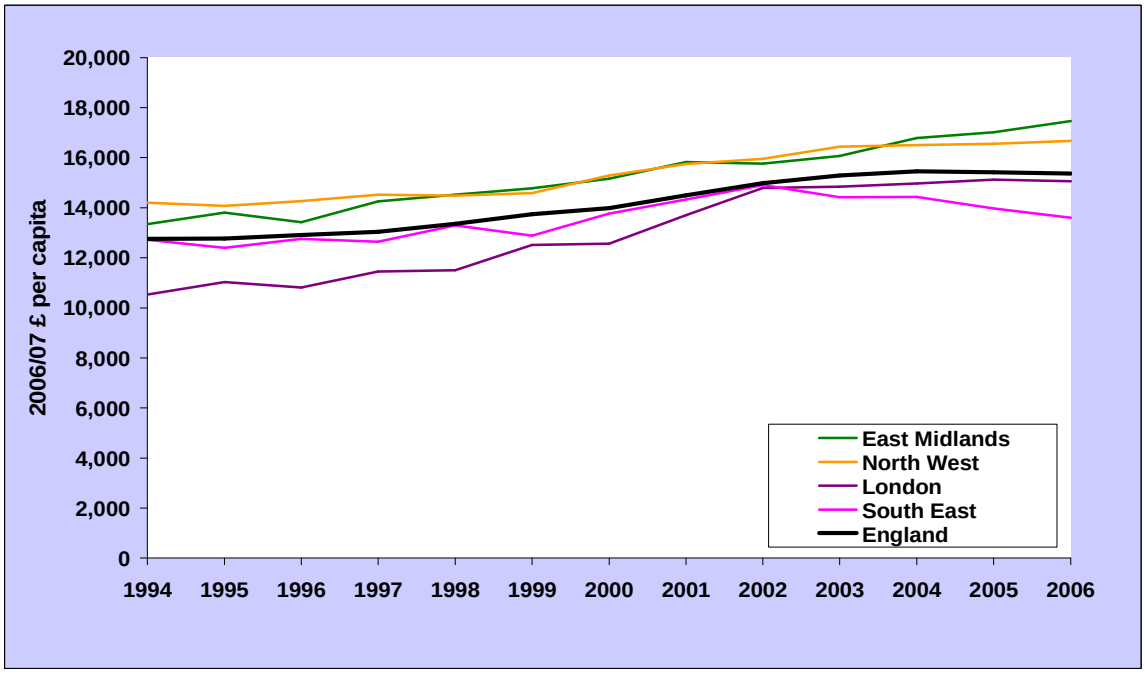


Figure 20: Results of Step 3, per capita for selected GORs.

2.3 Environmental factors

Several different kinds of environmental costs are considered, even though some of these may be in the process of becoming less important to the economy. These costs include the costs associated with 'local' environmental pollutants (air pollution, water pollution etc.); the

implicit costs in losses of agricultural land and natural habitats; the accumulated long-term costs associated with climate change; and the depletion of finite (non-renewable) resources, in particular of fossil energy resources. We discuss each of these adjustments in the following sections.

'Local' environmental pollution

Conventional 'local' air and water pollutants such as sulphur dioxide, nitrogen oxides, chemical oxygen demand, and so on have been the focus of environmental policy initiatives for several decades now. In the R-ISEW, four specific kinds of pollution costs are accounted for under this category:

1. Local and regional air pollution (including sulphur oxides, nitrogen oxides, carbon monoxide, particulates and volatile organic compounds).[10]
2. Water pollution (based on chemical and biological quality of waterways).
3. Pollution abatement.
4. Noise pollution (based on estimates of road and air traffic noise).

The first two categories measure the environmental impact of local water and air pollution – that is, the costs associated with levels of pollution actually recorded in the environment. The third category accounts for abatement costs to industry –expenditure at and before the point where emissions reach the smokestack or waste pipe. These costs are included because they are passed on to the consumer in higher prices, and are thus cashed out as a 'benefit' in the consumer expenditure data used as the R-ISEW baseline. They are, however, clearly *defensive* costs which cannot be said to contribute positively to welfare, and should therefore be deducted.

Taken together, the overall trend over time in the category of local pollution is a declining one. Although noise pollution costs are on the rise, the others are falling, and this category is dominated by the trends in air pollution, as we will see in more detail below.

Again, by following trends in air pollution costs, it can be seen that power-producing GORs, such as the East Midlands and Yorkshire and the Humber, have the highest overall costs in this category – and the highest reductions over the period of the study, in both absolute and proportional terms. GORs such as London and the South West, with little energy generation or heavy manufacturing see lower costs and lower reductions.

However, it is important to remember that the R-ISEW does not attempt to capture the impact of our economy and consumption habits on local environments outside the nine regions of England. For example, air pollution may have declined greatly in England, and indeed in most of Western Europe. However, this may be due to some extent to our increasing reliance on non-Western countries for manufactured goods. The fact that England manufactures fewer cars than in the past may have led to decreases in *local* air pollution. However, if this decrease in manufacturing has only been achieved through an increase in the import of cars manufactured in other countries, with similar or possibly even greater concomitant air pollution, then we might question whether the change really represents a move towards increased sustainability. Rather, we would suggest that the environmental costs have merely been exported.[11]

Water pollution (-0%)

The cost associated with rivers of low chemical and biological quality, as estimated by Defra. Levels of water quality for each GOR as reported by the Environment Agency.

Water pollution has a minimal impact on the overall R-ISEW, deducting a mere £7 per capita across England in 2006. This low figure represents a fall of 27% from 1994 levels. Comparing GORs is a little tricky here as, of course, some have greater lengths of waterway per capita than others (the South West has almost twice the English average,

whilst London has less than 10%). This can potentially result in regions being penalised simply for having more water.

Looking at the percentages of river length that have fair, poor or bad quality, it is London that performs worst, both in terms of biological and chemical quality. Chemically, the rural East of England also performs badly, whilst the sparsely populated South West and North East perform well. Biologically, the East of England and South East actually do relatively well (as of course does the South West); it is the North West and West Midlands that perform poorly.

Good quality water ensures that, even when the lengths of waterways are taken into account, the South West performs relatively well. However, it is ironically London which has the lowest cost per capita of water pollution of any GOR. Meanwhile, relatively poor quality in the West Midlands, combined with extensive waterways, mean it has the highest cost per capita in 2006. However, it should be noted that this has only been the case for the last four years of the time-series – prior to this the East Midlands had by far the highest costs per capita (50% above the English mean in 1994), mainly as the result of poor chemical quality.

Air pollution (-4%)

The costs of damage to health and property of local air pollution, estimated from two recent meta-studies. Levels of air pollution for the UK as a whole, and for each GOR gathered from the National Air Emissions Inventory.

The biggest single component contributing to local pollution is air pollution, although this cost has come down a great deal over the time period. In 1994, air pollution took 14% off England's R-ISEW total – £1,174 per capita. By 2006, the figure had dropped to less than 4% – only £404 per capita: a substantial 66% fall. Falls were most dramatic for sulphur dioxide (SO_2) emissions (a 75% drop for the UK as a whole) and carbon monoxide emissions (a 67% drop), with smaller declines in particulate emissions and nitrous oxide (NOx) emissions. As a result, NOx now represent the biggest total cost of any pollutant or pollutant group (£7.5 billion in 2006), whereas, until 2004, it was SO_2 that was the biggest problem (costing England's R-ISEW £27.9 billion in 1994).

Looking across England, these decreases have, of course, had the greatest impact on GORs with extensive heavy industry and power-production facilities: Yorkshire and the Humber, the North East and the East Midlands. However, these GORs still remain the biggest polluters. The only change in order is that, for the last three years, the East Midlands has no longer been the GOR with the highest per capita cost. This has been the result of a dramatic decrease in SO_2 emissions. Emissions in 2006 are estimated to be one-third those only three years earlier, in 2003. Such a steep fall has not been matched in neighbouring Yorkshire and the Humber.

At the other end of the scale, it is unsurprising that the rural South West has one of the lowest per capita costs. It is worth noting, however, that London, despite what its residents may suspect, actually enjoys the lowest per capita cost of any GOR (62% below the English average). This is due to the lack of both energy generation and heavy manufacturing in the region.

Pollution abatement (-1%)

This represents current expenditure and annuitised capital expenditure per employee on pollution abatement by sector from Defra. The Labour Force Survey was used to determine the number of employees in each sector for each GOR.

Pollution abatement cost England's R-ISEW £65 per capita in 2006. These costs are, of course, closely related to the prevalence of power generation and heavy industry. The distribution of costs is therefore not very surprising: very low in London (only £29 per capita) and more southern GORs, and highest in the North East (£89 per capita) and other northern GORs. Over the six years for which actual data is available, costs have dropped slightly,

though this has been anything but a linear trend, and we suspect that the estimations that had to be made for earlier years (1994–2000) should be treated with some caution.

Focusing on changes over the last couple of years, there has, in fact, been some increase in spending on pollution control, most clearly borne out in the North East and the West Midlands. Looking at lower-level data, it seems that this effect is a result of operating expenditure on pollution control in the electricity, gas, steam and hot water sector more than doubling from £335 million in 2005 to £799 million in 2006. These two GORs currently have the largest shares of these sectors (in terms of numbers of employees).

Noise pollution (-1%)

This is based on three estimates of the cost of road traffic noise pollution in the UK, and regional data from the Department for Transport. Aviation noise is also costed based on a government-endorsed study, with the regional distribution of flights sourced from the Civil Aviation Authority.

Noise pollution has a similarly low impact on the overall R-ISEW, costing only £78 per capita in 2006, of which by far the biggest factor is road traffic. However, unlike the other costs of local pollution, the cost of noise pollution has risen slightly since 1994 – by 15%. By far the most important single driver of this increase has been the increase in the number of vehicle kilometres over time. Variation between GORs is also determined by this factor. The regions with the highest per capita costs are those that include swathes of the commuter belt – the South East and the East of England – with costs decreasing as one moves away from the capital. London itself, however, being an urban conurbation with relatively good public transport links, has by far the lowest cost – 37% below the English average. Interestingly, London is also the only GOR where traffic levels have not risen since 1994; consequently costs have remained static, indeed falling slightly since 1999.

Of course, looking at noise from air traffic, the picture is very different – and here it is London that by far bears the biggest cost at a total of £81 million; this is almost half the total for England - £184 million.

Loss of farmlands and natural habitats (-1%)

The value of natural habitats is estimated based on a willingness-to-pay model using data from the RSPB. The value of farmland and costs of soil erosion are sourced from earlier studies. Rates of farmland and natural habitat loss (or gain) come from the Countryside Survey and the Defra June Agricultural Census.

In the R-ISEW, these factors – particularly the loss of farmland – represent a modest adjustment to the overall index. Furthermore, estimates for the loss of natural habitat are based on only two data points; one should be very cautious about their interpretation.

Looking then at natural habitats, the slight decrease in wetland area in England between 1990 and 1998 has been taken to imply a general slow loss across the country. However, this loss has been so slow as to only just keep pace with population growth. As such, per capita figures for this component have remained steady at £45 per capita.

The costs of loss of farmland and soil erosion are even slighter – £12 per capita. They tend to affect GORs that have historically been more agricultural, such as the East Midlands and the South West. However, it is interesting to note that the South West has seen a sharp decrease in the cost of this component, owing to over 100,000 hectares having been brought into cultivation in the region since 1994.

Step 4: The combined impact of local pollution and loss of farmland and habitat

As a result of the falling costs of air and water pollution and pollution control expenditure within England, the combined impact of these columns has fallen from £1,398 per capita in 1994 to £612 per capita in 2006 (Figure 21). These amounts subtract from 11% to 4% from the total calculated at Step 3. The result is to push up the R-ISEW, in relative terms, in

recent years. At Step 4, having included everything except the costs of resource depletion and long-term environmental damage, the adjusted indicator plots a 30% increase from 1994 to 2006 (as opposed to the 21% increase in Figure 18, which did not include the costs of local pollution). However, a drop can still be observed in 2006, albeit not in 2005.

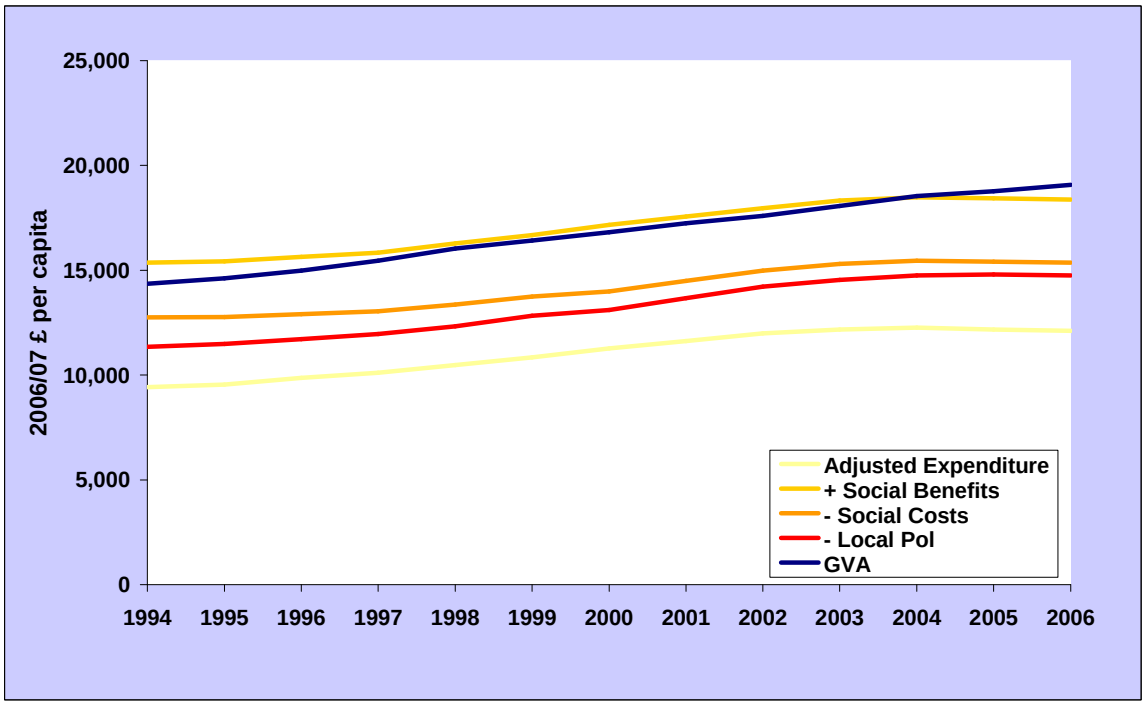


Figure 21: Steps 1 to 4, vs GVA.

Looking across GORs, both the East Midlands and North West suffer somewhat from the inclusion of the local pollution components; however they still remain at the top of the table in 2006. Local pollution certainly pulls the East Midlands' figures down for the earlier years in this time period, and does so, too, for Yorkshire and the Humber. Meanwhile, London edges up the order a little, so that it reaches the English average by about 2001.

Long-term costs of climate change (-22%)

This component is based on an estimate of the total (increasing) cost of dealing with future problems caused by climate change. It then treats this as an accumulated debt; as though it could be paid off over time through an annuitised endowment fund which matures when required in the future. Costs are distributed to the point of emission (using data from the National Air Emissions Inventory), rather than the point of consumption. [12]

As we have already seen in Section 1.3, this is the largest negative component of the R-ISEW, representing just over a quarter of all the costs included in 2006, or £2,280 per capita. Furthermore, as carbon dioxide emissions continue to accumulate in the atmosphere without any serious attempts to ameliorate the damage they will potentially cause, it is a growing component, at an average rate of 2.8% per year since 1994.

Given that the impacts of greenhouse gases are costed at the point of their emission, rather than the point at which their benefits (e.g., electricity) are consumed, this component sharply distinguishes between energy-producing GORs and energy-*consuming* GORs (Figure 22a). So Yorkshire and the Humber suffers particularly (£4,296 per capita is almost half its total R-ISEW for 2006), as does the East Midlands and the North East. On the other hand London and the South West have particularly low costs (London's cost being only 55% of the English average).

nef intends to carry out some development work on this component in the near future, which could dramatically change its value. First, we should explore whether it is more meaningful to attribute the costs at the point of consumption rather than production of energy. Secondly, estimates of the cost envelope of climate change need to be assessed in the light of the Stern review.[13] Lastly, as with the costs of local pollution, this component does not internalise the environmental costs of goods consumed in England but manufactured (with concomitant energy demands) elsewhere. To remedy this gap, one needs to make extensive use of trade data, in a similar fashion to the WWF's ecological footprint methodology.[14] However, such a modification of the R-ISEW is unlikely in the near future.

Resource depletion (-18%)

This is estimated as the cost of replacing fossil energy use with renewable energy, in line with the replacement cost methodology of Cobb and Cobb.[15] At the time of writing, national energy use data was available from the Department for Business Enterprise and Regulatory Reform. Regional distribution is estimated using data on sectoral GVAs, population and travel.

