



# **The 2010 R-ISEW (regional index of sustainable economic well-being) for all the English regions**

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# Executive summary

English Regional Development Agencies have been 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. Measurement of economic wellbeing has moved up the agenda with the recent decision of the Prime Minister to ask the Office for National Statistics to investigate the measurement of national happiness.

Three years 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. The 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 calculations reveal that the R-ISEW for England in 2008 stood at £12,111 per capita, 42% of per capita GVA for England of £21,020. This figure represents a rise of 39% since the first year for which we are able to calculate the R-ISEW - 1994. Whilst the R-ISEW had faltered somewhat in the years 2003 to 2006, it has begun to increase again rising 2.0% between 2007 and 2008.

The regional pattern for the R-ISEW is somewhat different to that seen looking at GVA. Whilst London is the region with the largest per capita figure for both (an R-ISEW of £15,097 per capita), it is the South West that has the second highest R-ISEW (£14,454 per capita) despite only having the fourth highest GVA. Meanwhile rich regions such as the South East and the East of England have some of the lowest R-ISEWs. Nevertheless, it is Yorkshire and the Humber which has the lowest figure in this year's update at £8,322 per capita. In recent years, the gap between regions widened – with London's R-ISEW growing rapidly, whilst Yorkshire and the Humber's fell due to the unmet costs of long-term environmental damage resulting from a history of coal-powered energy production that supplies other regions.

This report is the last of a series of update reports produced for the Regional Development Agencies. We will soon be publishing a report on development work to improve the methodologies we have been using to date.

# 1. Introduction

This is the fourth consecutive report presenting R-ISEW (regional index of sustainable economic well-being) calculations for the nine Government Office Regions (GORs) of England.<sup>1</sup> New data available in the summer of 2010 allows a continuous time series from 1994 to 2008 – 15 years. Because of the nature of the data required for the R-ISEW, there is always a two-year lag before results for any given year can be completed.

Throughout the time series, the R-ISEW has been substantially lower than GVA, with the gap growing (in absolute terms) from £6,609 per capita in 1994 to £8,909 per capita in 2008. Generally, year-on-year growth rates for the R-ISEW have been lower than those of the GVA (gross value added), ultimately becoming negative in 2006. However the last year of the time series (2008) reveals an increase in the R-ISEW whilst GVA has remained at 2007 levels.

Previously, we had speculated that the decline in the R-ISEW in 2006 might have indicated an early warning of the impending recession. The new data for 2008, but also updated figures for 2007, make such a conclusion less obvious – why have R-ISEW values grown over the last two years of the series even as the recession hit? As usual, breaking the Index into its constituent components will help explain this apparently paradoxical outcome. We will see that the most important factor leading to an increase in the R-ISEW in those two years is a turnaround in England's regions' net international position, with growth in exports exceeding growth in imports for the first time in several years. This, coupled with increasing public expenditure, decreasing costs of non-renewable resources, and a halt in the deterioration of capital stocks, has led to an increase in per capita R-ISEW of £540 between 2006 and 2008.

Ultimately, however, we would need to be able to calculate the Index for further years (2009 and 2010 and perhaps beyond) to be able to understand the implications of the full course of the recession on the R-ISEW.

As in our previous three reports, we 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 last of three annual updates that we are carrying out using the current methodology. In parallel, we have also conducted a strand of development work to improve the methodology of certain components of the R-ISEW. We will be reporting on this development work next month, exploring its impact on the figures calculated.

### 1.1. Overall patterns

The total England R-ISEW in 2008 stood at £623 billion, which is 42% below the total GVA of £1,081 billion. Per capita, the figures are £12,111 per person and £21,020 per person (Figure 1). This represents a gap of £8,909. 2008's results represent a marked break from the typical pattern of the R-ISEW, which has seen this gap predominantly growing over the time period. Indeed 2008 saw the largest fall in this gap since 1994, as per capita R-ISEW grew by 2% whilst GVA fell slightly. As a result, the accumulated growth of the R-ISEW since 1994 now exceeds that of the GVA (48% vs. 46%). This represents mean annual growth rates of 2.4% per year and 2.3% per year respectively.

Whilst GVA grew most rapidly between 1996 and 1998, the R-ISEW grew most rapidly between 2000 and 2002 (at up to 5% per year – Figure 2). The R-ISEW stagnated and actually fell in 2006, but rose again sharply in 2007 and 2008. In percentage terms, these patterns mean that the gap between the R-ISEW and the GVA is now 42% of the total GVA, down from 44% in 2006 (Figure 3).

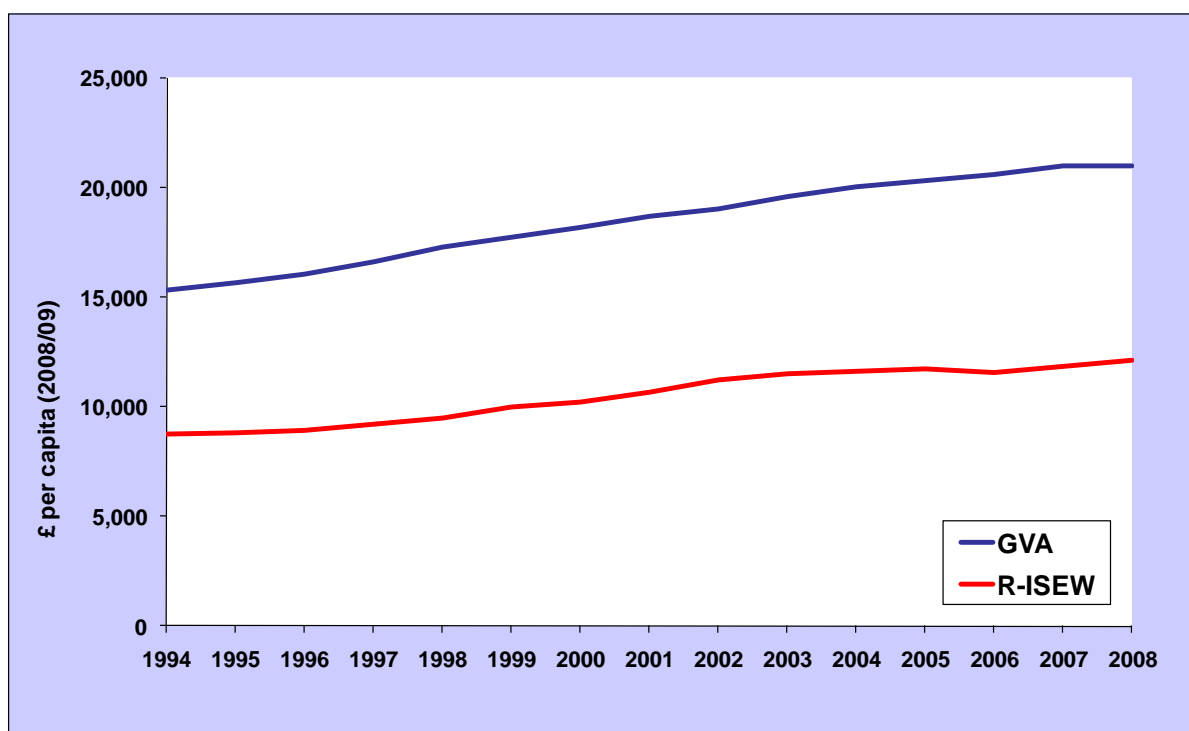


Figure 1. R-ISEW and GVA for England per capita.

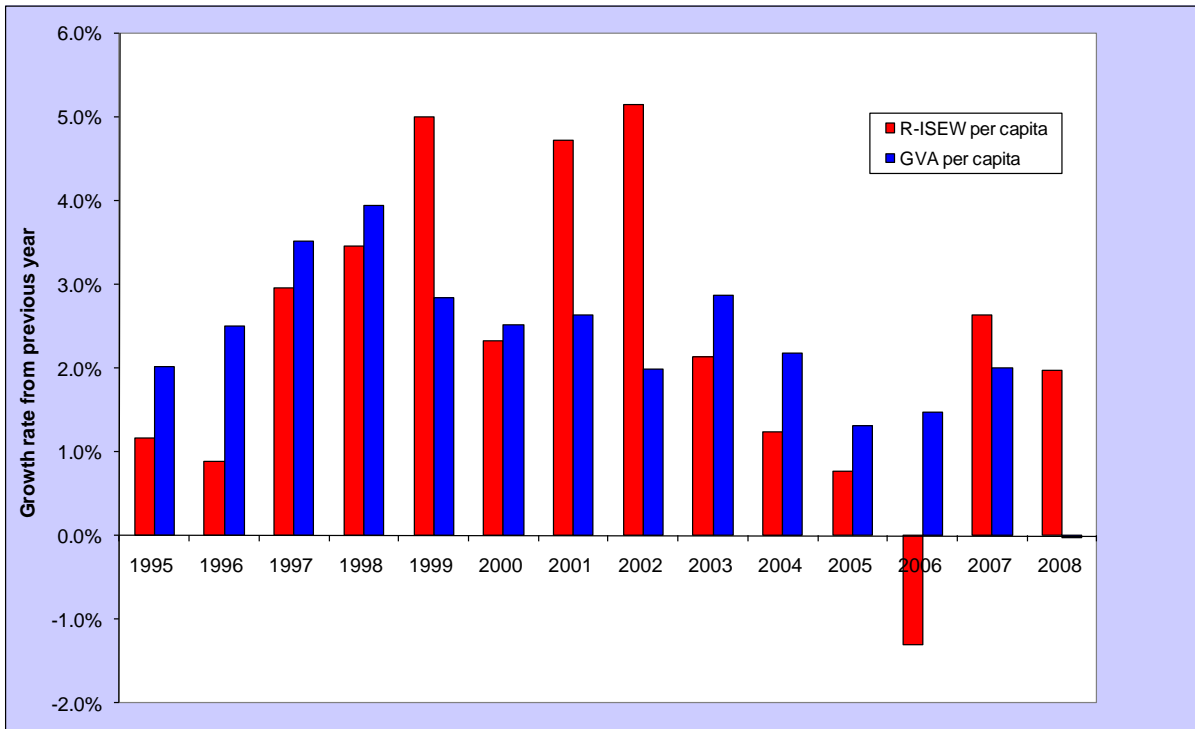


Figure 2. R-ISEW and GVA per capita year-on-year growth for England.