Resource depletion is the second-biggest negative component in the R-ISEW, representing over one-fifth of all costs in 2006 (£1,897). Like long-term environmental damage, this is a growing component – it has grown 27% since 1994 (an average of 2.1% per year). However, unlike the costs of long-term environmental damage, this growth has begun tailing off in recent years. The change between 2005 and 2006 was marginal, and one might anticipate the possibility of a decrease in 2007, once data becomes available. It is important to recognise the differences behind the underlying calculations for this component and the long-term environmental damage component. Whilst long-term environmental damage costs are based on a complex annuity fund methodology that means that the costs of previous years continue to be borne in future years, the resource depletion component simply measures resource consumption in the year in question. If we cut our resource consumption by 50%, the component's impact would drop by 50%, whereas the long-term environmental damage cost will continue to increase unless money is set aside in the hypothesised annuity fund.

Looking across GORs (Figure 22b), more affluent GORs such as the South East and the East of England suffer the highest per capita costs – 6% above the English average in 2006. Meanwhile, the North East and Yorkshire and the Humber, having borne some of the highest costs of long-term environmental damage, actually have the lowest per capita costs of resource depletion (7% and 5% below the English average in 2006, respectively). London, perhaps because its service economy, is less energy-intensive than more industrial economies, and because of its low transport use, more or less tracks the English average throughout the time period.

Over time, the GORs have more or less grown their consumption in step, though increases have been marginally more rapid in the South West and marginally slower in the West and East Midlands. Looking at the differences in growth patterns between different sectors is more revealing. Here, we see that increases in energy consumption by transport have been most dramatic – an increase of 15% from 56 million tonnes of oil equivalent in 1994 to 65 million tonnes in 2006 – 28% of overall consumption. Meanwhile, energy consumption by industry has remained more or less static over the time period at between 58 and 60 million tonnes of oil equivalent.

Whilst this component attributes the costs of energy consumption at the point of the energy *consumption* (unlike the previous component, which penalises at the point of energy *production*), it should be remembered that the consumption of energy does not necessarily coincide with the consumption of a service or good. A car manufactured in the West Midlands, but purchased by an individual living in the South West will contribute positively to the South West's R-ISEW in terms of consumer expenditure, but negatively to the West

Midlands' R-ISEW in terms of resource depletion (of course, if the energy used to manufacture the car was generated in the East Midlands, then it is this region that will see its long-term environmental damage component affected by the car's manufacture).

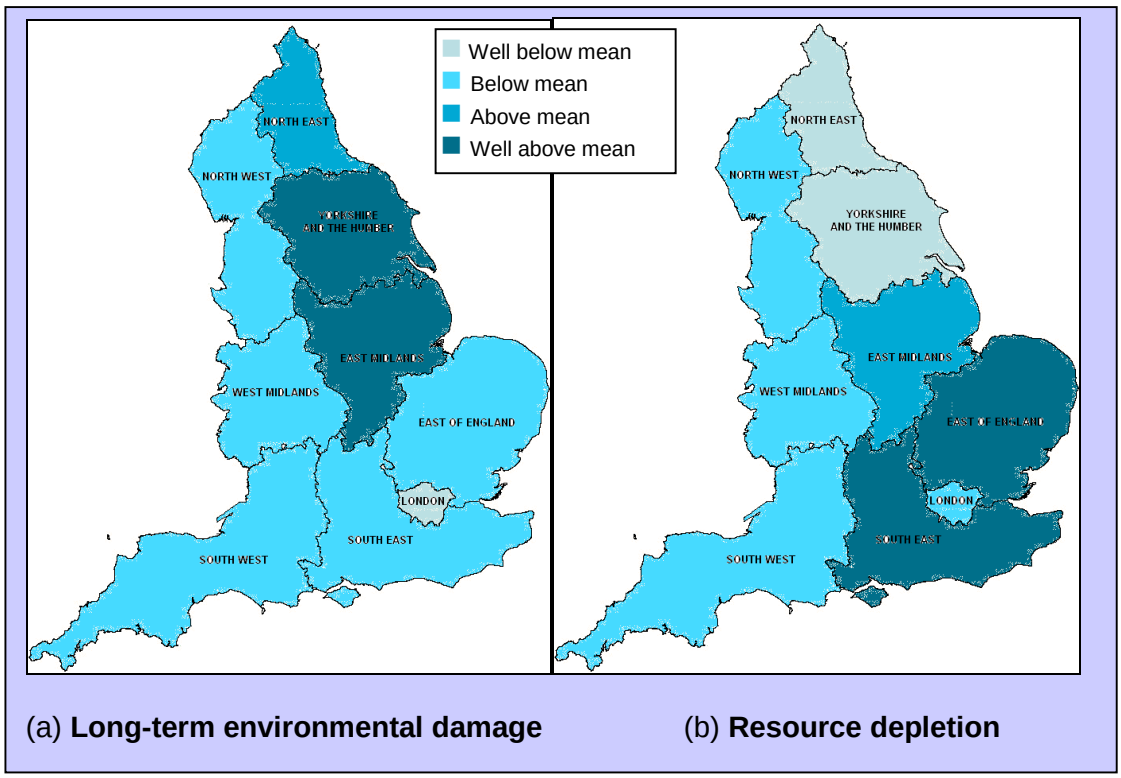


Figure 22: Per capita costs of long-term environmental damage and resource depletion in 2006.

Step 5: Final results

If the inclusion of local pollution served to ameliorate the divergence over time of the R-ISEW from traditional indicators such as GVA, the inclusion of resource depletion and long-term environmental damage (both global environmental costs) undoes that change. As we have seen, the R-ISEW has grown by 29% since 1994, slightly less than the growth rate before global environmental costs have been considered (Figure 23).

Looking across the GORs (Figure 24), it is the electricity-generating regions which are the biggest losers in Steps 4 and 5. The East Midlands is displaced from the top spot it had since Step1, dropping to fourth place; Yorkshire and the Humber drops from fourth to seventh. Meanwhile, the South West jumps to first place from third, and London moves up from fifth place to third.

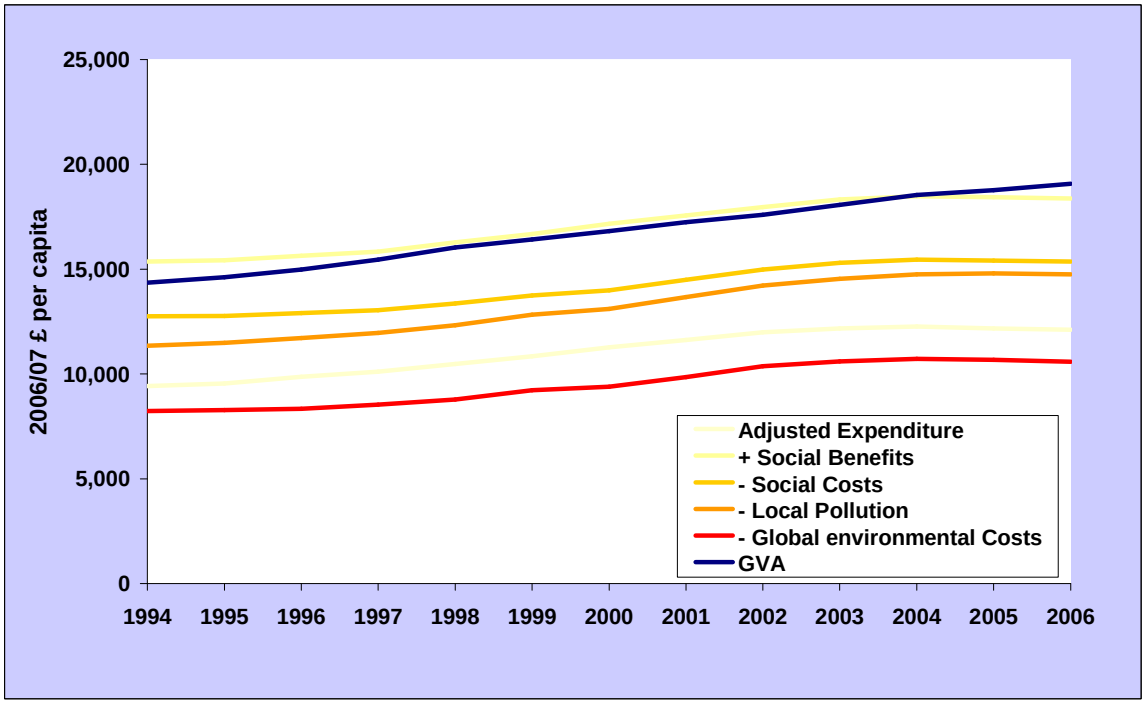


Figure 23: All steps (1–5) in the calculation of the R-ISEW for England. The red line is the final R-ISEW, after Step 5.

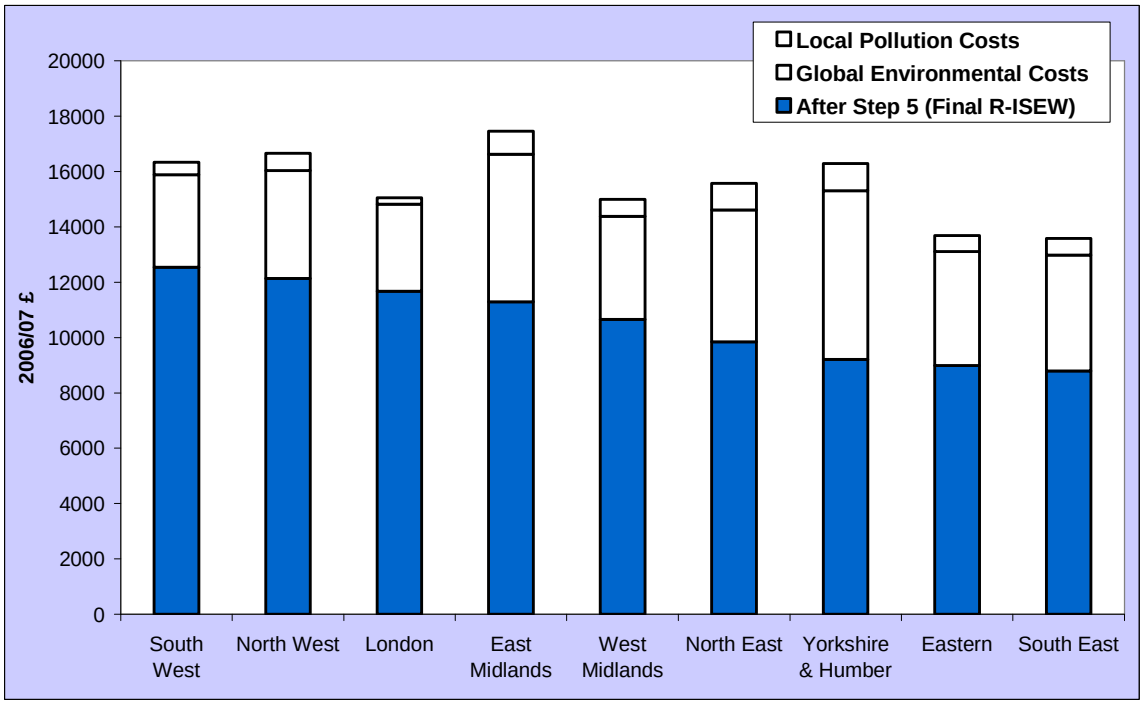


Figure 24: The final R-ISEW, having subtracted both local and global environmental costs from the figures calculated previously for Step 3.

2.4 Importance of each component

Section 3 will explore the results region by region. Before doing so, it is worth gaining a sense of which components tend to drive the variation between regions, and which tend to

drive the variation between years. Figures 25 and 26 show how much absolute variation is contained in each component. In Figure 25, for each component, the lowest regional value is subtracted from the highest regional value for each year, and the differences are averaged across years, so as to get a figure which represents the mean range of each component.

It is clear to see which components are doing most of the 'work' in terms of shaping the regional pattern. Net international position surpasses even consumer expenditure here. Whilst resource depletion is a large component, it is the costs of long-term environmental damage which separate out one region from another. Other important components are the costs of income inequality and air pollution, and net capital growth.

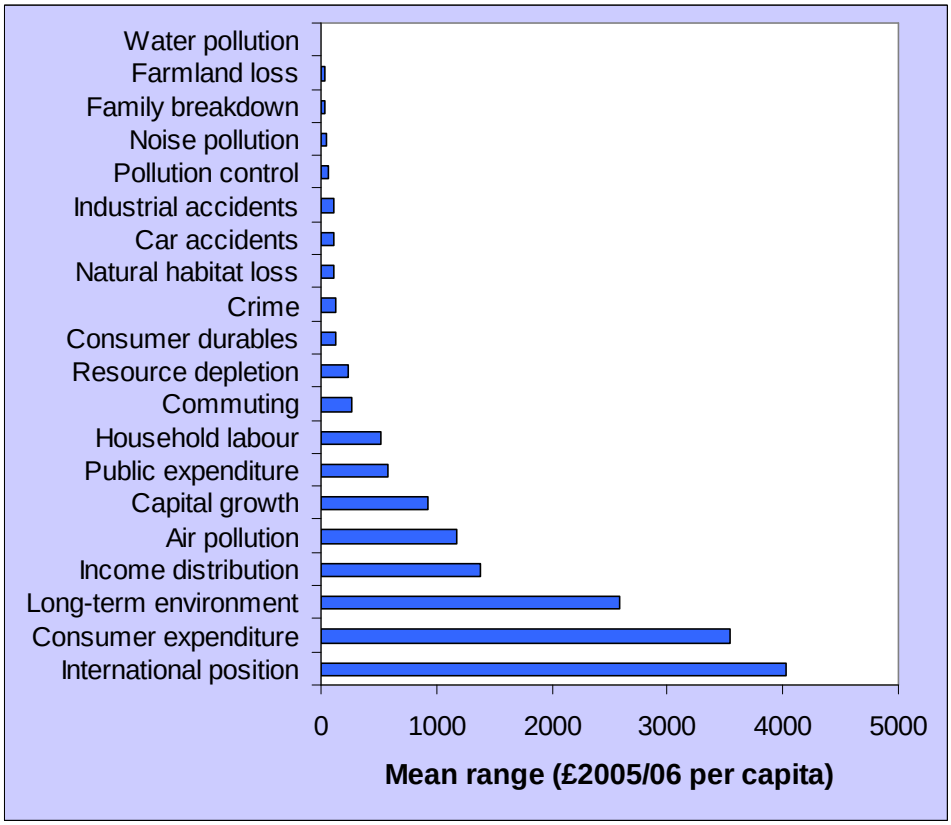


Figure 25: Mean range between GORs, over years, for each component (£ per capita).

A slightly different way of looking at this is to see which components have shaped change over the years. For Figure 26, the difference between the maximum value and the minimum value of a component was taken for each year over the 12-year period for each GOR, and then the annual differences were averaged across GORs.

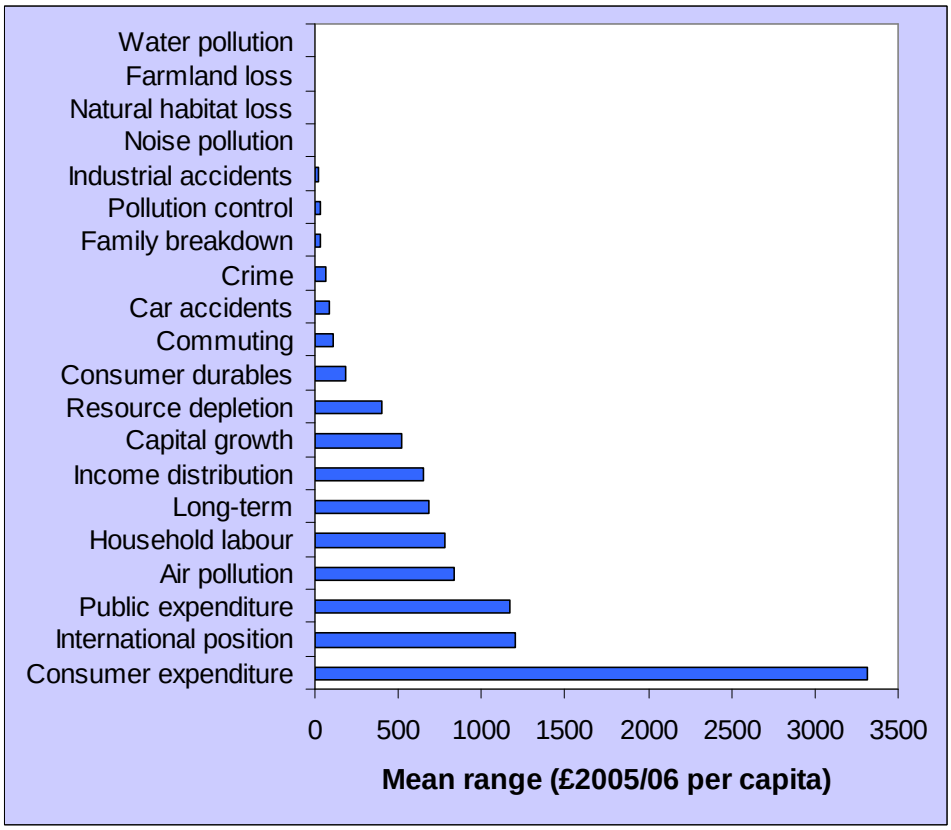


Figure 26: Mean range between years, over GORs, for each component (£ per capita).