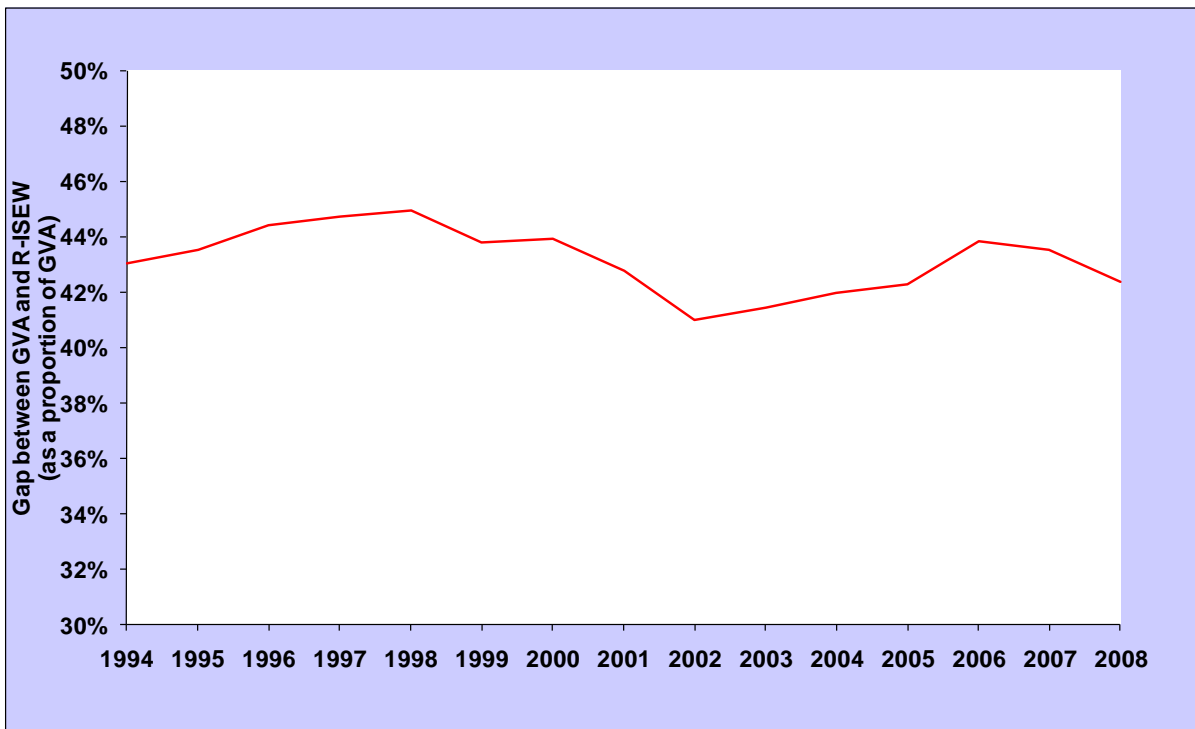


Figure 3. Gap between GVA and R-ISEW for England, as a proportion of GVA.

## 1.2. Regional patterns

Until this year's report, the South West had consistently topped the R-ISEW rankings. This time, however, it has fallen just behind London, which has the highest per capita R-ISEW at £15,097, compared to the South West's £14,454 (Figures 4 and 5). Despite the similarity of the final value, the two regions couldn't be much more different. While London's R-ISEW is equivalent to less than half its GVA (the largest absolute gap for any GOR), the South West has the smallest gap between its R-ISEW and GVA. As a result, whilst London's GVA per capita is around £13,000 greater than that of the South West, its R-ISEW per capita is only £500 greater. The North West retains its place in the top three, with a similarly small gap between its R-ISEW and GVA values.

Meanwhile, Yorkshire and the Humber, with one of England's lowest GVA, also remains the GOR with the lowest per capita R-ISEW, at £8,322, encumbered by a large cost associated with long-term environmental damage. But the regions just above it in terms of the R-ISEW, the South East and the East of England are those that have some of the highest GVA values per capita. Above them is the North East, the region with the lowest GVA per capita, but the sixth highest R-ISEW per capita.

In between, lie the West and East Midlands, with the West Midlands achieving a marginally higher R-ISEW per capita in 2008 than the East Midlands despite having a marginally lower GVA per capita.

These patterns have not stood unchanged in the 14 years from 1994 to 2008. 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 (doubling from £6,131 to £12,255 per capita) and London (£8,522 to £15,097 – a 77% increase). Conversely, the smallest increases were found in the North West (20%), the South East (21%), and the West Midlands (21%).

As a result of these changes, London has moved up the R-ISEW table from fifth place in 1994 to top place in 2008 (with the most rapid increase between 2000 and 2002); the East Midlands has moved from eighth to fifth, reaching fourth place in 2005 and 2006. The most substantial drop is seen for the South East (from fourth to seventh), though the region saw quite a marked recovery in the last two years of the time series. The North West, which was in top spot until 2001, had fallen to third place by 2008. Yorkshire and the Humber, which had reached values similar to those of the South East and the East of England between 2003 and 2006, sees its third consecutive decline in R-ISEW and is now falling behind the other regions. Figure 8 and Table 1 shows these results in more detail.



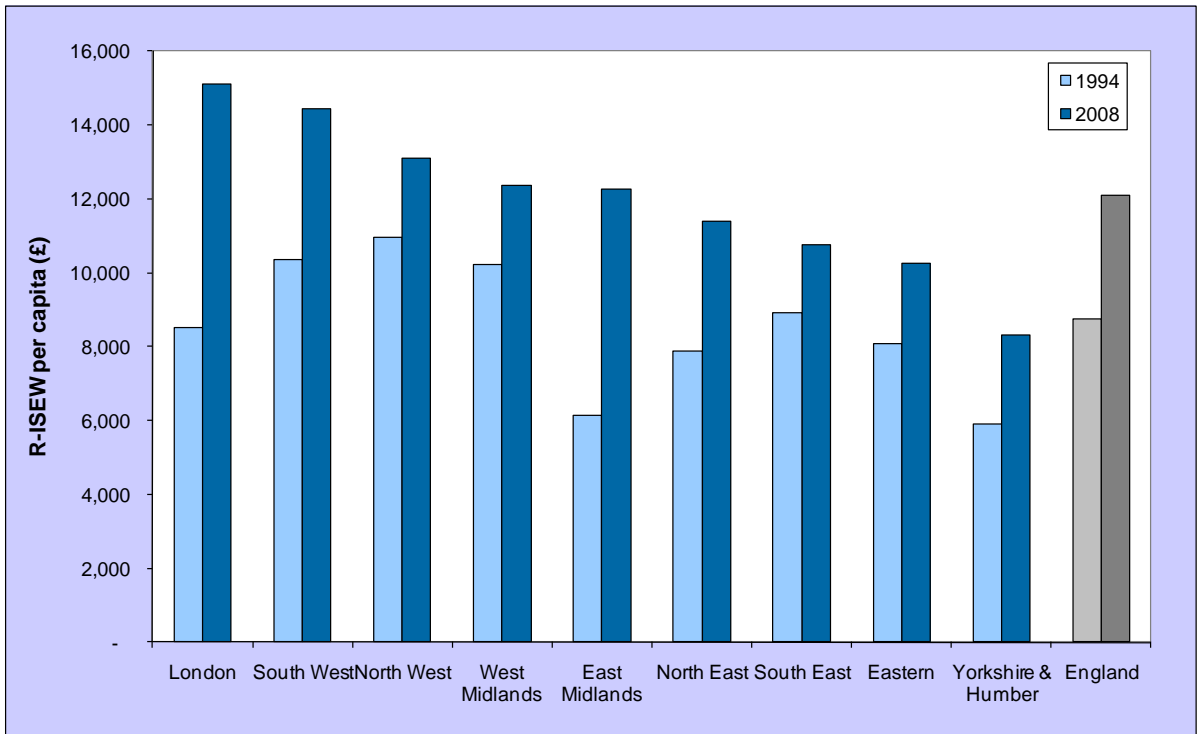


Figure 6. Increases in the R-ISEW from 1994 to 2008 across the GORs.

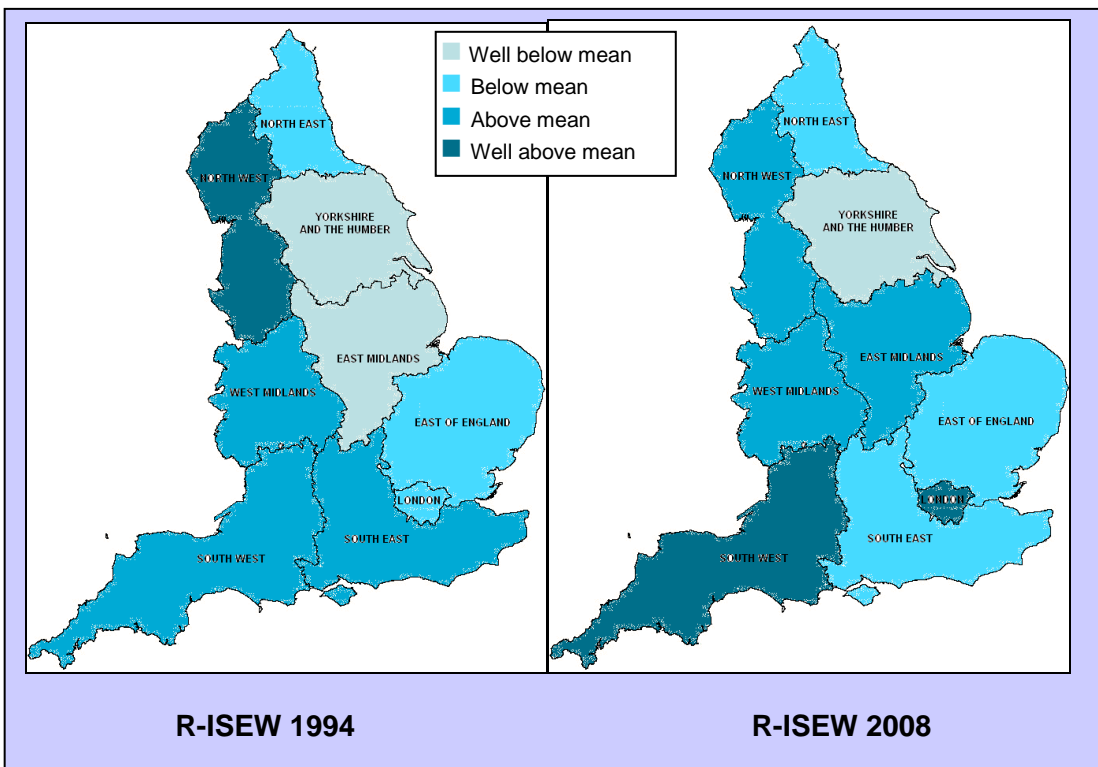


Figure 7. Per capita R-ISEWs for 1994 and 2008.<sup>4</sup>

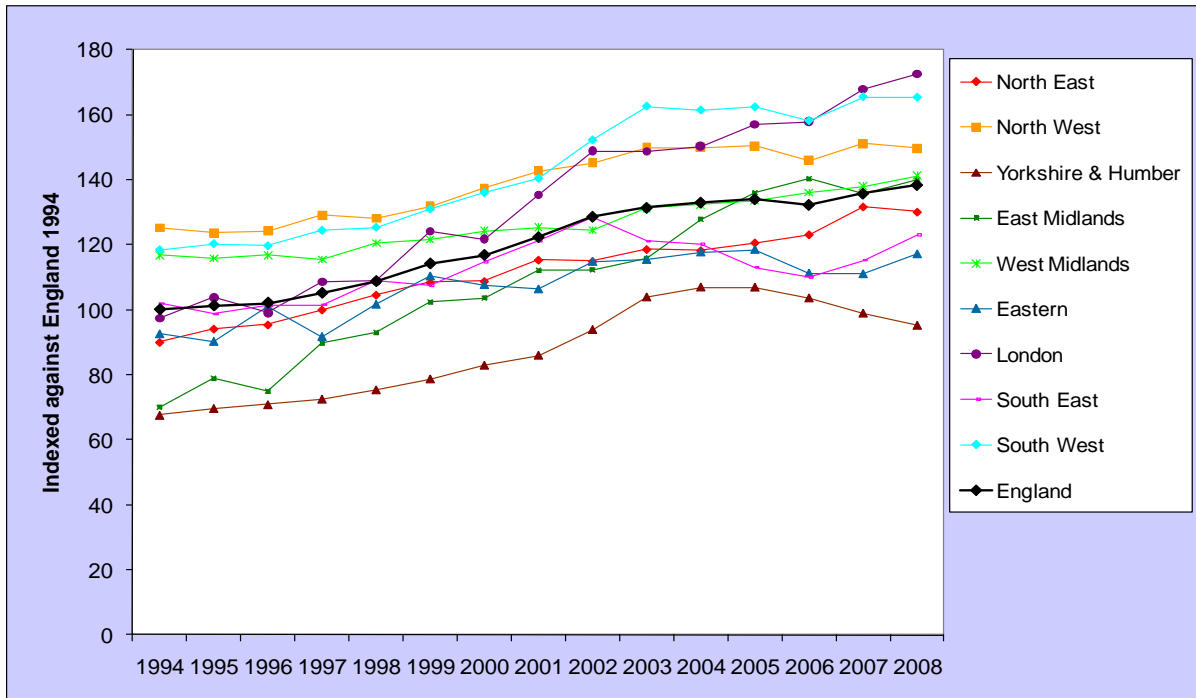


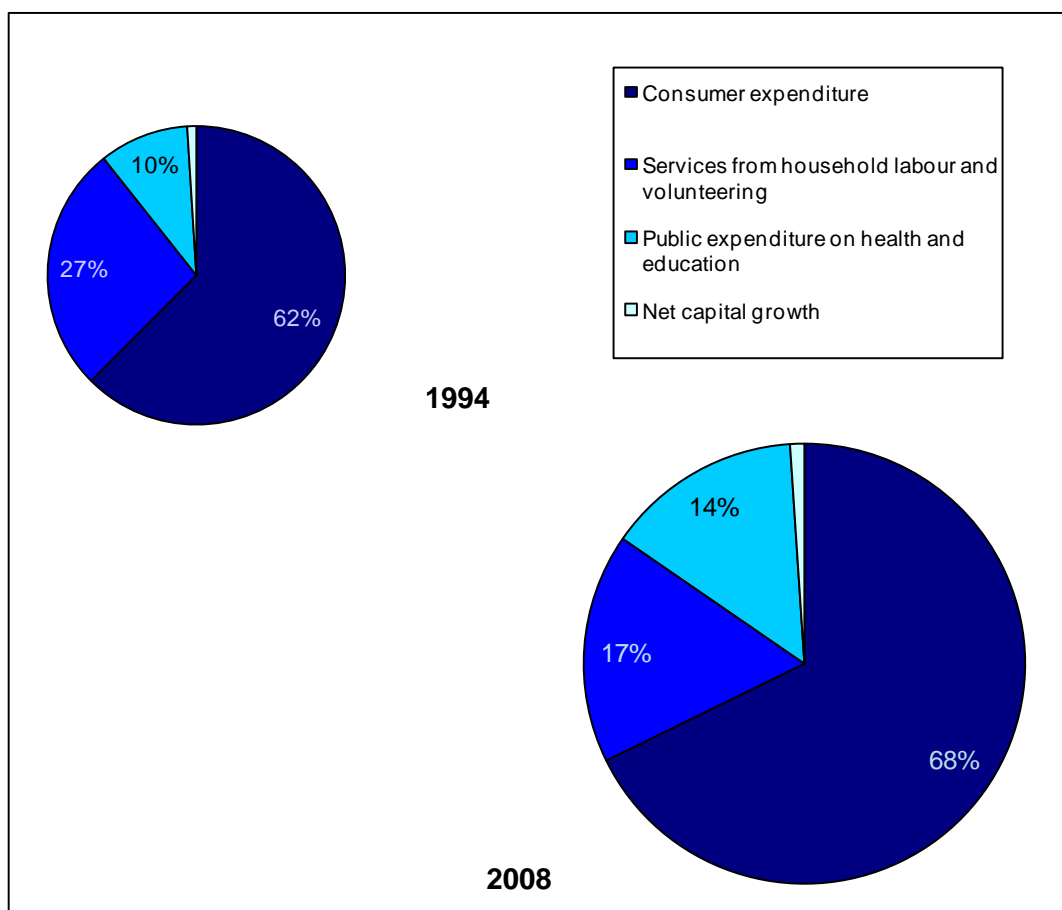
Figure 8. R-ISEWs per capita indexed against England's R-ISEW for 1994, for all the English GORs.

Table 1. R-ISEW per capita rankings for each region from 1994 to 2008.<sup>3</sup>

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
North East	7	6	7	6	6	6	6	6	6	6	7	6	6	6	6
North West	1	1	1	1	1	1	1	1	3	2	3	3	3	3	3
Yorks	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
East Mid.	8	8	8	8	8	8	8	7	8	7	5	4	4	5	5
West Mid.	3	3	3	3	3	4	3	4	5	4	4	5	5	4	4
Eastern	6	7	5	7	7	5	7	8	7	8	8	7	7	8	8
London	5	4	6	4	5	3	4	3	2	3	2	2	2	1	1
South East	4	5	4	5	4	7	5	5	4	5	6	8	8	7	7
South West	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2

### 1.3. Component patterns

The R-ISEW takes consumer expenditure as a starting point – which reached a total of £748 billion for England in 2008. 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 2008 (starting at £222 billion but dropping to £186 billion), public expenditure on health and education has almost doubled – growing from £80 billion to £158 billion.



**Figure 9. Positive components of England's R-ISEW in 1994 and 2008.**

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 (£124 billion in 2008) and depletion of non-renewable resources (£104 billion in 2008) – with the local costs of air pollution also representing a substantial cost (£19 billion in 2008). The two largest social costs are the adjustment for income inequality (which took £97 billion off England's R-ISEW in 2008) and the cost of commuting (£34 billion in 2008). Lastly, the main negative economic cost – net international position – represented a loss of £43 billion.