Now there is a slightly different pattern. Consumer expenditure is by far the single most important factor increasing the R-ISEW over the years. International position, having been so important in determining the relative performances of the regions, now plays a secondary role – in other words, the component is more stable over time than across GORs. The rise in public expenditure, and declines in household labour and air pollution are also very important in shaping how the R-ISEW has changed over time.

3. The R-ISEW in the English regions

Having explored the results component by component, we shall now briefly explore them GOR by GOR. For each region, we shall trace the progress of its R-ISEW, exploring significant trends and fluctuations. We shall also identify where GORs were performing particularly well or poorly compared to the English average in 2006, using spider diagrams.

For these diagrams we have standardised component values across GORs so that we can compare the relative performance a region has on different components without being concerned about absolute costs. Where the blue line goes within the thick black circle, the GOR is performing worse than the English average (either due to a cost component being larger than average, or a benefit component being smaller than average). Where it goes outside of the thick black circle, and towards the outside of the diagram, the GOR is performing better than the English average (either due to a cost component being smaller than average, or a benefit component being larger than average). We have attempted to group similar components together where possible. If we imagine the diagram as a clock face, the economic adjustments are on the top right, between noon and 2 o'clock; the social benefits are around 3 o'clock; the social costs are between 4 o'clock and 7 o'clock; local pollution costs are between 7 o'clock and around 10 o'clock; and the global environmental costs are at the top left, around 11 o'clock.

We should stress again that these diagrams allow comparisons of a GOR's *relative* performance on a component, not the absolute contributions each component makes to its R-ISEW. So for example, the fact that the North East performs far below the English average on the loss of farmland and natural habitat, does not mean that this is the biggest absolute cost for the region – as we know, this component has a very small absolute effect on the R-ISEW.

After exploring each GOR in turn, we shall briefly look at how the variation across GORs has changed over time, in Section 3.2. Appendix 2 brings the spider graphs together for all regions for easy comparison.

3.1 Region by region

North East

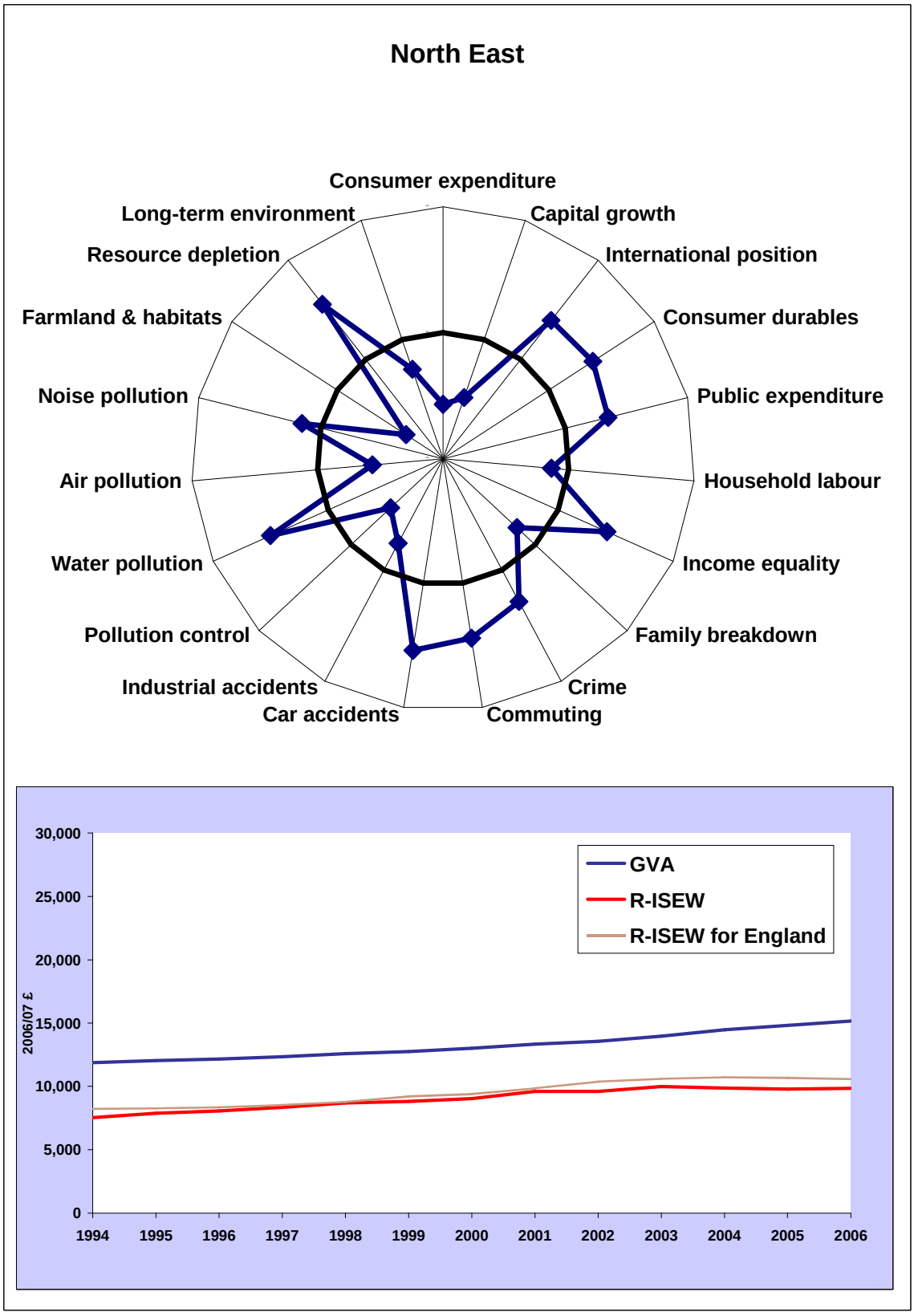


Figure 27: R-ISEW per capita for the North East.

Being on the edge of England, and, according to traditional measures, the poorest GOR in the country, it is not surprising that the pattern of results for the North East should be unique. However, when all components are combined, the region does not perform spectacularly poorly or well, remaining slightly below the English average throughout the 12-year period of these calculations. Its R-ISEW in 2006 was £9,852 per capita, 7% below England, in sixth place out of nine. Negative growth began in the North East in 2003, a year before the rest of England; since then values have remained relatively flat despite ever-more rapid GVA growth in the region. Indeed, it is somewhat ironic that the most rapid growth in GVA (3.5%) occurred in the same year (2003/2004) that the R-ISEW began falling.

Like most GORs, the North East's early growth seems to have been driven by increases in consumer and public expenditure, and a decrease in air pollution. However, since 2003, these benefits have been offset by a lack of capital growth, and a declining international position, coupled with a relentless increase in the costs of long-term environmental damage.

The spider diagram helps understand the North East's pattern of results. One can see its poor relative performance on net capital growth (the lowest score in England) and long-term environmental damage compared with the rest of England (in 2006). Other areas where its costs are particularly high are the loss of natural habitats, pollution control (the highest cost for any GOR) and air pollution (the North East now has the second-highest cost in this component, behind Yorkshire and the Humber). Meanwhile, of course, the region has the lowest level of consumer expenditure in England. Making up for these components, the North East has particularly low costs of resource depletion (the lowest in England), water pollution (second lowest), and four out of the six social costs: income inequality, car accidents and commuting (lowest in all three), and crime (second lowest). Despite a gradual decline since 2003, it still enjoys a relatively strong international position – only beaten by the East Midlands as of 2006. Lastly, the region benefits from the second-highest per capita public expenditure in England, only behind London.

North West

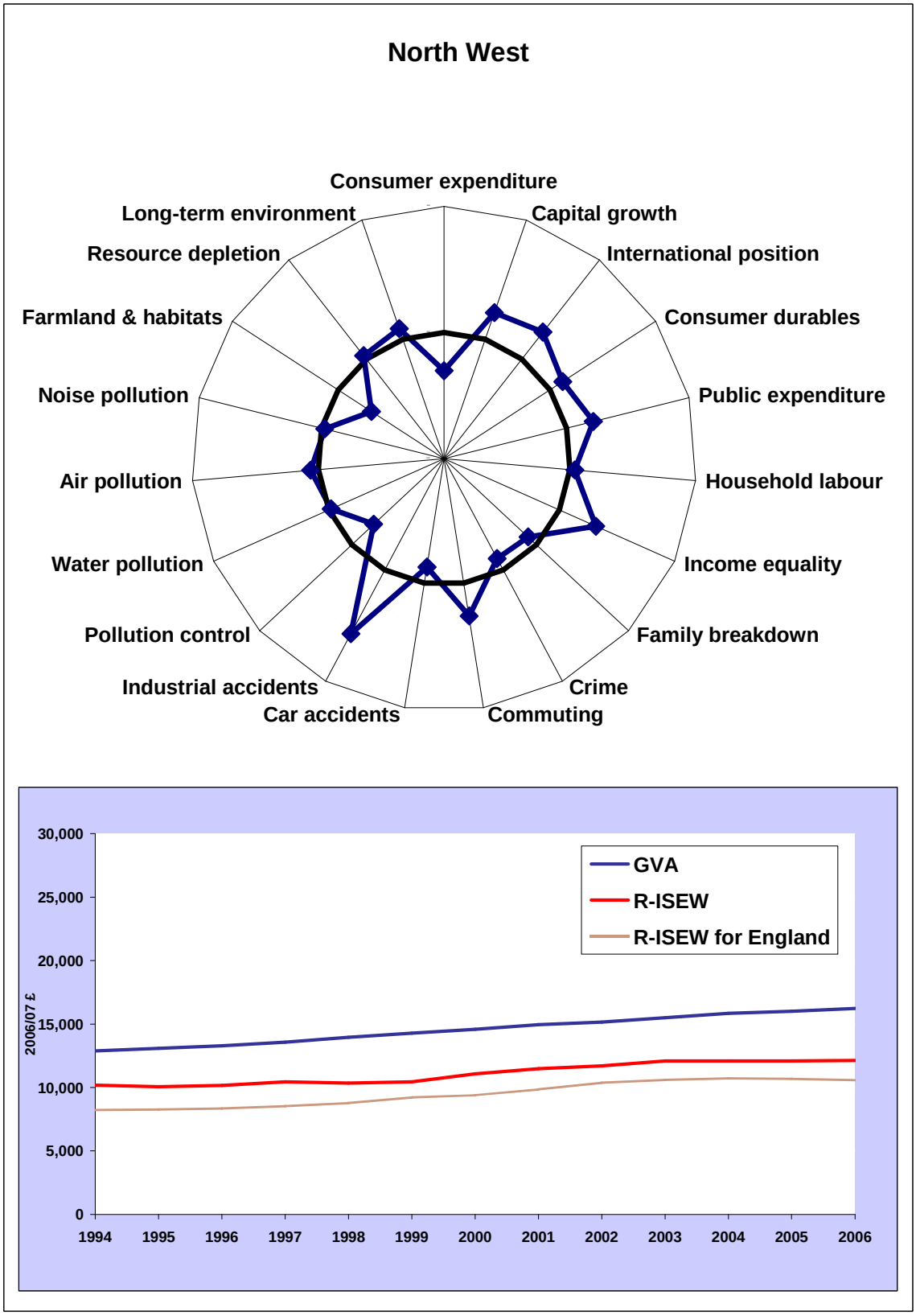


Figure 28: R-ISEW per capita for the North West.

In 2006, the North West had the second-highest R-ISEW in England, at £12,133 per capita (15% above the English average). The region has always had one of the highest R-ISEWs; indeed it had *the* highest R-ISEW up until 2002, when it was displaced from top spot by the South West. The region's strong performance is particularly interesting as it has a low GVA, 15% below the English average in 2006. Indeed, as we have discussed in Section 1.2, it has the smallest GVA–R-ISEW gap of any GOR.

Nevertheless, as for England as a whole, this gap has increased in the last three years (from 22% in 2003 to 25% in 2006). Unlike for the rest of England, however, the region's R-ISEW has continued to grow slightly, only faltering ever so slightly between 2003 and 2005.

What explains this relatively strong performance? The spider diagram reveals that the North West, unlike the North East, is not a region of extremes. The only component where it performs very well is industrial accidents – not a particularly major component in the index. Apart from a below-average level of consumer expenditure, however, it scores slightly above average in every single one of the large-value components: capital growth, international position, public expenditure, domestic labour and volunteering, income inequality, air pollution, resource depletion, long-term environmental damage and commuting. The components where it does not do so well are mostly in the social costs portion of the chart: family breakdown, crime and car accidents (but not commuting).

Yorkshire and the Humber

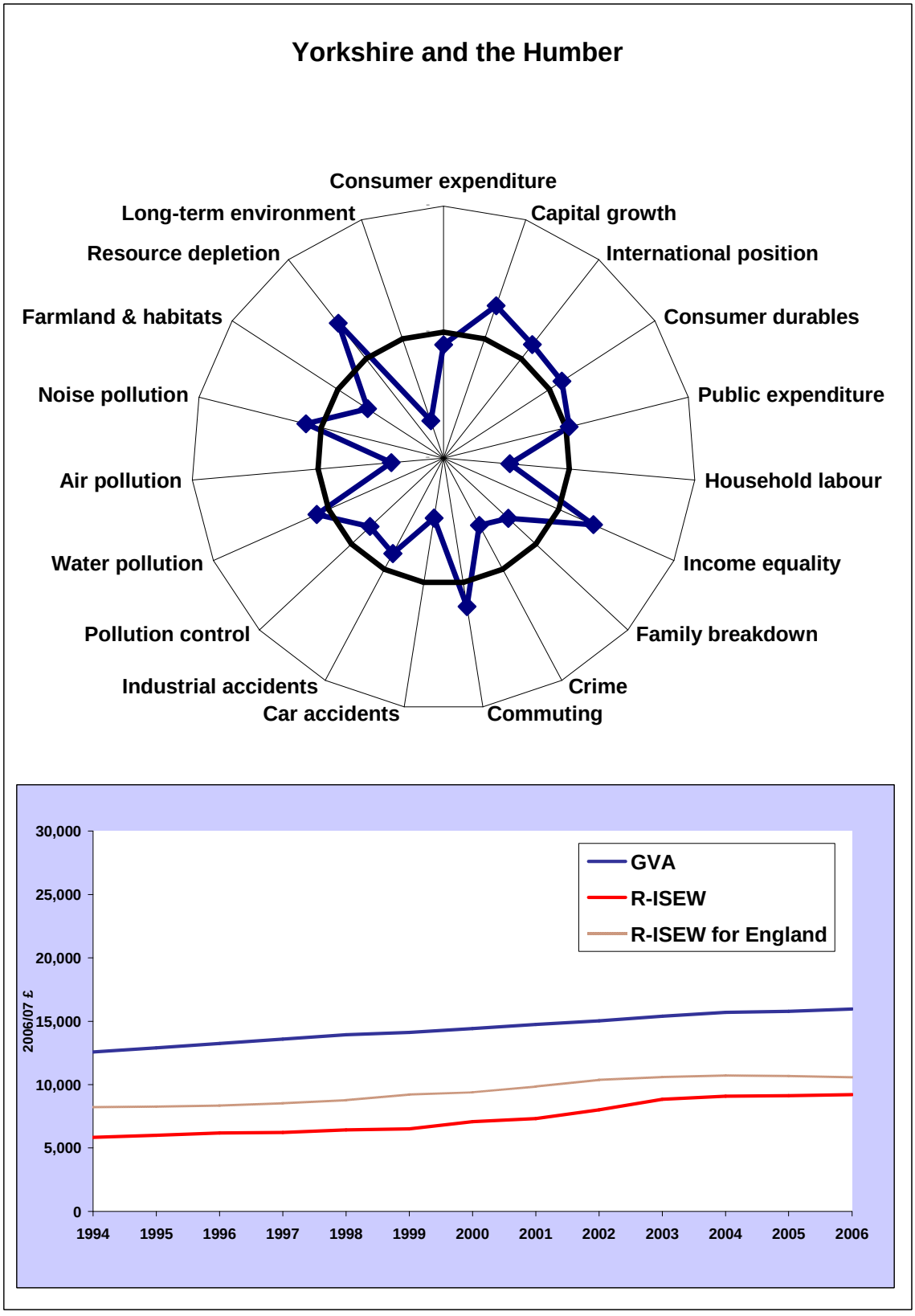


Figure 29: R-ISEW per capita for Yorkshire and the Humber.

Yorkshire and the Humber, burdened by the high pollution of heavy industry and power generation, has one of the lowest R-ISEWs. At £9,211 per capita, it is 13% below the English average. However this figure itself represents a substantial improvement for the region, which started this time-series with the lowest R-ISEW by far (29% below the English average, and almost £2,000 per capita below the next lowest GOR, as recently as 1999). From 1999 to 2003, however, the period saw rapid improvement in the region's performance; this can be attributed to four factors.

The first two factors are not unique to the region: increases in public expenditure on health and education were particularly steep in that period, as were decreases in air pollution, which of course had a particularly strong absolute effect on Yorkshire with its high levels of industry. Two other factors, however, seem to set the region aside. First, the region's consumer expenditure grew by over 16%, which is considerably more than the average growth in England for the same time period (of only 9%). This growth is also of note because it did not seem to be marred by increases in inequality as seen in other GORs where growth has occurred. Secondly, the region enjoyed a huge surge of capital growth so that, between 2002 and 2004, it enjoyed the highest levels of any English GOR (reaching £883 per capita in 2003).