Over the 14 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 47% of the R-ISEW costs in 2008, compared with 38% in 1994), and the *decrease* in the costs of air pollution (only 4% of the R-ISEW costs in 2008, compared with 16% in 1994). The costs of income inequality and net international position have also increased over the 14 years since 1994, though those associated with English regions' net international position have declined slightly since 2006 (when they peaked at £50 billion).

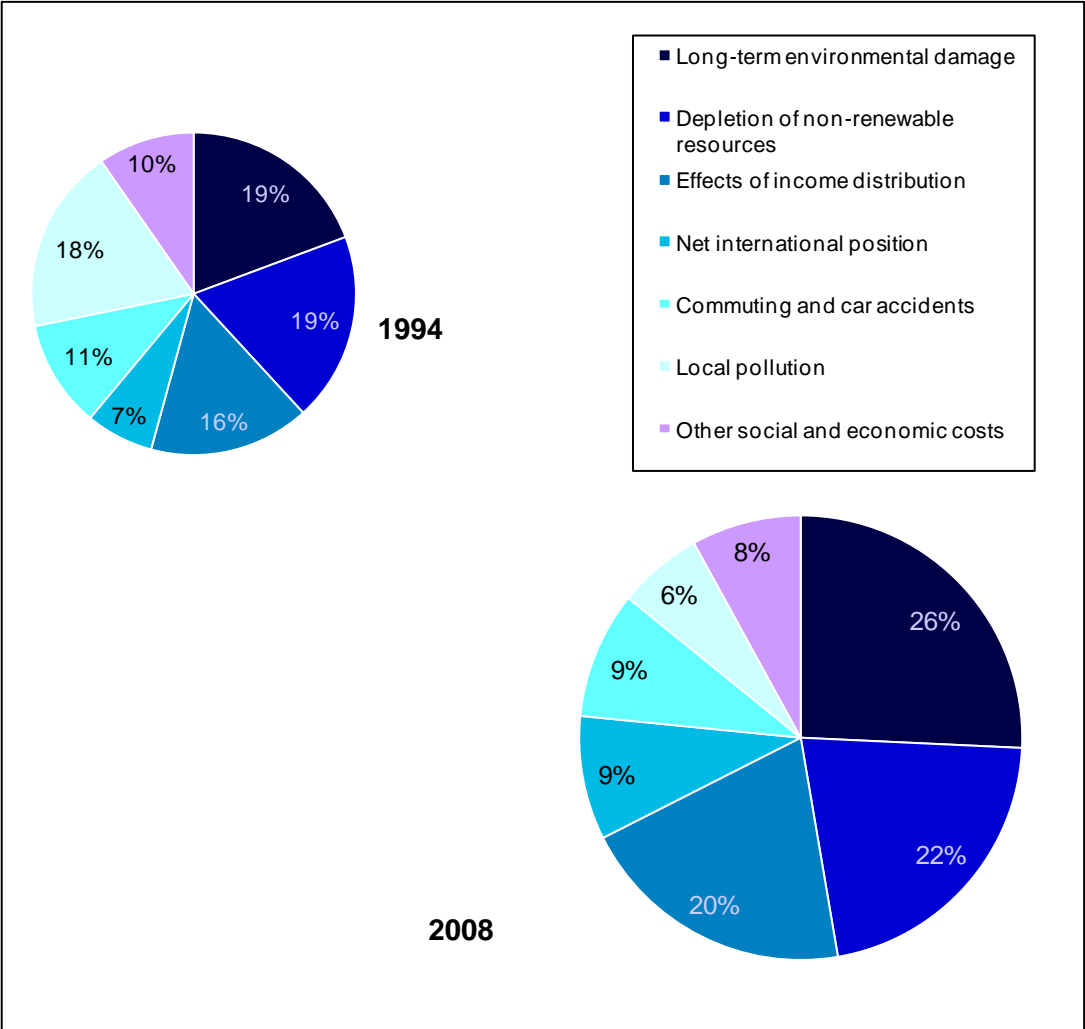


Figure 10. Negative components of England's R-ISEW in 1994 and 2008.

## 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 1994–2008. 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 an earlier report,<sup>4</sup> and in a technical report.<sup>5</sup>

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 14 years in this time series – from 48 million in 1994 to 51 million in 2008. For each component, the percentage in brackets in the title represents the percentage change for this component between 2007 and 2008 for England. 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 (-0.3%)<sup>6</sup>**

*Household final consumption expenditure. National figures from the ONS Blue Book, which are based primarily on information from retailers. Estimated regional figures derived using data from the Expenditure and Food Survey.<sup>7</sup>*

Per capita regional consumer expenditure for England grew by 35% in real terms over the period 1994–2008, from £10,739 in 1994 to £14,535 in 2008, which is a marginally smaller increase than that in GVA per capita (which increased by 37%,

from £15,354 to £21,020).<sup>8</sup> Year-on-year growth in consumer expenditure was greatest in the late 1990s, reaching 4.8% in 1998. Since then, however, growth rates have fallen considerably, never going above 2% per year. In 2008, but also 2006, there were indeed slight decreases in per capita consumer expenditure (though there were no decreases in total consumer expenditure).

Unsurprisingly, there are quite large differences between GORs, with per capita expenditure in the South East (£16,258 in 2008) 33% higher than that in the North East (£12,237). This range had been falling from a high of 44% in 2000 (when London's per capita consumer expenditure was briefly marginally higher than that of the South East) to a low of 26% in 2007. However, in 2008, consumer expenditure dropped considerably in the North East, leading to the gap widening once more.

Looking at the data over time, it is likely that it is last year's results rather than this year's ones which represent the exception. In the previous report, we reported surprisingly large increases in consumer expenditure between 2006 and 2007 for the North East, the South West, the East of England, and London, alongside drops in consumer expenditure in the East Midlands and Yorkshire and the Humber. Of these effects, all are reversed between 2007 and 2008 with the exception of the increase in consumer expenditure in the East of England, and the decrease in Yorkshire and the Humber. The result is that these are the only two regions for which consumer expenditure relative to the rest of England has changed noticeably from 2006 to 2008, with Yorkshire and the Humber now seeing lower per capita expenditure than the East Midlands, and the East of England now marginally higher than London and the South West.

Looking over a longer timeframe, one can see how the East of England's rise is part of a steady ongoing increase – indeed it is the region which has seen the largest increase since 1994: 56% compared to the English average increase of 35%. The South West has also seen a large increase of 49% since 1994. Both regions have thus moved above the English average whereas in 1994 they were below it. Conversely, the East Midlands has fallen below the mean for England – whereas it used to be above the mean in 1994 and 1995. 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 (6% lower than the England mean), its GVA was, compared with rest of England, more or less the same as it was in 2008 (5% above the mean in 1994, at the mean in 2008). 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 2008.

### ***Net international position (-9.6%)<sup>9</sup>***

*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 £575 per capita in 1994, to £987 per capita in 2006. This is predominantly due to imports of material goods far exceeding exports, a deficit that has not been compensated for by the surplus in trade in services. For England as a whole, net imports of goods have more than tripled from £32 billion in 1994 to £103 billion. Whilst net exports of services have proportionally risen by an even greater amount (from £12 billion in 1994 to £53 billion in 2008) – the absolute value of this change is not enough. Having said that, in the last two years of the period (2007 and 2008), service exports did indeed speed up, such that England's deficit decreased by 9.6% from 2007 down to £845 per capita in 2008.

Whilst England as a whole has been consistently in deficit, three GORs have maintained surpluses throughout the time period – the East Midlands, the North East, and the North West. The North East and the North West both started the period with particularly high surpluses (£1,321 and £839 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 (£68 per capita) which rose to £992 in 2005 and 2006, but has since declined to £575 per capita (predominantly due to goods exports faltering and falling since then, whilst imports have risen ever more quickly. Indeed, the key factor for the surpluses in all these regions appears to be surpluses in the balance of goods, though they disappeared in the North West and the East Midlands in 2008.

Meanwhile, by far the biggest deficits were seen in the South East and the East of England. Until 2006, these had been consistently growing, reaching £3,854 per capita in the South East, and £3,206 in the East of England. However, in the last two years, the deficit in the South East has come down slightly such that it was the East of England which had the largest deficit of any region in 2008. Again, these deficits are driven by the balance of goods trade, with goods deficits for the South East and the East of England having increased significantly since 1994 (for example, that for the South East has increased from £1,972 per capita in 1994, to £5,243 in 2006). Whilst these GORs have also seen increases in their services surplus, this does not compensate for the goods deficit.

The region with the third highest deficit per capita is the West Midlands (£855 per capita in 2006). This represents a steady decline from a *surplus* of £934 per capita in 1994. The region's balance of payments went into the red in the year 2000, again driven predominantly by a switch from having a goods surplus to a goods deficit.

By contrast, London has seen a substantial improvement in its net international position. Whilst it remains in deficit, it has reduced this deficit from £3,102 per capita in 1994, to £415 per capita in 2008. In 2003, the deficit was only £99 per capita. Whilst the region, like most of England, has seen a growing goods deficit, this has been more than matched by a growing services surplus.

The reduction in the English deficit over the last two years has been echoed across the country with the exception of two regions: the East Midlands and the East of England.

Figure 11b maps net international position across the GORs for 2008.