Currently, the region's R-ISEW is just higher than that of the South East and the East of England, but a fair bit lower than that of the North East. The spider diagram reveals many components are still below the English average: household labour and volunteering (second lowest in England), the costs of family breakdown, car and industrial accidents (Yorkshire has the highest per capita cost of car accidents), pollution control, loss of farmland, and of course, long-term environmental damage and air pollution. The region performs above average in terms of income equality, resource depletion and capital growth and also marginally above average in terms of international position and the costs of commuting.

East Midlands

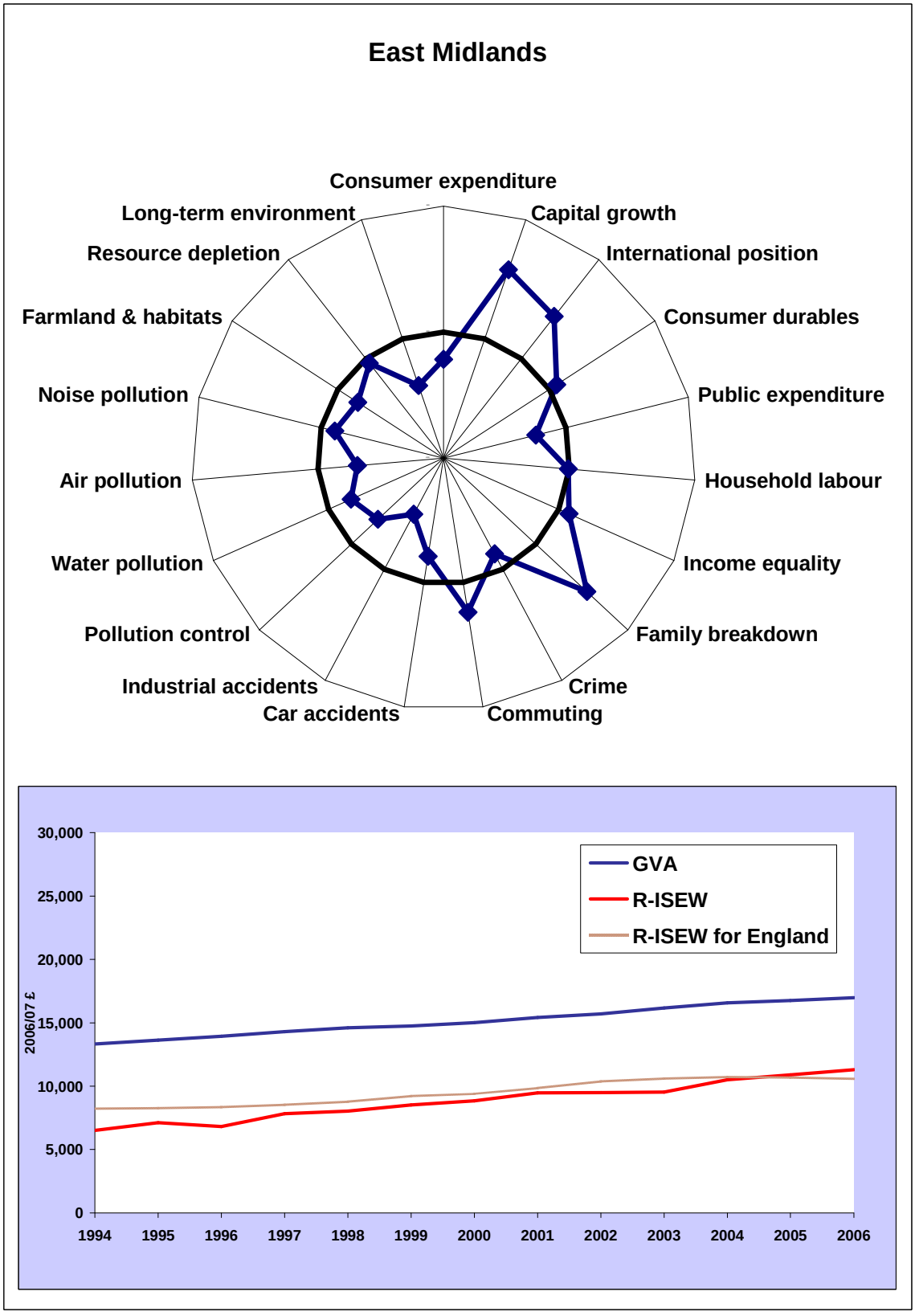


Figure 30: R-ISEW per capita for the East Midlands.

Whilst the East Midlands fared little better than its neighbouring region Yorkshire and the Humber back in 1994 (with an R-ISEW per capita of £6509 compared to £5844), it has successfully moved from second-to-bottom to being above the English average as of 2005. In 2006, its R-ISEW was 7% above average, at £11,291 per capita. It is the only GOR to have seen any substantial growth since 2003, enjoying growth rates of just under 6% per annum during the last three years of the time-series.

What explains this performance? Consumer and public expenditure have grown in the region, but then they have everywhere in England. Indeed, it is only in the last three years of the time-series, that growth in consumer expenditure in the region exceeded the English average – previously, consumer expenditure growth was only at an average rate of 2.1% per year, whereas it was at 3.1% for England as a whole. Furthermore, the region has suffered in recent years from some growth in income inequality.

Rather, there are four areas where the region does relatively well, compared to the rest of England – particularly in the last three years of the time-series. First, whilst the costs of resource depletion have increased in the East Midlands, they have done so at a slower rate than for England overall. Secondly, the costs of car accidents have fallen at a faster than in the rest of England. Thirdly, as we have seen, air pollution has fallen dramatically in this region, even faster than in other GORs that previously were heavy polluters, such as Yorkshire and the Humber. And last, but not least, the region has done particularly well in terms of economic adjustments – net international position and capital growth. Net capital growth rates have more than tripled between 2002 and 2006, such that the East Midlands currently has the highest rate in England. The region also has the highest net international position of any English GOR, though here growth has been a little less dramatic, only increasing by 45% from 2002 to 2006. Top performance in these two economic components in the last few years explains why, during the running calculations of the R-ISEW in Section 2, the East Midlands remained the GOR with the highest R-ISEW up until environmental costs were added.

The spider diagram illustrates this very clearly. Starting from a below-average consumer expenditure, the East Midlands then performs above average in six out of the first seven components (up until 4:30 on the clock-face. As well as the components discussed in the previous paragraph, the region has the lowest per capita costs of family breakdown, and reasonably low costs of income inequality (despite recent increases). It also has low relative costs of commuting. However, once one moves to the left of the spider diagram, from 6 o'clock to midnight, it performs below average on every component, particularly the costs of industrial accidents (highest in the country) and long-term environmental damage (second highest in the country at over 50% above the English average).

West Midlands

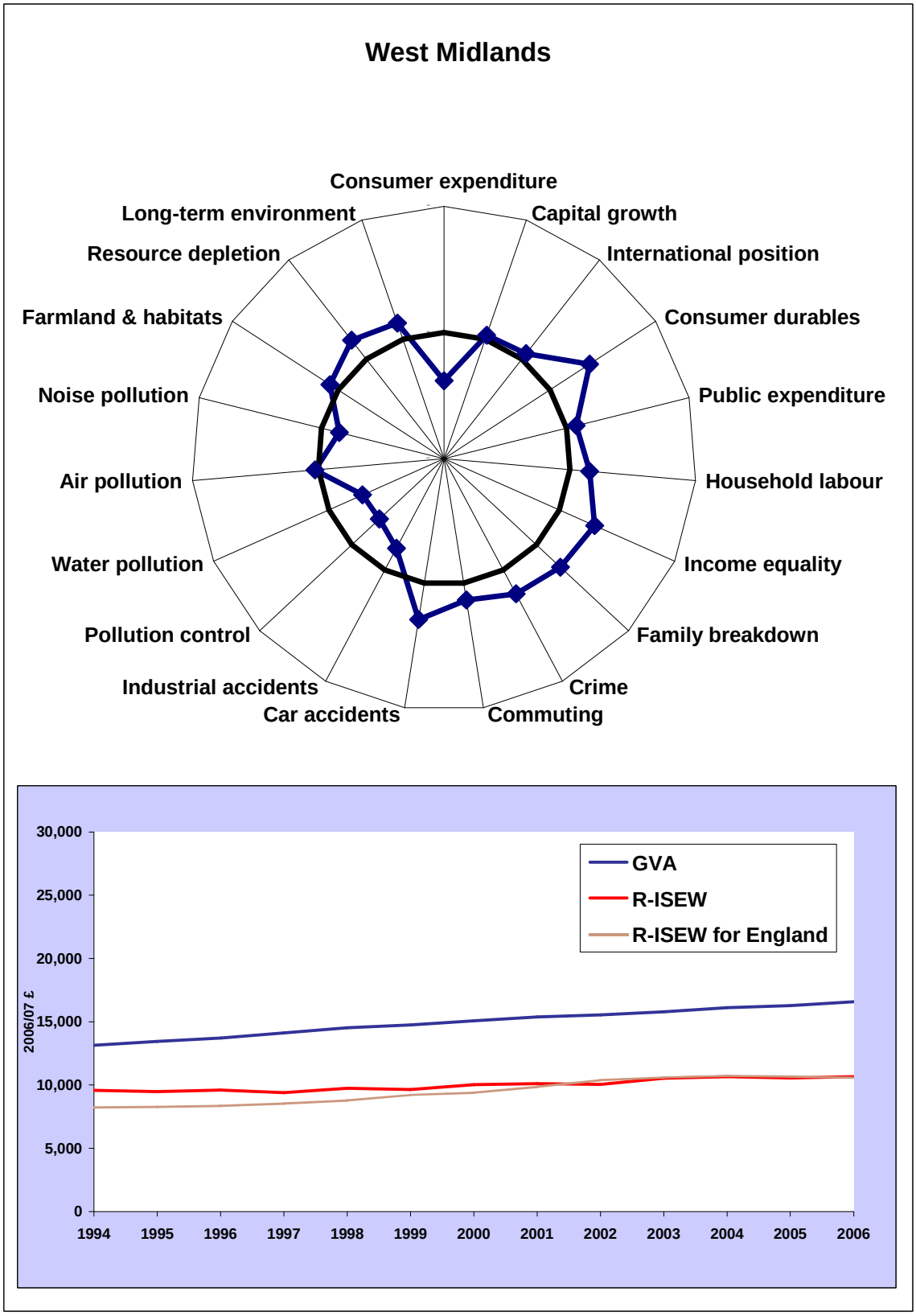


Figure 31: R-ISEW per capita for the West Midlands.

It is fitting that the middle of the country, the West Midlands, should have an R-ISEW more or less equal to the English average – £10,654. Like the rest of the country, R-ISEW growth has faltered in the last couple of years, though the effect is less marked here. Neither has R-ISEW growth completely stopped (the West Midlands' R-ISEW for 2006 is still its highest over the time period), nor was it ever that great – indeed the West Midlands has had one of the slowest-growing R-ISEWs of any GOR, at 1.1% per year from 1994 to 2004, compared to an English average growth rate of 2.7% per year for the same period. As such the two questions worth asking are: why has the R-ISEW in the West Midlands not grown as rapidly as the rest of England, and why has it not stopped growing?

The main drivers of R-ISEW growth for England, aside from growth in consumer and public expenditure, have been dramatic cuts in the costs of air pollution, alongside smaller decreases in several other environmental and social costs, including the costs of car accidents and pollution control. For the West Midlands, consumer expenditure did not increase at quite as fast a pace as in the rest of England (2.8% per year vs 3.1% per year). Furthermore, the region did not enjoy the same surge in net capital growth that the rest of England did from 1999 onwards. As for its recent relative success, it seems that reasonably stable consumer expenditure, decreasing social costs (around crime, family breakdown and car accidents), and less dramatic increases in global environmental costs are responsible.

The spider diagram for 2006 reveals a fairly balanced set of components. Like the East Midlands, the West Midlands does better on the economic adjustments and social components (in all of which it performs better than the English average), and does worse on the environmental components; however the contrast is not as dramatic. Furthermore, the environmental components where the West Midlands does perform slightly better than the English average (long-term environmental damage, resource depletion and air pollution) are the very ones which have the biggest effect. The component where the region performs worst is consumer expenditure (which is currently 10% below the English average). The component where it performs best is on the net service flow deficit from consumer durables – not surprising as it is calculated using the same dataset as consumer expenditure.

East of England

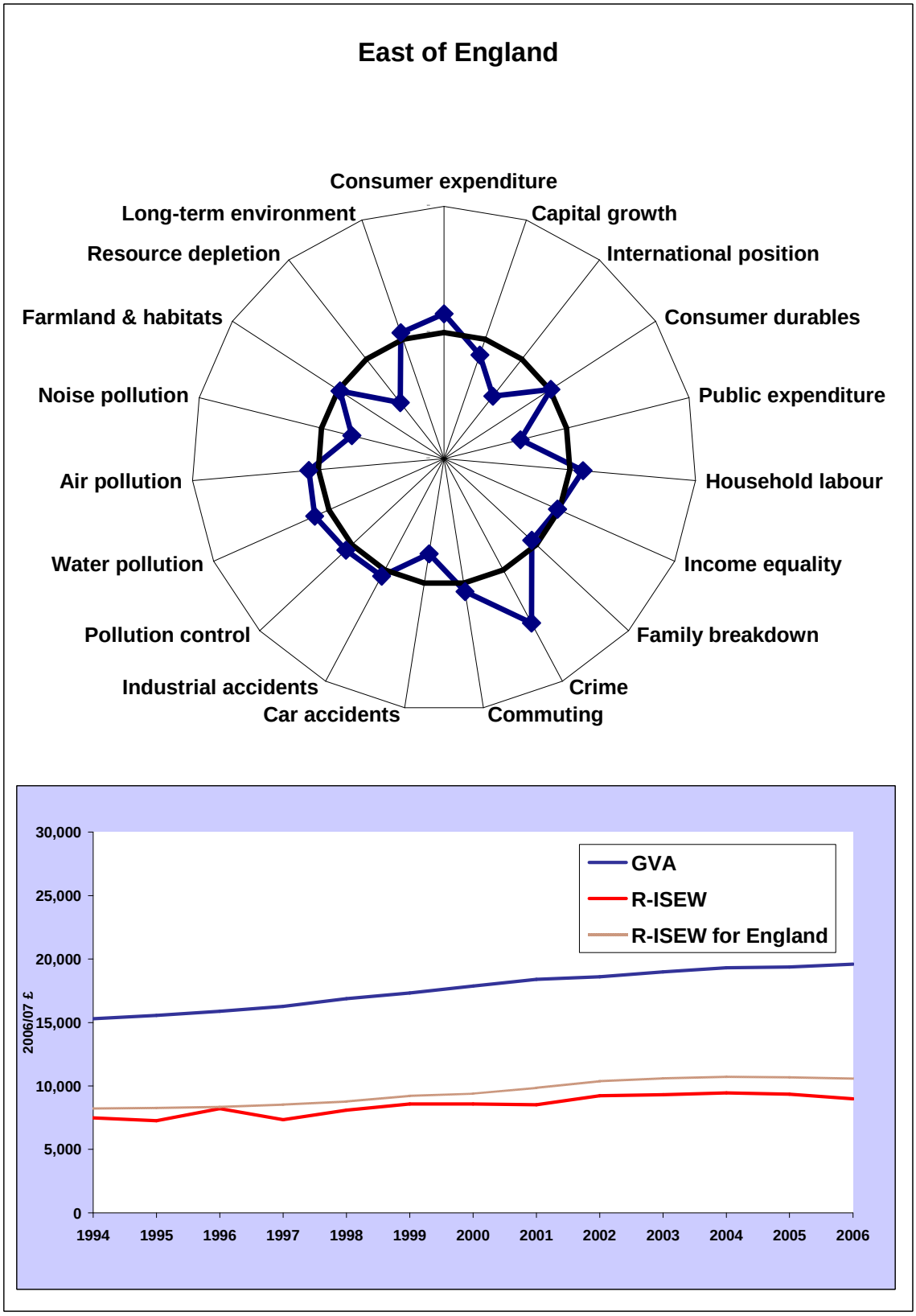


Figure 32: R-ISEW per capita for the East of England.

The East of England is a wealthy region with above-average GVA and consumer expenditure. However, in 2006, it had the second-lowest R-ISEW at £8,993 per capita – 15% below the English average. Like the rest of England, its R-ISEW has fallen in the last two years of the time-series. However, this fall has been slightly more dramatic in the East, at a rate of 2.4% per annum, as opposed to only 0.7% per annum for the rest of the country. Indeed, the region's R-ISEW is now lower than it was in 2002.

The region's main problems with regards to the R-ISEW, are its low net international position (second lowest in the country, with a deficit of £2,785 per capita in 2006), negative net capital growth, the lowest public expenditure in the country, and a high cost of resource depletion (joint highest with the South East). The increasing deficit in international position seems to be the main reason for the region's R-ISEW's steep decline since 2004. Indeed, if the deficit had remained at the same level since 2002, it would not have suffered any decrease in its R-ISEW. The only component that it performs particularly well at is crime, where it has the lowest per capita cost of any GOR.

London

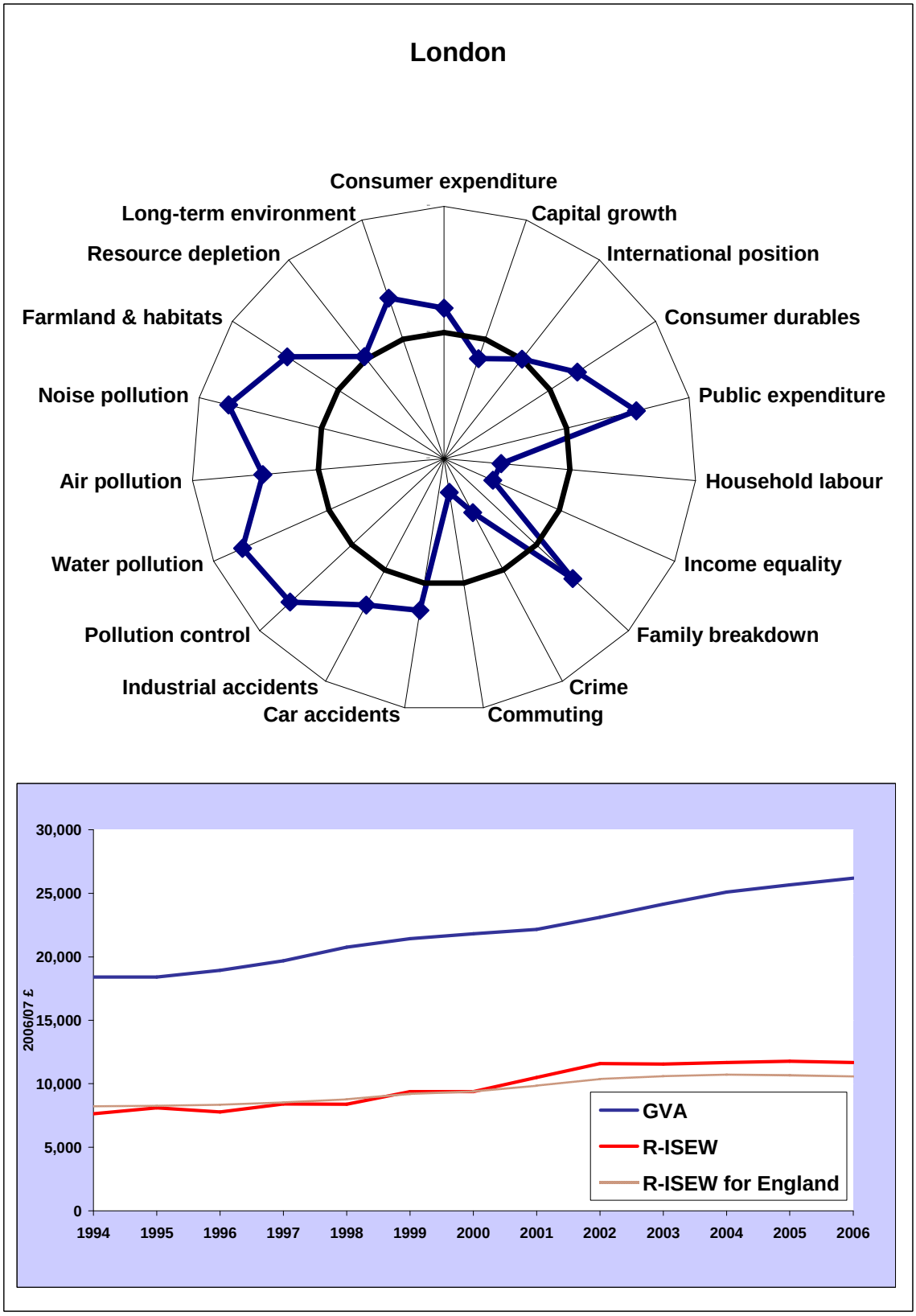


Figure 33: R-ISEW per capita for London.

London, as a GOR, is unique in that it represents a single and, in itself unique, city. The smallest GOR in terms of land area, it is the second-largest GOR in England in terms of population. It is therefore unsurprising that the R-ISEW for the region behaves markedly differently than that for other GORs.

London has by far the largest GVA per capita of any GOR – 37% above the English average and 22% above the next richest GOR, the South East. By traditional measures, it is the most successful GOR economically. However, when one starts from consumer expenditure and make the appropriate, economic, social and environmental adjustments, the region only makes it to third position on the R-ISEW. At £11,672, it is 10% above the English average, but behind the North West and South West. This nevertheless represents significant improvement, as, in 1994, the region was below the English average. Indeed, after the East Midlands and Yorkshire and the Humber, London has been the biggest R-ISEW mover. And yet, like most of the country, R-ISEW growth in London has ceased, and the region recorded a decline in its R-ISEW per capita from 2005 to 2006.

What makes London's R-ISEW so different from its GVA? First, whilst it has above-average consumer expenditure, for the last six years it has not been the region with the highest, exceeded by the South East. Since the year 2000, consumer expenditure in London has not risen. Rather, it has fallen from £14,310 per capita in 2000 to a low of £13,543 in 2004 – perhaps as a result of migration of wealthier families to the commuter belt towns of the South East and the East of England. Once one has adjusted consumer expenditure with London's below-average capital growth and net international position, the region drops to a lowly fifth place. The region does benefit from the highest per capita public expenditure on health and education, but it is perhaps not surprising that it suffers very high social costs (highest in terms of income inequality, commuting and crime) and gains the lowest value from domestic labour and volunteering of any GOR.

From 6 o'clock onwards on the spider diagram, however, London performs above average on every component. It has below-average costs of car and industrial accidents, and the lowest costs for all local environmental components, as well as for long-term environmental damage. Even on resource depletion, which is measured at the point of consumption and tends to penalise wealthier GORs, London has lower costs than the English average.

London's big improvement in R-ISEW occurred between 1998 and 2002, where the R-ISEW increased at a rate of 10% per annum – a total of £4,042 per capita. This growth was driven predominantly by the region's vastly improving net international position, slashing a £2,208 per capita deficit down to £657 per capita in 2002 and £340 per capita in 2003. Meanwhile, the region's global environmental costs did not increase quite as fast as those in the rest of the country; its public expenditure increased at a faster rate; and it continued its sharp drop in the rate of car accidents.

South East

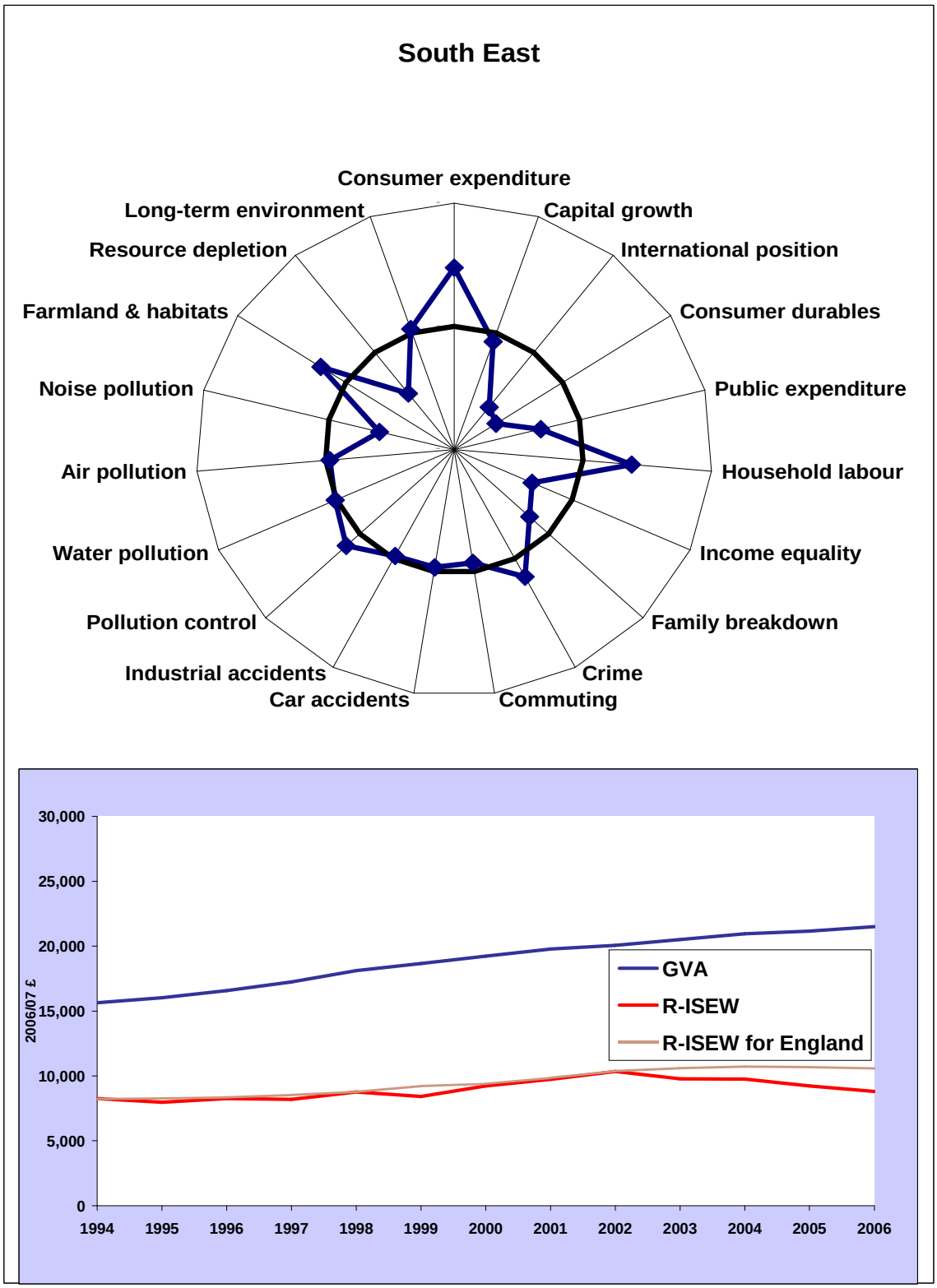


Figure 34: R-ISEW per capita for South East.

The South East is the second-richest GOR in terms of GVA, and the richest in terms of consumer expenditure. It is also the largest GOR in England in terms of population. It is therefore of concern that, whilst its GVA has continued to grow, the region has suffered from a falling R-ISEW since 2002, when it peaked at £10,336. It has now dropped to £8,800 per capita, falling at an average annual rate of 3.7%, such that the region now has the lowest R-ISEW in England, 17% below the national average.

The biggest cost to the South East's R-ISEW, is its huge apparent balance of payments deficit – £3,704 per capita in 2006. Looking at the raw data, this is mainly due to importing twice as many goods as it exports. As a result, even before social and environmental costs are considered, the South East has the second-lowest adjusted consumer expenditure in England. Aside from this component, it also has the second-highest income inequality in England, the highest levels of noise pollution thanks to its reliance on the automobile, and the joint highest levels of resource consumption (also, partly due to its reliance on the automobile). The only component where the region does relatively well, aside from consumer expenditure, is domestic labour and volunteering – according to the 2000 Time Use Survey, people in the South East spend over one hour more per week on domestic labour than the British average, and 7 minutes per week more on volunteering.

The South East's declining R-ISEW in the last four years is mainly due to growth in its balance of payment deficit. Other components can also be held partly responsible however: increasing costs of crime and commuting, decreasing net capital growth and, of course the increasing global environmental costs associated with resource and energy consumption.

South West

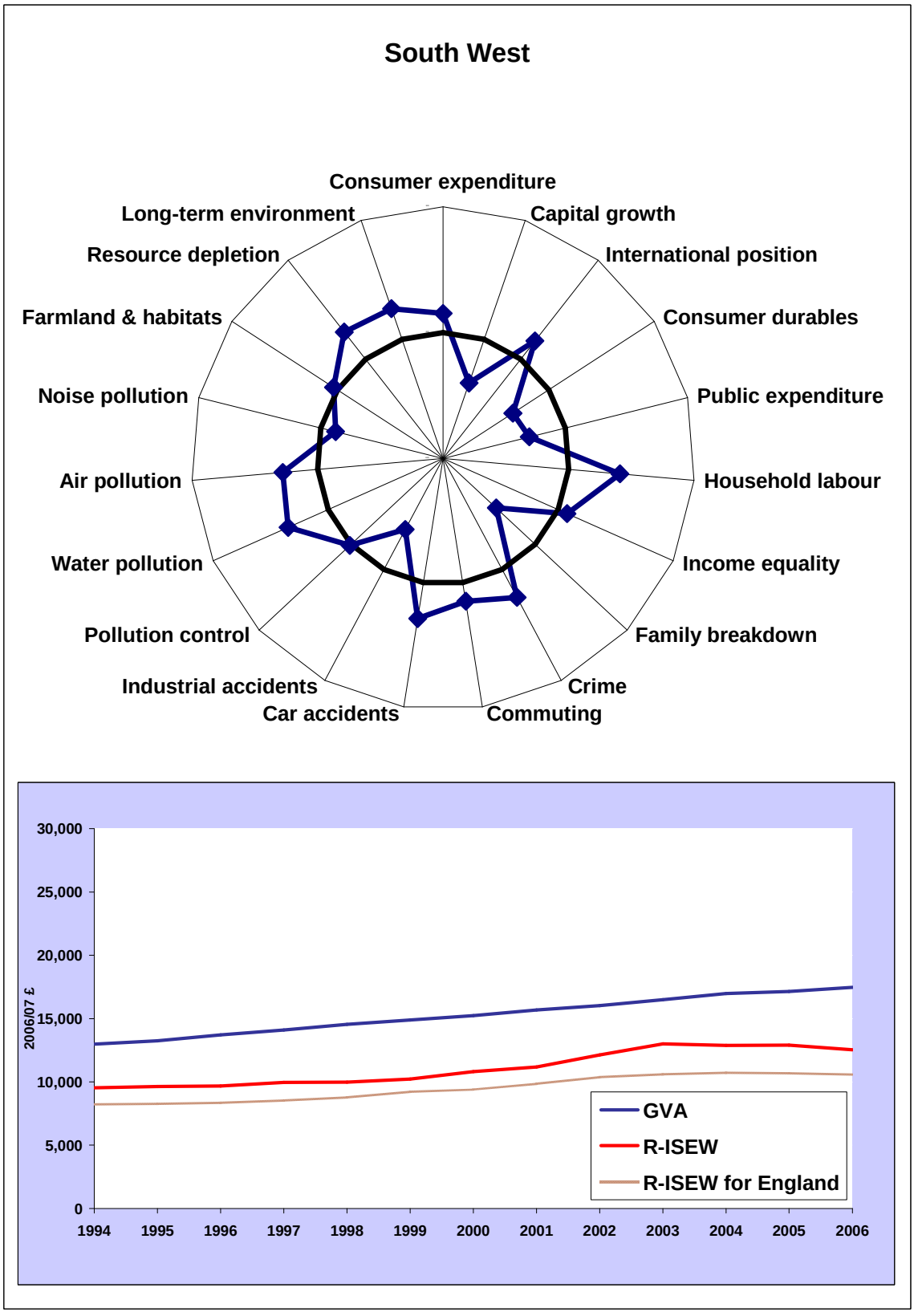


Figure 35: R-ISEW per capita for South West.

The South West of England is neither associated with the high energy consumption typical of the wealthy Home Counties, nor the social problems of London, nor the environmental damage of traditional industrial GORs of the north. As such it is perhaps not surprising that it has the highest R-ISEW in England – £12,540 per capita, 19% above the English average. However, the story for this region is not all positive. It, too, has suffered a decline in its R-ISEW since 2003 when it peaked at £13,006. As a result, its lead over the rest of England is less dramatic than it has been previously.

The spider diagram confirms the suggestions raised in the previous paragraph. The South West performs above average on six out of the seven environmental components, including the largest ones – long-term environmental damage, resource depletion and air pollution. It also performs above average on income equality, crime, commuting and car accidents, and household labour and volunteering. It even performs reasonably on international position – the main problem for its neighbour the South East. As a result, it is in second place behind the East Midlands as soon as consumer expenditure has been economically adjusted, before social and environmental costs are subtracted.

The region's failure to improve its R-ISEW in recent years can be put down to net capital growth switching from a positive to a negative figure, whilst resource depletion has grown at a faster rate, and the costs of commuting have grown, having gone down the previous three years.

3.2 Trends in variation

As well as looking at the absolute values of the R-ISEW for different GORs, it is of interest to explore how the level of *variation* across GORs has changed over time – are regions becoming more or less similar? Figure 36 shows the coefficients of variance for the R-ISEW, GVA and consumer expenditure over time. The coefficient of variance is calculated by dividing the standard deviation of a particular indicator for a particular year by the mean of that indicator for that year. Higher percentages indicate high variance in that indicator.