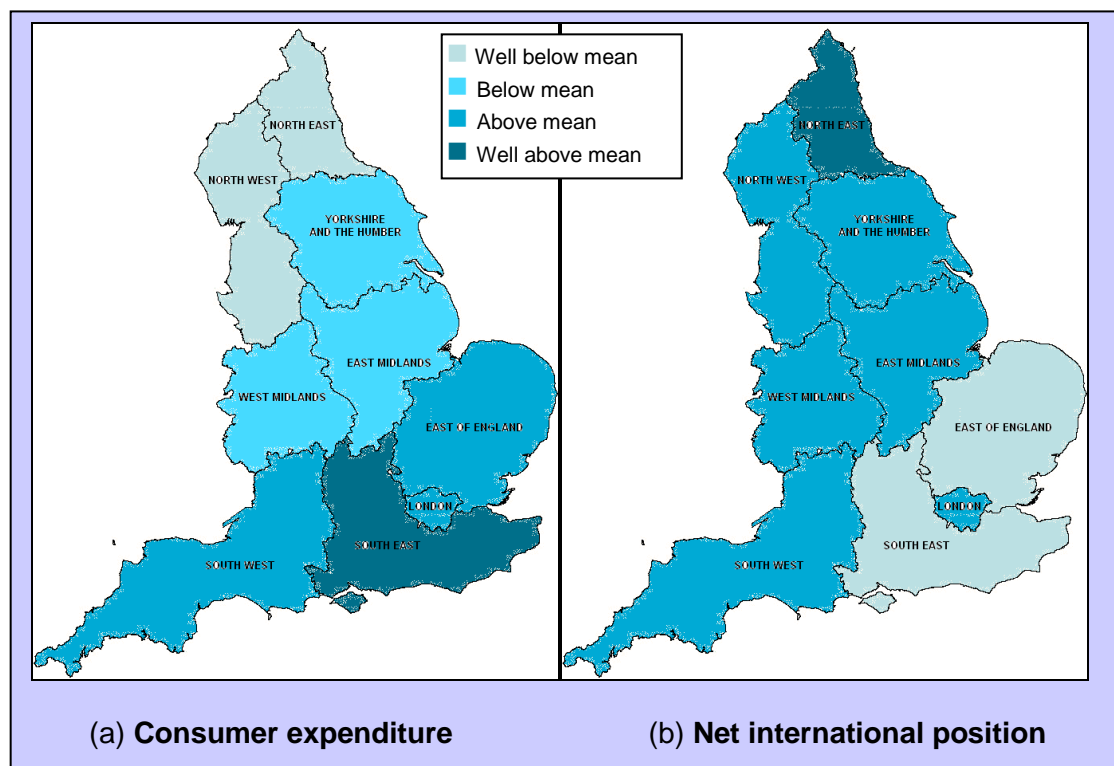


Figure 11. Per capita consumer expenditure and net international position in 2008.<sup>4</sup>

### Net capital growth (+18.3%)

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 £404 per capita in 2002. Since then it has declined somewhat, to £189 per capita in 2007. In 2008, it rose again slightly, to £223 per capita.

In contrast to its low temporal variability, however, this component has substantial spatial variability. In contrast to its excellent performance in terms of net international position, the North East is the only GOR to have been consistently in deficit during the 14-year period. However, this appears to be changing, and the deficit for the region had disappeared by 2008. Meanwhile, several GORs have consistently turned out a positive figure for net capital growth – namely the East Midlands, the North West, and the West Midlands – areas traditionally recognised as the industrial hub of England.

Yorkshire and the Humber had also consistently seen positive net capital growth, recording the highest per capita figures between 2001 and 2004. Since then, however, net capital growth has dropped substantially in the region, becoming negative in 2007. In 2008, the region had the second lowest per capita value of any region. The South West has also seen net capital growth dramatically decrease, such that the region had the lowest regional per capita figures in 2008 (-£464 per capita).

At the other end of the table, the East Midlands and London have been the regions that gain the most from this component over the last three years. In the East Midlands case, values rose steadily to a peak in 2007, before falling slightly (to £1,143 per capita) in 2008. Conversely, London's value moved up rapidly from joint lowest in 2003 such that it stood at £1,081 per capita in 2008. Looking at the original source data on net capital expenditure, we can see that it had increased in London by 43% between 2003 and 2008, compared to an increase of only 8% for England as a whole.

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 (-23.3%)**

*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 the goods are purchased. To adjust for this, the difference between expenditure on and service flow from consumer durables is estimated, accounting for depreciation and obsolescence.*

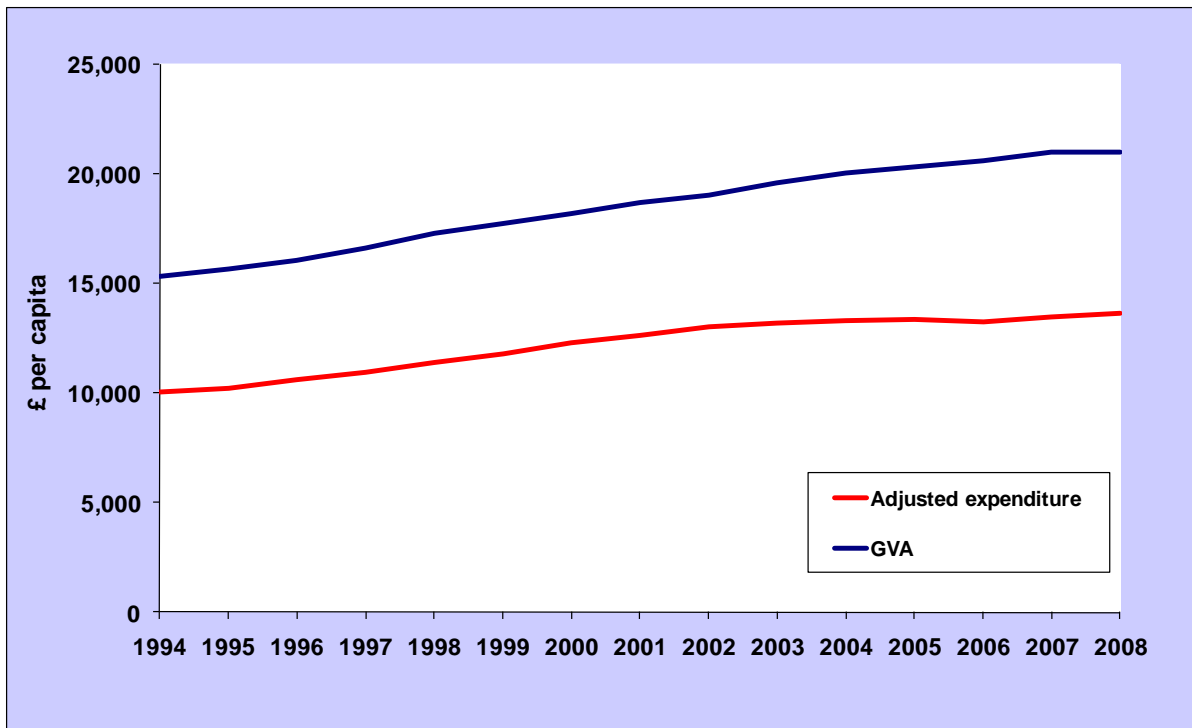
This component has a modest impact on the R-ISEW, subtracting 2.1% of the value of England's consumer expenditure (£256 per capita) in 2008. This represents a decrease from the high point of £441 per capita in 2001. Generally, the pattern is for this component to be largest when consumer expenditure 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. Hence it has dropped 23% from 2007 to 2008 in response to declining consumer expenditure.

Comparing across regions, this component has been consistently the largest in affluent southern GORs (particularly the South East). The exception is London, for which the cost of this component has tended to be below average

### **Step 1. Effect of economic adjustments**

Applying these three economic adjustments to consumer expenditure is the first step in creating the R-ISEW. Doing so reveals some differences with GVA (Figure 12). From 1995 to 2002, the adjusted indicator grew at a faster rate than GVA, with an average annual growth rate of 3.5% versus 2.9%. Since then, however, GVA has tended to grow faster. Indeed in 2006, whilst GVA grew by 1.5%, this economically adjusted indicator fell by 0.6%, before social and environmental

factors have been taken into consideration. The per capita value for 2006 was only 0.5% higher than that for 2003, whilst GVA had increased by 5.0%.



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

Since then, however, 2007 and 2008 did see some growth return even whilst GVA growth faltered. In 2007, this growth (of 1.6% compared to 2006), can be attributed entirely to a rapid rise in consumer expenditure. In 2008, by contrast, it appears to be due to positive changes in relation to the three adjustments: net international position, net capital growth, and services from consumer durables. Of these, the most important is the reduction of the trade deficit, adding £90 per capita between 2007 and 2008.

Comparing GORs also reveals important differences (Figure 13). London remains in first place, though its significant lead in terms of GVA all but disappears. Meanwhile, the figures for the East of England and the South East are the lowest for any region at £11,992 and £12,775 per capita in 2008 (12% and 6% below the England average, respectively). Meanwhile, the North East, the East Midlands, and the North West reveal economically adjusted figures that are higher than one would expect based on GVA. In the case of the North East, the region with the lowest per capita GVA, this means that it moves to fifth place in the rankings.

Over recent years, we can see (in Figure 14 for selected regions) how the lead the East Midlands maintained between 2004 and 2006, has now gone, with London taking top place. To put this in context, London was the region with the lowest per capita value on this adjusted indicator in 1996, and only overtook the English average in 1999. The East Midlands decline from 2006 is principally due to the shrinking trade surplus we discussed earlier. As we also noted earlier, the discontinuity in consumer expenditure in 2007 appears to have resolved itself and was not singly responsible for the East Midlands lower adjusted value since then.