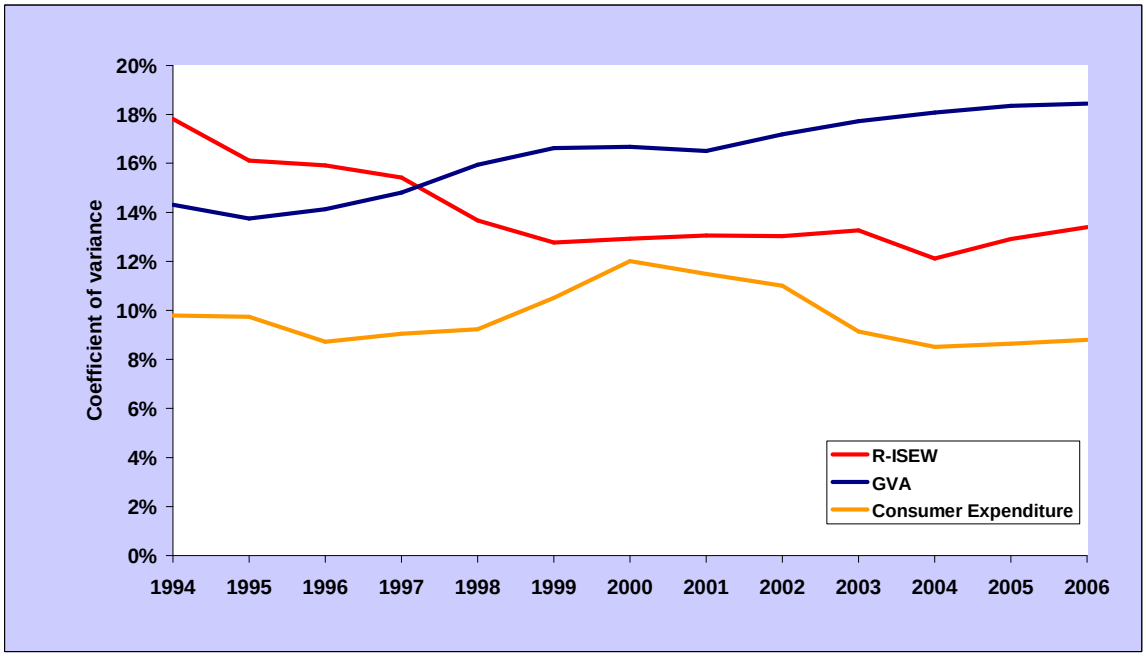


Figure 36: Coefficients of variance over time for the R-ISEW, GVA and consumer expenditure.

Whilst England appears to be getting more unequal in terms of GVA (the coefficient of variance has risen from 14% in 1994 to 18% in 2006), regional R-ISEWs seem to be converging slightly, or at least did so between 1994 and 1999. The coefficient of variance has fallen from 18% in 1994 to around 13% over more recent years. Meanwhile, little trend can be discerned based on consumer expenditure, though it is interesting to note that, overall, coefficients of variance for this measure are much lower (at around 10%) than those for GVA.

Judging from earlier sections of this report, we would suggest that this convergence of R-ISEWs came about as poor performers, such as the East Midlands, gained ground over the late 1990s as a result of improving economic indicators, and decreasing local pollution. Another peripheral, less positive, explanation might be the spread of social costs such that they are not exclusive to London.

Figure 37 demonstrates that it is indeed the case that the coefficients of variance of air pollution and the combined social costs (excluding income inequality), have gone down since 1994. However, the coefficient of variance for net international position is quite hard to interpret, partly thanks to its volatility. It appears to have risen dramatically between 1994 and 1997, as the deficits of GORs such as the South East and the East of England grew rapidly.

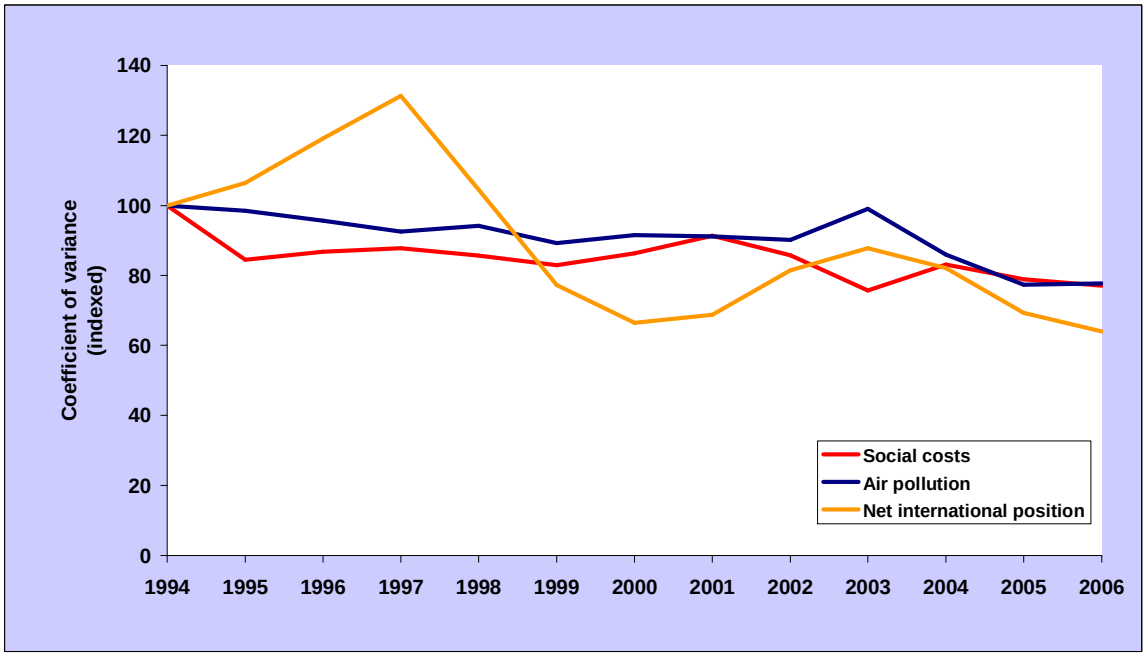


Figure 37: Coefficients of variance over time of selected components and component sets.

4. Amendments to the R-ISEW methodology

As with many complex indicators, updates of R-ISEWs from one year to the next are subject to adjustments and modifications. There are several reasons for this:

1. Updates of the source data on which the R-ISEW is dependent.
2. Linear trends used to estimate values for some years are affected by later data.
3. Occasionally, figures that previously had to be estimated can be replaced by new data sets. Similarly, unit costs are subject to updates.

This section explores the difference between this year's R-ISEW and last year's. It then summarises the changes made and the difference the changes have made to the results.

Overall R-ISEW

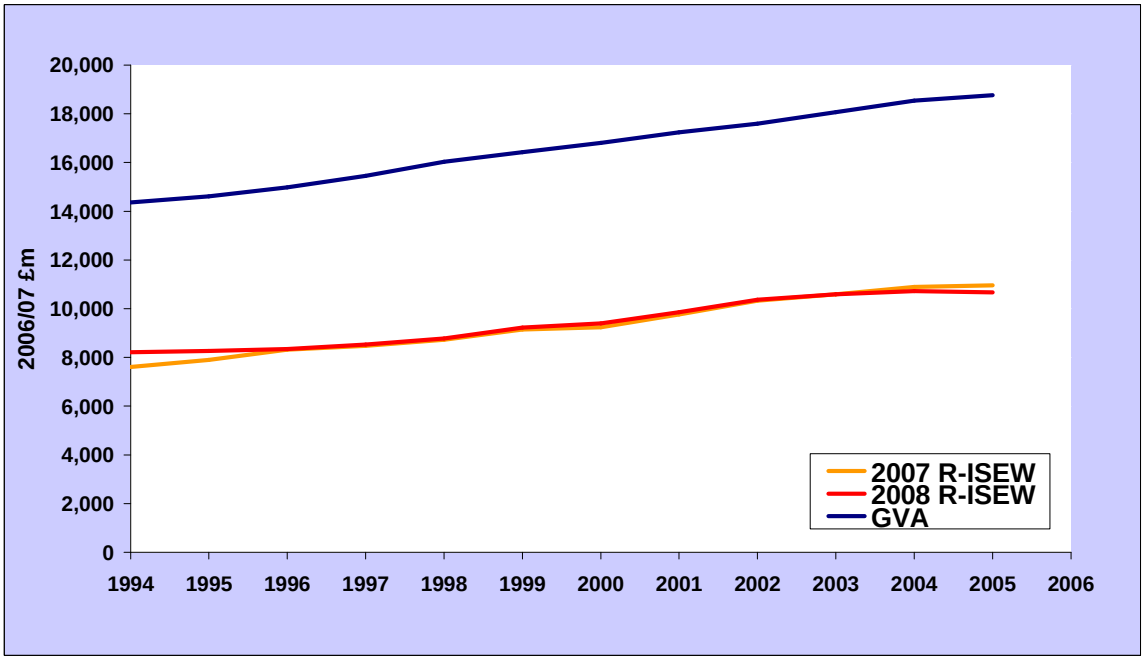


Figure 38: This year's R-ISEW per capita for England compared with last year's R-ISEW.

Figure 38 highlights the fact that, overall, the changes have made very little difference to the total R-ISEW for England, once last year's figures are deflated to 2006/07 prices. Overall, there is a general trend of having increased the UK R-ISEW in earlier years and decreased it for the last two. Our new estimates for 1994 and 1995 are 8.0% and 4.8% higher than the previous ones, whilst those for 2004 and 2005 are 1.6% and 2.6% lower than last year's.

For the intervening years, there is no difference greater than 2% between the two sets of figures. Whilst small, this adjustment does have the effect of turning what was an R-ISEW that was plateauing by 2005 according to the old calculations, into one which actually began declining that year.

The re-calculations also have quite a major effect on the ordering of GORs (Figure 39). The South East and the East of England do worse based on the new calculations, as does Yorkshire and the Humber. Meanwhile, the East Midlands does substantially better. These relative changes are not steady over time, as can be seen in the table shown in Appendix table 4. For example, whilst London is marginally penalised by the new figures in 2005, it gains an 18% increase in its R-ISEW for 1994.

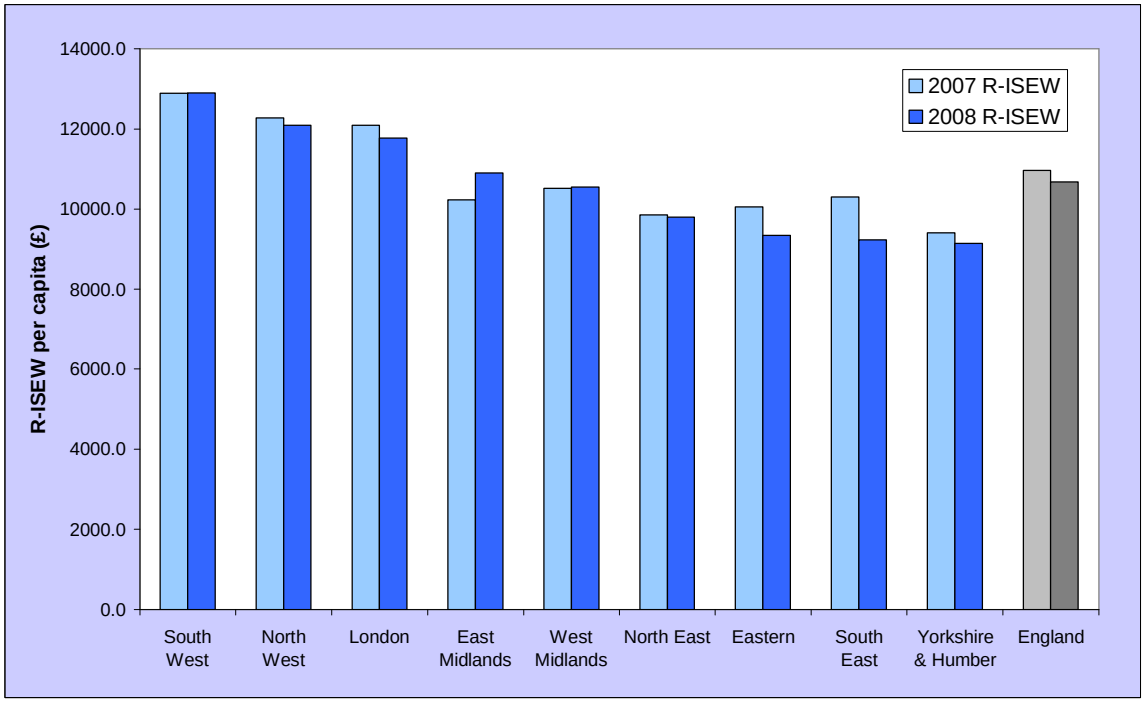


Figure 39: This year's R-ISEW per capita for each GOR, compared with last year's R-ISEW (data here for 2005).

The following sections offer some explanation for these differences, based on the changes that have been made to the calculations.

Deflation figures

The first thing that should be noted is that the deflators used in this year's R-ISEW have been updated since the previous year's calculations. This results in marginally different figures. For example, using this year's deflation figures in an attempt to produce 2005/06 prices, results in values that are around 0.3% higher than the values calculated using the deflators used in last year's R-ISEW. This can have quite substantial effects on large components, such as consumer expenditure. This issue shall be explored further before next year's calculations.

Capital growth and net international position

Capital growth and net international position are large volatile components that require rolling averages to be taken during their calculation. Such rolling averages, as well as new data, mean that this year's figures for these components are substantially different from last year's – as are the pattern's between GORs. If one controls for these differences, over one-

third of the divergence between the two sets of total R-ISEW figures is accounted for (the mean absolute difference between the two sets of calculations, across all GORs and all years drops from 3.5% to 2.1%).

Public expenditure on health and education

Regional figures on public expenditure on health and education are not available for 1994 or 1995. The previous R-ISEW therefore estimated figures for these years based on the linear trend of the available data – leading to a total spend of £48 billion in England (at 2006/07 prices). This year, however, we have identified total figures for the whole of the UK for these earlier years which suggest that spending was not as low as was estimated based on the trend. Across the UK as much as £98 billion was spent on public health and education in 1994. This suggests a different methodology should be used. As such, rather than taking the linear trend of the absolute amounts spent in each GOR to estimate figures for 1994 and 1995, only the *proportions* of UK spending were estimated based on this trend. Doing so, total spending in England for 1994 was estimated to be £77 billion – some £29 billion more than was estimated in last year's ISEW. This of course has quite a substantial impact on the R-ISEWs for all GORs for the first two years of our analysis – increasing R-ISEWs by almost £600 per capita.

Air pollution

As noted earlier, sometimes it is necessary to adjust the estimated unit costs associated with different environmental and social impacts. This year, it was felt that it was appropriate to desist from using quite old estimates of the costs of air pollutants that we had been using in earlier R-ISEWs. Whilst previously the R-ISEW had used an average of four different costings, this year it excludes the oldest two of these, which represent data from 1991.[16] This has the effect of increasing the unit cost of particulates by 62%, that of SO_2 by 28%, and NOx by 14%, whilst decreasing the unit cost of volatile organic compounds (VOCs) by 52%. The overall result is a substantial increase in the size of the component, an impact which plays a bigger role in the earlier years of this time-series when air pollution levels were higher. The new unit costs increase the impact of air pollution by £295 per capita in 1994, declining to an increase of £108 per capita in 2006.

Another important issue to note regarding this component is that, generally, emissions are distributed across GORs based on the years for which actual regional distribution data is available. Last year we only had the distributions from 2004, and 2003 for some GORs. This year, we also have the distribution for 2005, and so we proportioned emissions from earlier years based on a combination of the proportions for the years 2003 to 2005.[17] As this is a large component, this change is not insignificant. For example, a smaller proportion of all local air pollutants were emitted in England (as opposed to Scotland, Wales and Northern Ireland) in 2005 than in 2004. Combining this proportion with that from 2004 to estimate the proportions so as to distribute air pollution for *earlier* years, leads to lower estimates (for England) than were made in last year's R-ISEW. Furthermore, the pattern between GORs is of note. For example, it appears that the proportion of SO_2 emissions attributable to the East Midlands was 40% lower in 2005 than it was in 2004, and less than half what it was in 2003. As these proportions must be combined to estimate the proportions for earlier years, the result is that a lower percentage of SO_2 emissions is assumed to have been emitted in the East Midlands than in last year's R-ISEW.

If one accounts for these changes, as well as the changes to public expenditure, capital growth and net international position, the mean absolute difference between the two sets of calculations decreases to only 1.3%. Looking at England, this means the biggest difference between the two calculations for any one year is also only 1.3%.

Long-term environmental damage

Another set of methodologies we have improved is that used to proportion the costs of long-term environmental damage associated with greenhouse gases. Previously nitrous oxide

(N_20) emissions were assumed to map onto the regional pattern of other NOx emissions. Methane (CH_4) emissions were distributed according to various proxies including the total size of livestock herds (aggregating cattle and sheep herds). Lastly, the previous R-ISEW had used regional CO_2 emissions for 2004 to proportion all emissions of this pollutant for all other years.

This year, several improvements were made. With regards to N_20 emissions, we noted that they do not come from similar sources as other NOx emissions. Indeed the principle source of N_20 emissions is the use of fertiliser. As such, emissions of this pollutant were proportioned using regional agricultural GVA as a proxy.

Two improvements were made with regard to the proportioning of CH_4 emissions amongst GORs. First, we took account of the fact that cattle are responsible for far more methane emissions than sheep. Second, we attempted to accurately distribute the substantial methane emissions produced from the extraction of raw materials for energy, by using the appropriate sectoral GVA by GOR as a proxy. Lastly, with regards to CO_2 emissions, those produced from aviation were treated separately, and airport traffic data were used to distribute them amongst GORs, rather than the mapped pollutant levels (which are unlikely to fully capture emissions from aircraft at high altitudes).

The result is that, based on the new data, total emissions per annum go up by between 1% in 1994 and 7% in 2006. Given the large size of this component, this has a noticeable effect on the final R-ISEW figures, particularly bringing the totals from more recent years down (for example the difference between the two methodologies for 2006 is equivalent to £127 per capita for England).

As with air pollution, the share of the costs of long-term environmental damage that are attributable to each GOR, and to England itself (as opposed to Scotland, Wales and Northern Ireland) is determined based on the regional data that we have for 2003, 2004 and, this year, 2005 as well. This again means that the estimates made for earlier years vary with the inclusion of new data. For example, the 2005 figures attribute less air pollution to England as a whole than the 2004 figures did. More pollution is attributed to Yorkshire and the Humber, and less to the North East, altering the relative performances of these two GORs.

Resource depletion

We made two substantive changes to this component. First, we were able to locate data specifying the proportion of UK electricity produced from renewable sources other than hydropower. This means we were able to subtract a larger proportion of the total amount of electricity consumed in the country, and also to track the gains made from the increasing use of renewable energy. In 2006, renewable sources were used to produce 6% of electricity in the UK, compared with just 2% in 1994 – small proportions but growing. Taking account of this has the effect of slightly reducing the impact of this large negative component on the overall R-ISEW – by about £20 per capita in 1994, rising to £50 per capita in 2006.

Secondly, we found actual data from the Department for Transport on regional fuel consumption for 2002 to 2006, allowing us to proportion the costs of resource depletion from transport more accurately, as opposed to estimating proportions from the number of vehicle kilometres travelled in each GOR.

Crime

Last year's calculations of the crime component underestimated the costs of several types of crime (including the category 'other violent crime'). This has been rectified, obviously resulting in higher costs of crime across GORs and for all years. The correction takes a further £60 of the R-ISEW per capita for 1994, rising to £90 per capita for 2006.

Another slight change that we made this year is to attempt to incorporate crimes recorded by the British Transport Police (BTP), whilst in previous years these had been ignored. Home Office statistics do not report in which GOR crimes recorded by the BTP took place. As such, we had to estimate the regional distribution of these crimes, based on the distribution of crimes for which we *do* have regional distributions.

Commuting

Last year's R-ISEW introduced a valuation of the time spent commuting, alongside the monetary costs of commuting. This had a substantial impact on the overall costs of this component, more than tripling its size. One assumption that was made in calculating the amount of time spent commuting is that the average working individual works five days a week, and therefore 233 days a year once annual leave is accounted for. However, of course, this is a strong assumption. Since last year, we have found data on the average number of commuting trips made each year. It appears the time spent commuting had been over-estimated by around 30%. Using the new data therefore reduces this cost by around £100 per capita in 1994, rising to around £140 per capita in 2006. Of course, this reduction particularly benefits GORs where the amount of time spent commuting is high – particularly London where the time element of this component is over 60% higher than the average for England.

Industrial accidents

This year, we made an effort to ensure that costs to different stakeholders (e.g., the employer, the employee and 'society') were not double-counted, and that only costs to society are included in the total cost of industrial accidents. The result is a substantial 40% reduction in the size of this component. As such, the total cost of this component is reduced by around £90 per capita in 1994, rising to around £120 per capita in 2006. Again, GORs which have higher rates of industrial accidents obviously benefit most from this change.

Another minor adjustment made was to weight injuries to non-workers (e.g., passers-by) differently to of workers. The costs attributed to the injury of a worker include many associated with their employment – loss of productivity, further recruitment costs, etc. While a passer-by may, of course, have a job and therefore his or her injury may imply these some costs, this cannot be assumed. Therefore these costs are removed. Of course costs to the nation's health service, and psychological costs remain for both workers and non-workers. At any rate, these values are only used as a proxy by which to distribute the total cost of all injuries, for which there is a single figure for the whole of England. As such, this change does not affect the total cost for any year, only its distribution across the country.

Family breakdown

The unit costs of divorce are based on two elements: the increased risk of morbidity, and the defensive costs associated with setting up a new home. The latter are based on two Norwich Union surveys (one from 2003 and one from 2006), which break down the costs into different categories including legal fees, buying a second car, etc. All these costs had been included, except for 'maintenance payments' – which are a cost to one divorcee but a gain to the other – and one entitled 'personal savings' – which was assumed not to represent a separate cost, but rather a source of funding for the other costs. On closer inspection, we have decided to exclude a third cost from this study – entitled 'treats'. For this cost, it is not clear that it represents a defensive cost uniquely associated with divorce. One may spend money on treats for a variety of reasons, including enduring an unhappy marriage. By including it as a defensive cost for divorce alone, the R-ISEW penalises the economic well-being of couples who divorce and spend money on treats, but not that of those that remain in unhappy marriages, and also spend money on treats.

Having removed this part of the unit cost, the two surveys result in very similar unit costs per divorce – and one can assume that the slightly larger cost found in 2006 can be

attributed to the increased cost of living. As such, the defensive costs of divorce were allowed to increase over time, indexed to national GVA.

These changes do not have a huge impact on the overall R-ISEW, shaving a mere £20 per capita of this negative component in 1994, decreasing to £13 per capita in 2006.

Household labour and volunteering

The population figures used to estimate the total value of this component for each GOR were updated, decreasing the total value of this component by around 0.5%.

Difference between service flow and expenditure on consumer durables

Last year's R-ISEW estimated service flows based on Blue Book figures for expenditure on consumer durables, but expenditure itself (which one subtracts from the service flows) was taken from a different source – the Family Expenditure Survey. It appears that using this *reported* expenditure slightly overestimates the amount spent and therefore leads to the component being artificially inflated. Correcting for this reduces the size of this component by £90 per capita. It seems, however, that changes to the estimates of reported consumer expenditure figures for recent years drown out this effect.

Noise pollution

Last year's R-ISEW attempted to recognise that flights to and from airports in more urban surroundings are likely to have a greater noise pollution cost than those flying to and from airports in rural areas. The appropriate rural/urban breakdown for each GOR was available, and assumed to be constant over the entire time period. Since then, we have identified data allowing us calculate the breakdown separately for each year allowing one to track the change in time for a particular GOR. For example, aside from the total number of flights involving airports in the South East having risen, the percentage of those using airports in built-up areas has more than doubled, as Southampton International Airport grows in importance. This leads to a slightly larger proportion of the total England cost being attributed to that region.

5. Concluding remarks

The *Measure of Domestic Progress* (MDP), calculated for the UK as a whole in 2004, revealed that the country had had its highest levels of sustainable economic well-being in 1976, after which it suffered a period of negative growth up until a low point in the 1990s.[18] The regional calculations from 1994 have tracked a rise in R-ISEWs across England since that point suggesting a period of increasing sustainable economic well-being for the country. This rise has been driven by increasing consumer and public expenditure, and falling local pollution and social costs.

However, the latest R-ISEW figures reveal for the first time that these gains may only represent a short-term trend, rather than steady progress. Since 2004, the R-ISEW for the English regions has begun to decline again. The step-by-step calculations in Section 2 demonstrate that this decline appears in the R-ISEW even before environmental and social costs are taken into account. The English regions' falling net international position and failure to replace capital stocks are enough to explain why the R-ISEW ceased growing between 2004 and 2006. However, social and environmental factors cement this decline – particularly the increase in the costs of long-term environmental damage, and the decrease in household labour. At this stage, it is not clear if the decline represents a brief faltering in growth, a medium-term period of decline similar to that seen in the late 1970s and early 1980s, or indeed a precursor to a serious economic downturn.

Looking across the regions, the R-ISEW paints a very different picture to GVA. Regions traditionally seen to be economically successful, such as the South East and the East of England, have the very lowest per capita R-ISEWs. London, which has by far the highest GVA per capita, is only third in terms of the R-ISEW. Meanwhile, it is the South West and the North West with the highest R-ISEWs. For the North West in particular this represents a marked divergence from its relative performance in terms of GVA.

The order of the regions has remained relatively stable over recent years. The notable exceptions have been the South East falling from sixth to ninth place between 2003 and 2006, and the East Midlands rising from seventh to fourth over the same period of time.

One cannot forget that the R-ISEW is an evolving methodology. **nef** will be calculating R-ISEWs for two further years using the same methodology as that used in this report. However, after that it is likely that the methodology will undergo further development. Such developments might lead to quite different patterns of results.

One theoretical challenge that needs to be faced is dealing with the increasing pattern of exporting environmental costs. Increasingly, our consumption habits are met through the importing of goods manufactured in other countries. For example, imports to the UK from China rose by 115% between 2001 and 2006.[19] This change in trade patterns may lead to decreased local pollution impacts and indeed decreased costs in the long-term environmental damage and resource depletion columns as our manufacturing base shrinks. These decreases may have served to allow the R-ISEW to have risen up until 2004. However, it is arguable whether they represent a move to a more sustainable economic well-being. If the environmental costs are simply being exported to another country, they are

simply being shifted around, not reduced. This is particularly pertinent for global environmental issues such as climate change. It remains to be seen whether the R-ISEW methodology can be adapted to address this theoretical gap.

Appendix 1. The numbers

A.1 R-ISEW by GOR (£m 2006/07)

	North East	North West	Yorkshire & Humber	East Midlands	West Midlands	Eastern	London	South East	South West	England
1994	19,522	69,691	28,985	26,503	50,259	38,774	52,446	63,554	45,359	396,401
1995	20,369	68,679	29,757	29,154	49,818	37,829	56,050	61,804	46,125	399,991
1996	20,771	69,225	30,667	27,968	50,558	42,944	54,220	64,301	46,341	404,742
1997	21,423	71,026	30,822	32,247	49,399	38,617	59,032	64,327	48,023	415,107
1998	22,228	70,210	31,809	33,211	51,398	42,877	59,243	69,103	48,325	428,535
1999	22,496	70,759	32,236	35,377	50,805	45,854	67,122	66,934	49,851	451,910
2000	22,984	75,055	35,040	36,840	52,874	46,117	67,848	73,676	53,169	462,298
2001	24,379	77,740	36,393	39,706	53,353	45,925	76,806	78,133	55,192	487,225
2002	24,398	79,299	40,011	40,046	53,195	50,116	85,367	83,172	60,326	515,025
2003	25,380	82,265	44,521	40,538	55,994	50,900	85,115	79,089	65,094	528,259
2004	25,097	82,476	45,964	45,039	56,741	52,024	86,163	79,190	64,986	537,337
2005	24,984	82,700	46,688	47,156	56,460	51,960	87,752	75,513	65,630	538,777
2006	25,183	83,146	47,365	49,274	57,180	50,422	87,679	72,495	64,254	536,993

A.2 R-ISEW per capita by GOR (£ 2006/07)

	North East	North West	Yorkshire & Humber	East Midlands	West Midlands	Eastern	London	South East	South West	England
1994	7,540	10,190	5,844	6,509	9,575	7,488	7,630	8,241	9,535	8,219
1995	7,886	10,058	5,998	7,125	9,476	7,267	8,108	7,961	9,646	8,267
1996	8,063	10,165	6,182	6,808	9,606	8,206	7,775	8,244	9,668	8,342
1997	8,342	10,454	6,217	7,827	9,388	7,332	8,415	8,191	9,949	8,530
1998	8,679	10,337	6,416	8,036	9,751	8,087	8,385	8,759	9,966	8,778
1999	8,822	10,447	6,504	8,520	9,637	8,589	9,382	8,414	10,213	9,216
2000	9,038	11,080	7,066	8,839	10,033	8,580	9,375	9,220	10,813	9,390
2001	9,598	11,478	7,312	9,476	10,103	8,505	10,490	9,739	11,166	9,853
2002	9,602	11,699	7,999	9,485	10,046	9,224	11,596	10,336	12,131	10,373
2003	9,988	12,098	8,855	9,529	10,541	9,297	11,558	9,780	13,006	10,594
2004	9,873	12,093	9,077	10,496	10,652	9,440	11,661	9,747	12,889	10,723
2005	9,798	12,091	9,140	10,896	10,551	9,340	11,769	9,226	12,902	10,676
2006	9,852	12,133	9,211	11,291	10,654	8,993	11,672	8,800	12,540	10,578

A.3 R-ISEW per capita by component for England (£ 2006/07)

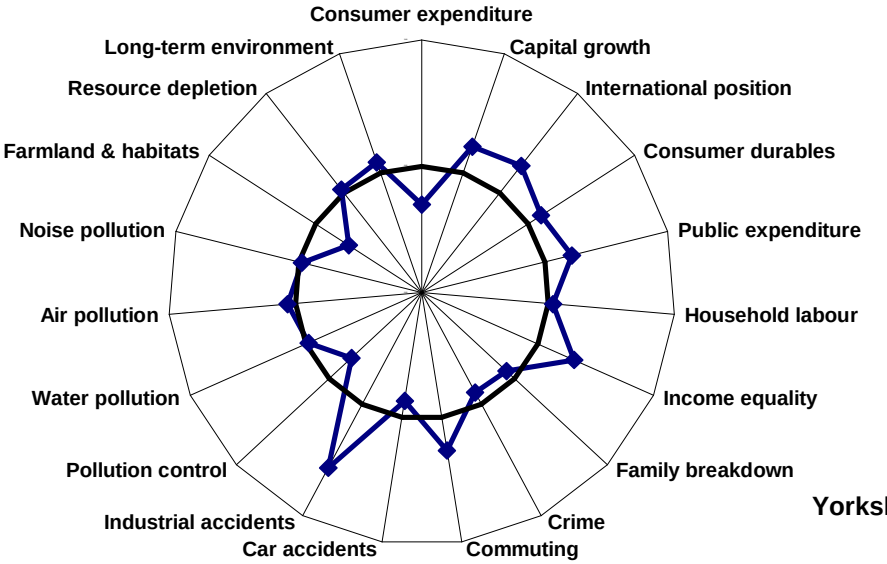
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Consumer expenditure	10,048	10,197	10,529	10,824	11,281	11,773	12,233	12,470	12,657	12,857	13,049	13,132	13,231
Effects of income distribution	1,268	1,313	1,365	1,444	1,576	1,563	1,829	1,722	1,622	1,672	1,649	1,689	1,696
Services from household labour and volunteering	8,780	8,884	9,163	9,380	9,705	10,210	10,404	10,747	11,035	11,185	11,400	11,443	11,535
Public exp. on health & education (consumption)	4,345	4,277	4,220	4,157	4,111	4,054	3,966	3,860	3,795	3,751	3,678	3,611	3,561
Net service flow from consumer durables	1,589	1,601	1,544	1,577	1,696	1,776	1,926	2,090	2,191	2,401	2,539	2,655	2,706
Costs of commuting	-238	-264	-322	-376	-378	-377	-390	-413	-390	-387	-374	-317	-301
Costs of crime	498	508	527	557	559	591	579	558	542	534	587	571	564
Costs of family breakdown	207	200	200	186	184	187	181	193	223	229	231	228	216
Costs of car accidents	158	160	161	152	148	148	148	167	173	171	170	154	147
Costs of industrial accidents	308	299	302	299	286	279	276	272	265	256	238	228	221
Cost of pollution control	173	172	172	171	170	169	168	167	162	172	164	161	162
Costs of water pollution	86	84	81	79	77	73	71	71	58	67	53	60	65
Costs of air pollution	9	9	9	8	8	8	7	7	7	7	7	7	7
Costs of noise pollution	1,174	1,068	968	862	823	695	659	611	556	541	492	418	404
Costs of loss of natural habitats	68	69	71	72	73	74	74	75	76	77	78	78	78
Costs of loss of farmlands	46	46	46	46	46	46	46	46	46	46	46	46	45
Depletion of non-renewable resources	15	15	15	13	14	14	16	13	15	14	14	13	12
Long-term environmental damage	1,490	1,521	1,633	1,634	1,695	1,717	1,771	1,817	1,795	1,839	1,870	1,894	1,897
Net capital growth	1,645	1,692	1,742	1,792	1,843	1,893	1,945	1,998	2,053	2,109	2,167	2,221	2,280
Change in net international position	161	99	84	41	62	137	229	309	349	295	249	218	150
R-ISEW	**8,219**	**8,267**	**8,342**	**8,530**	**8,778**	**9,216**	**9,390**	**9,853**	**10,373**	**10,594**	**10,723**	**10,676**	**10,578**
GVA	**14,361**	**14,611**	**14,983**	**15,448**	**16,030**	**16,419**	**16,813**	**17,232**	**17,589**	**18,071**	**18,543**	**18,763**	**19,082**