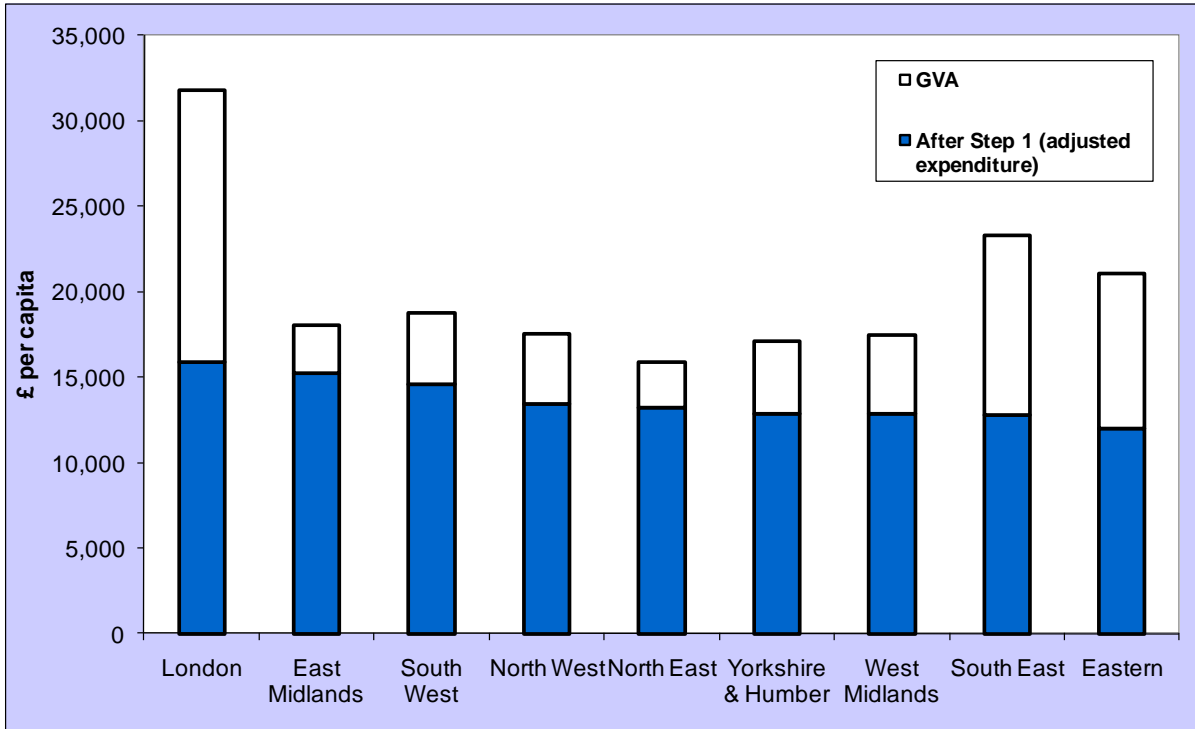


Figure 13. Adjusted per capita consumer expenditure vs total GVA for each GOR in 2008.

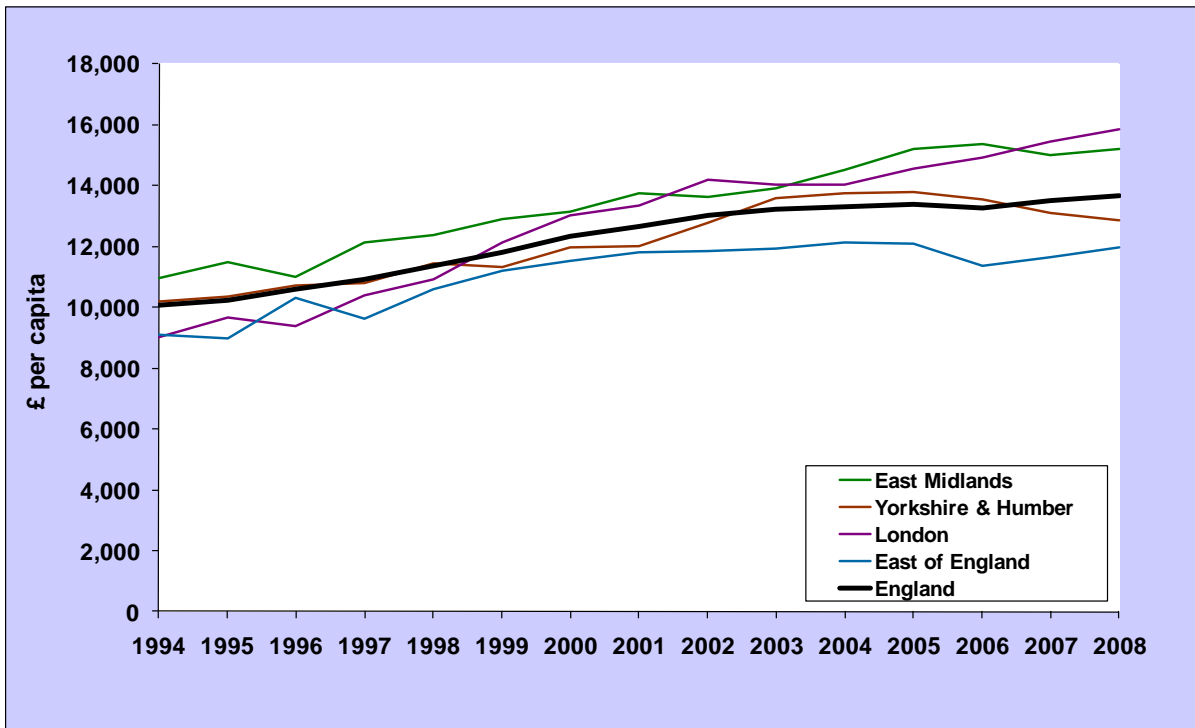


Figure 14. Adjusted consumer expenditure per capita for selected GORs.

At the other end of the table, the East of England now takes bottom place from the South East. In some ways, this is nothing new – in last year’s calculation, the East of England’s adjusted expenditure figure was lower than that for the South East for

every year except 2005 and 2007. In this year's report, its figure is now below that of the South East for every year except 2005. But the changes in the figures for the last couple of years, a result of new data and the process of taking rolling averages, are worth noting. In the last report, we reported the South East's adjusted expenditure heading downwards; it now appears to be rising, and is almost identical to the figures for the West Midlands and Yorkshire and the Humber in 2008. The change is mostly due to the net international position component. In last year's report we reported per capita deficits in 2007 of £3,329 and £3,797 for the East of England and the South, respectively. This year, for 2008, the East of England's deficit is comparable (£3,377), but that for the South East has fallen to £2,968 per capita.

Lastly, it is worth noting Yorkshire and the Humber, where adjusted consumer expenditure has fallen steadily since 2005.

Relative to GVA, adjusted consumer expenditure serves to reduce inequalities between GORs. Whilst London's per capita GVA was more than double that of the North East by 2008, the highest adjusted consumer expenditure figure (for London) was only 32% higher than the lowest (for the East of England).

## 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 (-2.2%)***

*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 £4,607 per capita in 1994, to £3,621 in 2008 (as noted in Section 1.3) – a drop of 21%. Nevertheless, this is still equivalent to £186 billion for the year across England.

Comparing across GORs, the South East and the 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 2008. 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 (+3.8%)**

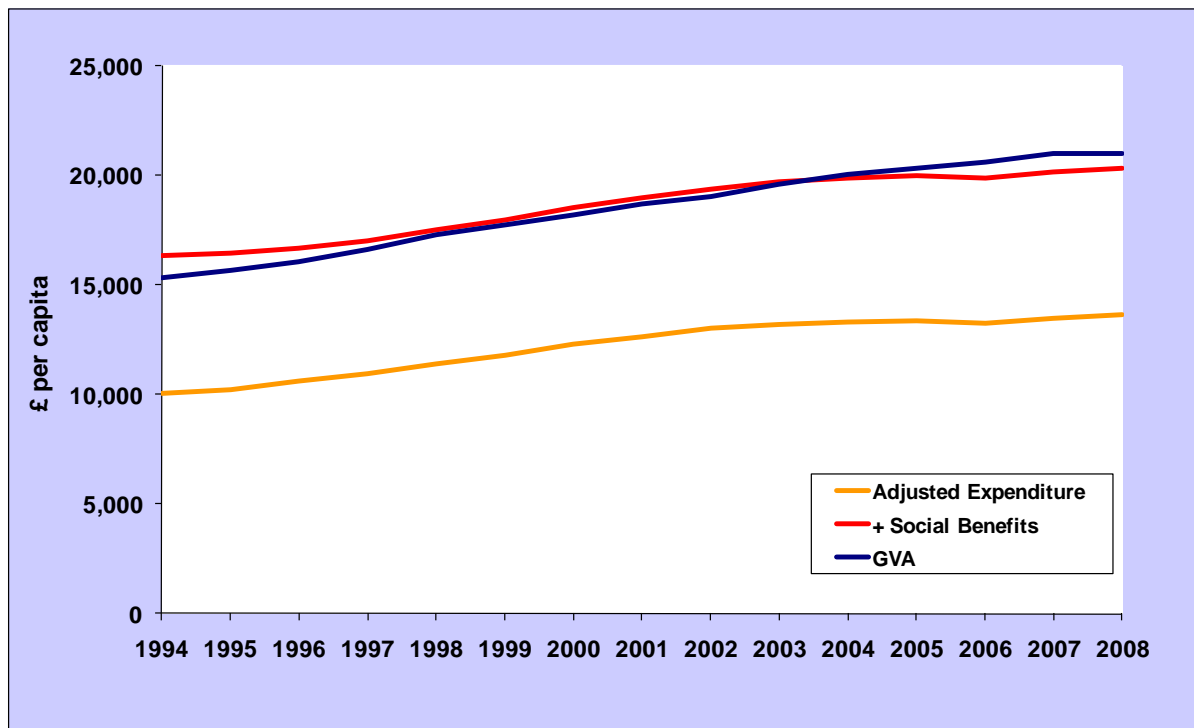
*All public expenditure on health and education is included (defensive health spending due to crime, car accidents and pollution is subtracted elsewhere)*

Public expenditure on health and education has increased across England by 84% from 1994 to 2008 – from £1,668 per capita to £3,078 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 had the highest per capita public expenditure – 17% above the English average in 2008. Meanwhile, the East of England, the South East, the South West and the East Midlands had the lowest spending per capita – between 6% and 11% below the English average.