A.4 Changes in calculated R-ISEW resulting from updated data

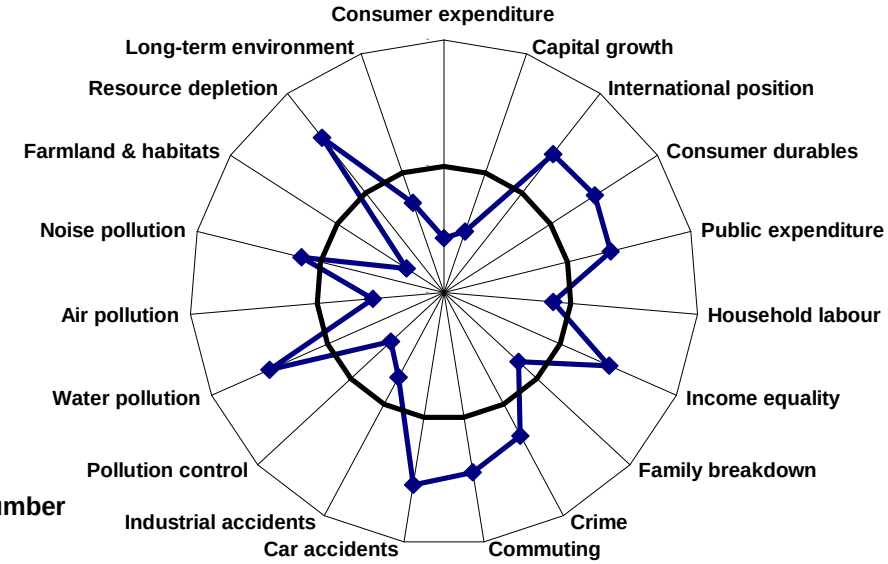
	North East	North West	Yorkshire & Humber	East Midlands	West Midlands	Eastern	London	South East	South West	England
1994	9.5%	6.7%	2.1%	2.1%	8.6%	3.2%	18.0%	8.2%	6.3%	8.0%
1995	6.6%	4.3%	-0.8%	1.2%	5.9%	0.3%	12.0%	4.1%	3.9%	4.8%
1996	2.8%	0.4%	-6.7%	0.6%	3.5%	-2.6%	7.3%	-0.8%	-0.1%	0.3%
1997	3.2%	0.3%	-7.3%	2.5%	3.7%	-3.5%	6.5%	-1.7%	-0.5%	0.6%
1998	3.8%	0.5%	-7.9%	3.6%	3.9%	-3.1%	6.2%	-1.5%	-0.7%	0.7%
1999	1.9%	-1.7%	-10.3%	2.0%	1.5%	-5.3%	2.8%	-4.3%	-3.0%	0.8%
2000	5.8%	1.3%	-5.8%	6.6%	4.7%	-1.6%	7.9%	-0.1%	0.1%	1.8%
2001	4.0%	0.4%	-4.6%	4.6%	2.7%	-2.3%	5.5%	-0.7%	0.1%	1.0%
2002	2.8%	-0.1%	-2.9%	3.8%	1.4%	-2.2%	3.0%	-0.8%	0.2%	0.4%
2003	4.2%	0.0%	-2.4%	2.7%	0.7%	-2.7%	2.0%	-1.9%	0.8%	0.1%
2004	1.2%	-1.5%	-5.4%	4.7%	-0.5%	-5.0%	1.9%	-4.6%	-2.2%	-1.6%
2005	-0.6%	-1.5%	-2.8%	6.4%	0.4%	-7.1%	-2.6%	-10.4%	0.1%	-2.6%

Appendix 2

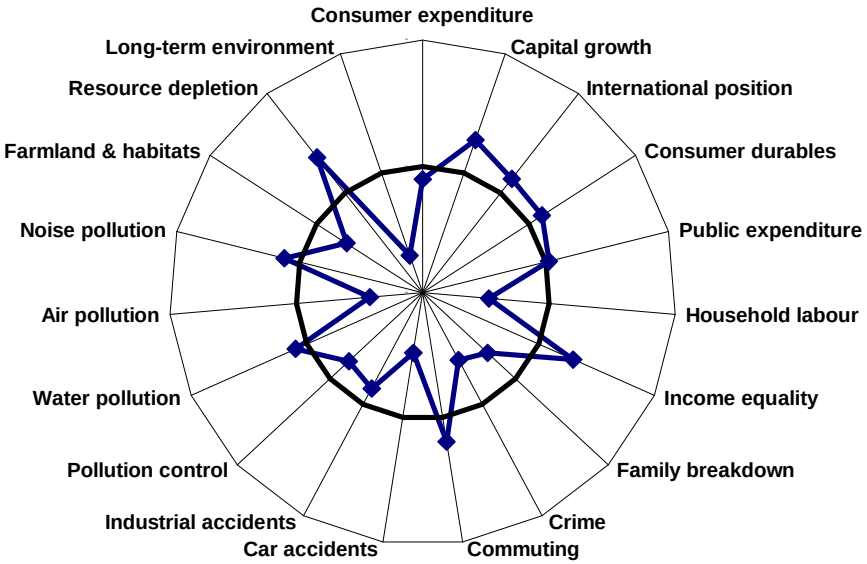
North West



North East

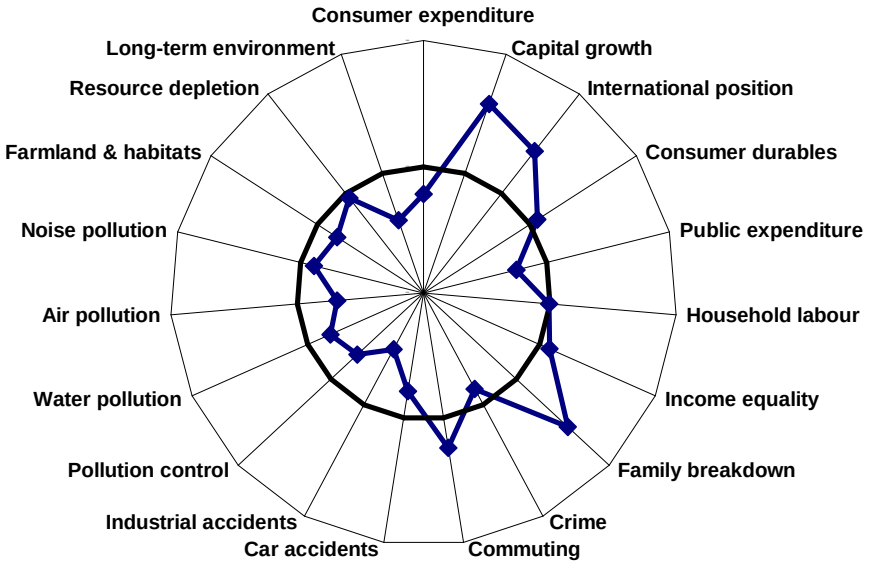


Yorkshire and the Humber

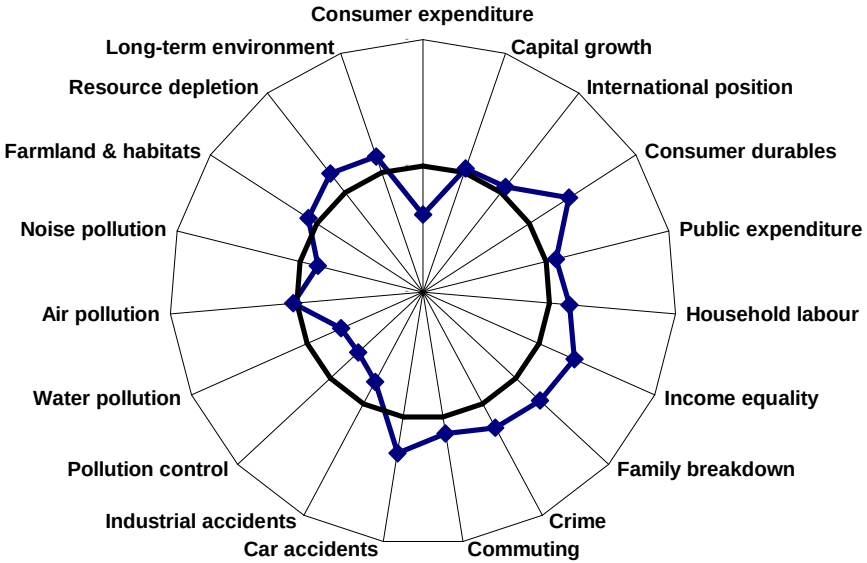


Spider diagrams for each GOR showing relative performance on each component

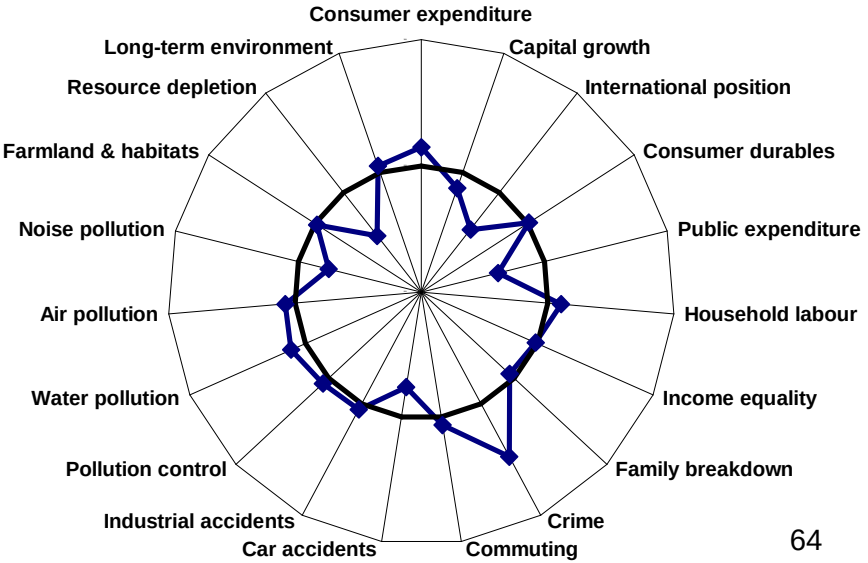
East Midlands



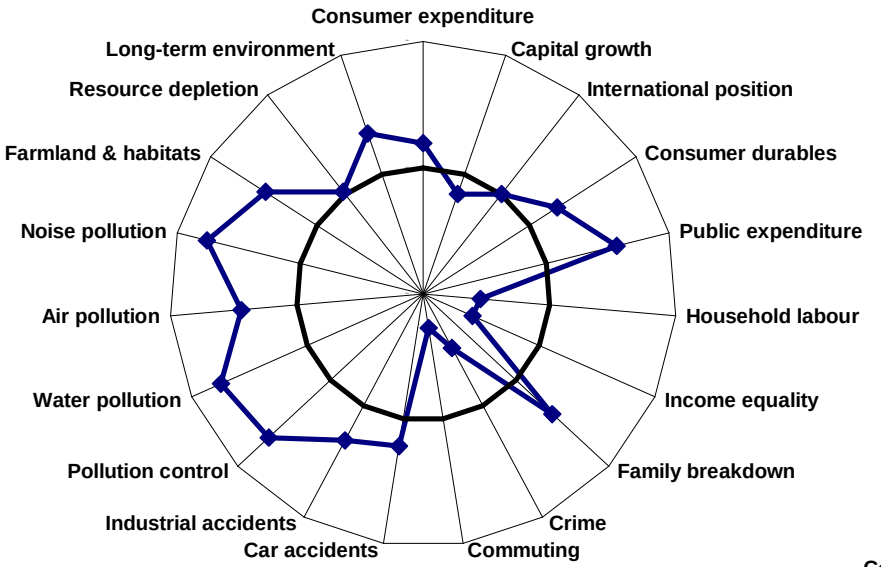
West Midlands



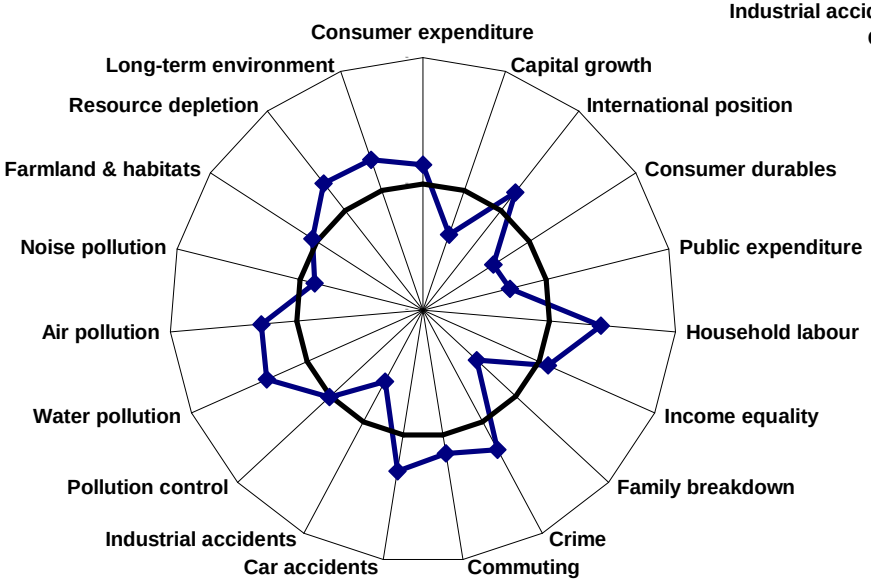
East of England



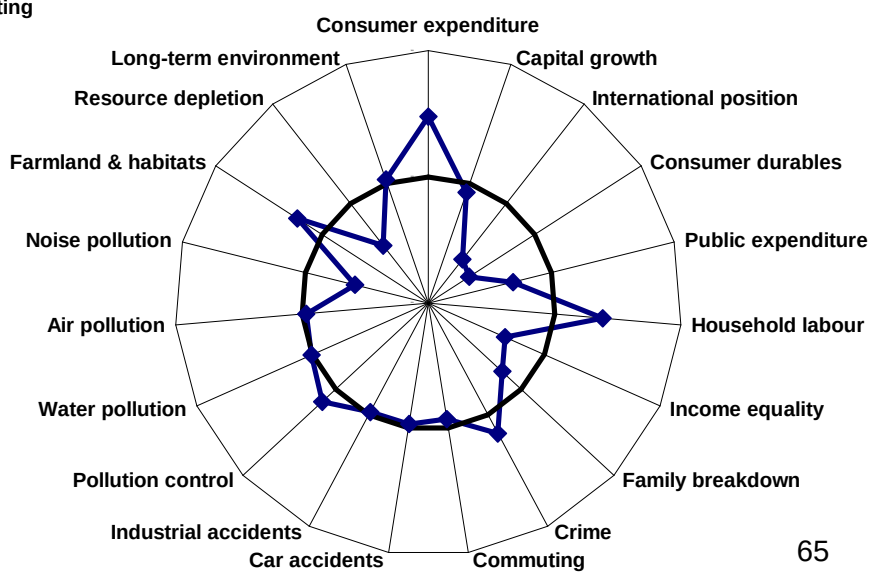
London



South West



South East



Endnotes

[1] Jackson T, McBride N, Abdallah S and Marks N (2008) *Measuring regional progress: regional index of sustainable economic well-being (R-ISEW) for all the English regions* (London: **nef**).

[2] For all maps, 'well below mean' refers to any region falling below 1 standard deviation of the figure for England, and 'well above mean' refers to any region with a figure 1 standard deviation above the figure for England (standard deviation defined with respect to the nine regions).

[3] Ranks in green denote the top 3 GORs, ranks in red denote the bottom 3 GORs, whilst the amber colour denotes GORs in the middle of the ranking.

[4] Jackson *et al*. (2008) *op. cit.*

[5] Abdallah S, Jackson T and Marks N (in prep) *The R-ISEW (regional index of sustainable economic well-being) technical specification* (London: **nef**).

[6] '+125%' indicates that the total value of consumer expenditure is 125% that of the final R-ISEW, and makes a positive contribution.

[7] Looking at *total* figures, increases in both consumer expenditure and GVA of course appear more dramatic (39% and 40% respectively).

[8] ε is a parameter which represents the degree to which the marginal utility from increased income falls with increasing income. A value of 0.8 is suggested by the literature as suitable. This is discussed further in Jackson T, Marks N, Ralls J and Stymne S (1997) *Sustainable economic welfare in the UK 1950-1996* (London: **nef**).

[9] This was the serial killer Harold Shipman, responsible for at least 172 deaths.

[10] We have excluded here consideration of global pollutants, such as carbon dioxide and methane, as these are included in the category of climate change costs. Also excluded are pollutants such as lead and benzene which may be important but for which we found no reliable estimate of cost.

[11] Simms A, Johnson V and Smith J (2007) *Chinadependence: The second UK interdependence report* (London: **nef**).

[12] See Appendix 4 of Jackson *et al*. (2008) *op. cit*. for details.

[13] Stern N (2006) *Stern Review: The economics of climate change* www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

[14] Loh J and Goldfinger S (2006) *Living Planet Report 2006* (Gland, Switzerland: WWF).

[15] Cobb C and Cobb J (1994) *The green national product* (University of Americas Press: Lanham, MD).

[16] Pace (1990). Environmental costs of electricity, Pace University Center for Environmental Legal Studies. Prepared for the New York State Energy Research and Development Authority and the US Department of Energy, Oceana Publications; and Tellus (1991) Environmental benefits of DSM in New York: Long Island Case study. Proceedings of the Demand-Side Management and the Global Environment Conference, Arlington, VA, April 1991.

[17] This combination weights the proportions from earlier years more than those from later ones.

[18] Jackson T (2004) *Chasing Progress? Beyond measuring economic growth* (London: **nef**).

[19] Simms *et al.* (2007) *op. cit*.