Whilst the increase in public expenditure appeared to be stop in 2006 (only increasing 1% from 2005 figures), 2007 and 2008 saw the increase continue once more. Indeed the two regions with the highest per capita expenditure, London and the North East, saw the greatest increase in expenditure, growing by 10% per capita over the two years.

### **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.**

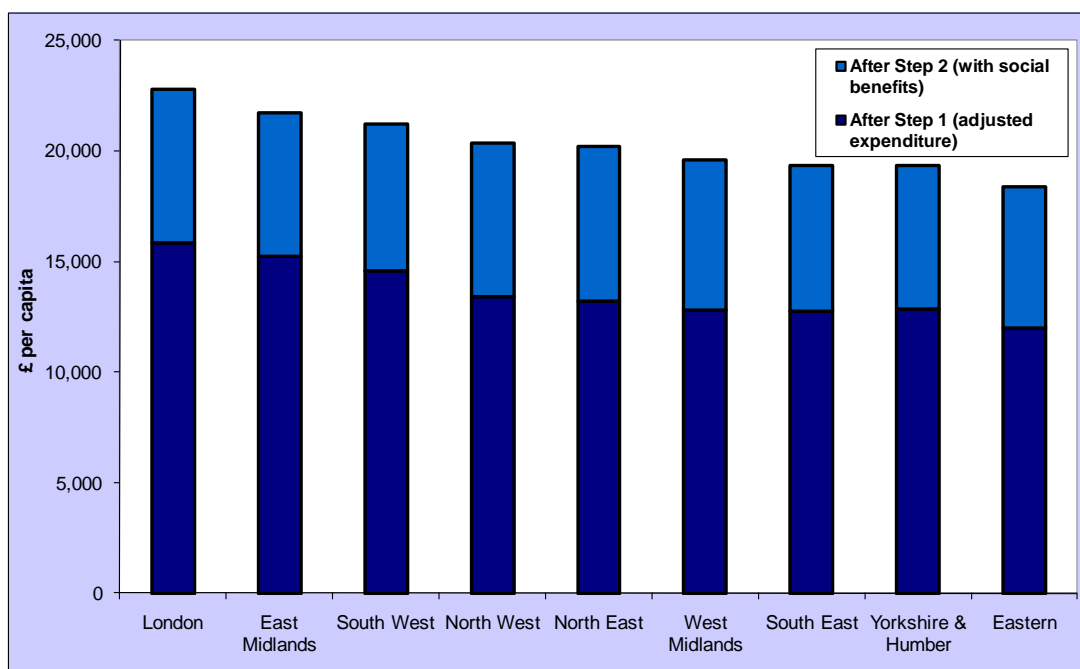
As in Figure 12, Figure 15 shows the adjusted index for England on a per capita basis. Adding public expenditure on health and education and services from

household labour returns the adjusted index to a level similar to that of GVA. The flattening out, however, seen from 2003 onwards in Figure 12, is not compensated for with the inclusion of social benefits. Indeed after that year, the adjusted figure falls below per capita GVA. And while GVA has grown by 7.1% between 2003 and 2008, adjusted consumer expenditure has only grown by 3.3%, and by 3.1% once social benefits are incorporated.

Including social benefits, particularly domestic labour, serves to drop Yorkshire and the Humber from sixth place to eighth, with the West Midlands and the South East moving ahead of it. It also serves to almost double London’s lead on the East Midlands from around £600 per capita to almost £1,100 per capita.

**Costs of income inequality (+2.8%)**

*This attempts to adjust unequal consumer expenditure to reveal the total associated utility, recognising that increased expenditure has different marginal utility at different expenditure levels. Atkinson Indices – a standard measure of inequality - are calculated for each GOR, from household income data from the Family Resources Survey, in order to determine the appropriate amount to be subtracted from total consumer expenditure for that region.*



**Figure 16. Adjusted consumer expenditure (after Step 1) combined with social benefits (Step 2) for each GOR in 2008.**

The costs of income inequality in England come to £97 billion or £1,887 per capita in 2008.<sup>10</sup> This represents 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. The data reveal a sharp peak in 2000, however, 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 £2,711 per capita in 2008. After London, the two GORs with above-average costs of inequality are its neighbours: the South East (£2,245 per capita) and the East of England (£2,032 per capita).

Meanwhile, the GORs with the lowest costs of inequality are generally those with lower consumer expenditure – the North East and the North West. This year's calculations, however, reveal an increase in the costs of inequality in 2008 for the West Midlands and Yorkshire and the Humber – two regions which had been doing well in 2007 – such that their per capita rose above those of the wealthier East Midlands for the first time since 2003. This is due to sharp rises in the Atkinson Indices in these two regions. For example, the Atkinson Index in Yorkshire and the Humber rose from 0.103 in 2007 to 0.124 in 2008 – from the lowest value to the fourth highest. Meanwhile an upwards spike in the Index for the North West in 2006 appears to not have been repeated, and the region now has the second lowest Atkinson Index (just above the North East).

### **Costs of crime (-7.1%)**

*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 per capita costs of crime in 2008 are the second lowest they have been since 1994. The figure now stands at £193 per capita, or £10.0 billion for England overall. The pattern has been somewhat complex, with costs falling gently to a low point in 2000, before rising again to a peak in 2004, then falling again quite sharply.

As might be expected, the costs of crime are by far the highest in London, at £259 per capita, with Yorkshire and the Humber and the North West a distant second and third at around £200 per capita. Meanwhile it is the East of England which has the lowest costs of crime.

The overall fall for England since 2004 has been for all regions though to differing degrees. For example, costs in London fell by 18% from 2005 (£325 per capita) to 2007 (£265 per capita), though this decline tailed off somewhat in 2008. Meanwhile the two northern regions with high costs have seen substantial declines which have continued in the last year of the time period, such that costs are now 24% lower in 2008 than in 2005 for both of them. Staying in the north, the North East has seen an even larger decrease in the costs of crime in the last three years (25%), meaning per capita costs there have fallen from around average to England to third lowest, below that of the South East.

Looking at types of crime, the biggest contribution to the decrease over the last three years comes from a 24% decrease in 'other violent crime' (excluding homicides) saving England £1 billion. Other important areas of reduction include sexual offences and vehicle theft, the latter falling by almost a third. The only area where a marginal increase in crime has been seen is in robberies of dwellings,

though this is more than compensated for by a substantial decrease in burglaries from dwellings.<sup>1</sup>

### **Costs of divorce (-11.0%)**

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

In 2008, the costs of divorce, at £136 per capita were the lowest they have been since 1994, and represent a 1.1% reduction in the overall R-ISEW. The pattern of costs for this component has been very similar to that for crime, with fairly low costs coming up to 2000, followed by a sharp rise in the early years of the new millennium (2001–2004), before falling again. The year-on-year fall to 2008, a decrease of 11%, is the biggest drop seen to date, and reflects the fact that the number of divorces decreased from 135,588 divorces in England in 2007, to 121,334 divorces in 2008.

The distribution of the costs of divorce across GORs does not match the distribution of other social costs. The highest per capita costs have tended to be in the South West. Indeed, in many years, the costs of divorce have been higher in this region than the costs of crime. Divorce rates peaked at 3.7 per 1000 inhabitants in 2002, compared to, for example, 3.0 per 1000 inhabitants in the West Midlands. The figure for the South West was particularly poor in 2007 – 17% above the English average.

Whilst the South West remains the region with the largest per capita costs of divorce, 2008 has seen some changes in the order for other regions. For example, there has been a substantial fall in the costs for the North West, from £146 per capita in 2007, to £107 per capita in 2008 making it the region with the lowest per capita costs. The two other northern regions (the North East and Yorkshire and the Humber) also saw substantial drops in costs. Meanwhile the only region not to see any substantial change between 2007 and 2008 has been London, taking it from below-average costs in 2007 to the second highest cost in 2008.

### **Costs of commuting and car accidents (-5.8%)**

*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 7.2% off the overall R-ISEW (5.5% attributable to the costs of commuting, and 1.6% attributable to the costs of car accidents).

Looking first at the costs of commuting, these increased from £560 per capita in 1994 to just over £700 per capita in 2000. Since then they have remained relatively stable. In 2008, they dipped to £672 per capita from £701 per capita in 2007.

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<sup>1</sup> The difference between the two being that robbery implies the threat of force against the victim.

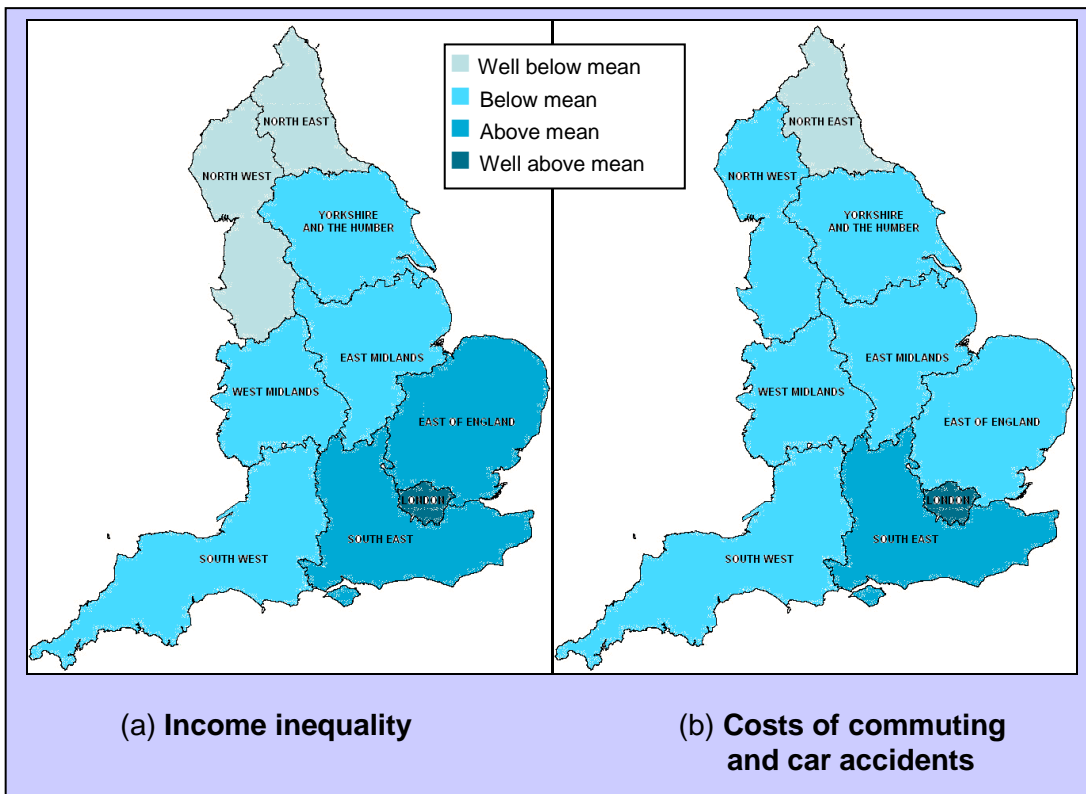
This decline is seen both in terms of the direct costs of commuting and costs of the time spent commuting. It can be observed in several of the raw data sources. For example, household spending on motoring decreased from £53 per household per week in 2007 to £52 in 2008 – part of a steady decrease from a high point of £68 in the year 2000. According to the National Travel Survey, the number of commuting trips per person per year (in Great Britain) fell from 162 in 2007 to 156 in 2008.

The rank order of the GORs has remained fairly stable (Figure 17b), with London having by far the highest costs (33% 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 increased from £769 per capita in 2003 to £912 per capita in 2005. This is largely due to the increased amount of time Londoners appear to have spent commuting in the last four years of the time series. This is not because individual commutes are taking much longer, however, but that the number of commuting trips reported to be made per person jumped up significantly. Further analysis is necessary to determine whether this is a genuine effect, as it is unclear why London residents would have suddenly increased their amount of commuting in 2004. This is a particularly sensitive issue as this change coincides with the introduction of the congestion charge in London.

The only change worth noting over the last couple of years has been a slight rise in the costs for the East Midlands, which move its per capita costs above those of neighbouring regions such as the West Midlands, Yorkshire and the Humber, and the East of England – all of which had higher costs in 2006. Indications suggest, however, that around half of this change can be traced to the data on household size from the *Expenditure and Food Survey* which suggests that average household size has fallen somewhat in the region without concomitant falls in transport expenditure.

The pattern for car accidents is very different. Here, a steady decrease has been recorded, from a starting cost of £328 per capita in 1994, to one of £198 per capita in 2008. 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 £167 per capita in 1994, to £58 per capita in 2008. At the beginning of this period, London had the highest costs (£391 per capita) followed by the East Midlands and the East of England, whilst the lowest costs were in the North East (£217 per capita) and the South West. The most dramatic change again can be observed in London, where per capita costs have more than halved. The biggest gains were seen here between 2003 and 2004, coinciding with the introduction of the London congestion charge. 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 three years of the time series. Between 2007 and 2008, the biggest falls in costs were seen in the West Midlands and the South West (both falling 15% in one year).

Though the costs of car accidents have fallen over the time series, they are still marginally higher than those of crime.



**Figure 17. Costs of income inequality, and commuting and car accidents in 2008.<sup>4</sup>**

### **Costs of industrial accidents (-3.5%)**

*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 1.3% of the R-ISEW (£162 per capita in 2008). 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 are available, costs have fallen by 11%, since a high point in 2003. Variation between GORs is fairly large, with the East Midlands tending to suffer the worst costs whilst the North West has the lowest costs.

These patterns have remained relatively static with costs decreasing across the country in tandem. One long-term trend that can be seen is that costs in the South West have gently risen whilst those in other regions have fallen slightly, such that the region now has almost the highest per capita costs. In 2008, the North East suffered a sharp increase in numbers of accidents, taking it to the highest per capita costs (£202 per capita). Indeed, for both the North East and the South West, costs of industrial accidents in 2008 exceeded those for crime and those for car accidents.

Meanwhile costs in the West Midlands have fallen from £193 per capita in 2006 to £157 per capita in 2008, resulting from a sharp decline in the number of fatalities amongst workers.

There are no apparent structural reasons for differences, such as the proportion of regional population employed in particular sectors. For example, why does a relatively industrial region such as the North West have the lowest per capita costs? This may be an area which merits more detailed investigation of the underlying data.

**Step 3. The combined impact of social and economic factors**

Throughout the time period, subtracting social costs takes between 16% and 19% from the total after Step 2. This impact peaked marginally in the year 2000 driven by the increased costs of inequality, but have since steadily declined both in absolute and relative terms. Indeed, proportionally, social costs in 2008 were the lowest they have been throughout the time period, at 16%. It is worth noting that this is despite an increase in the costs of income inequality between 2007 and 2008, as this increase is more than compensated for by declines in all the other social costs

As a result, the upward trend from 2006 to 2008 that was seen after steps 1 and 2 begins to look more pronounced after incorporating social costs (Figure 18).

Looking across the GORs, the largest social costs fall to London, followed by the South East. Meanwhile, the lowest costs were in the North East and the North West (Figure 19). As a result, London falls from first place before social costs are subtracted to second place behind the East Midlands, and the South East falls behind Yorkshire and the Humber to eighth place. Also the North East moves marginally above the North West into fourth place.

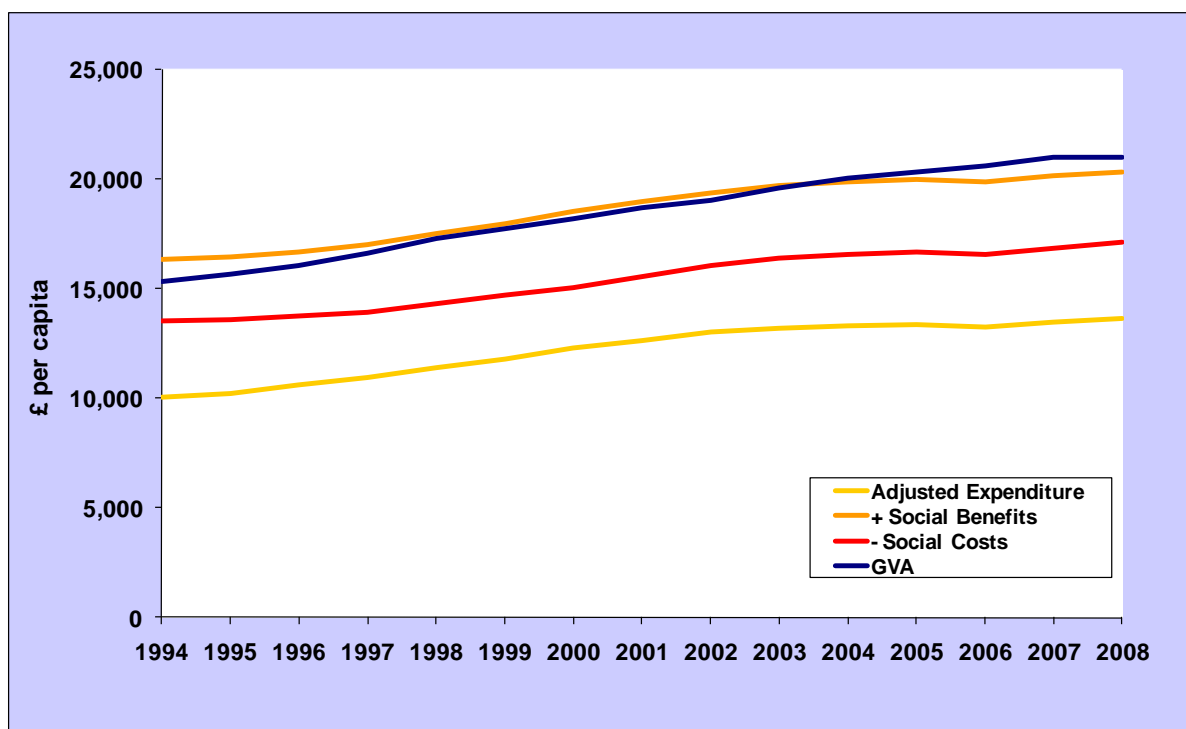


Figure 18. Steps 1 to 3 vs GVA.

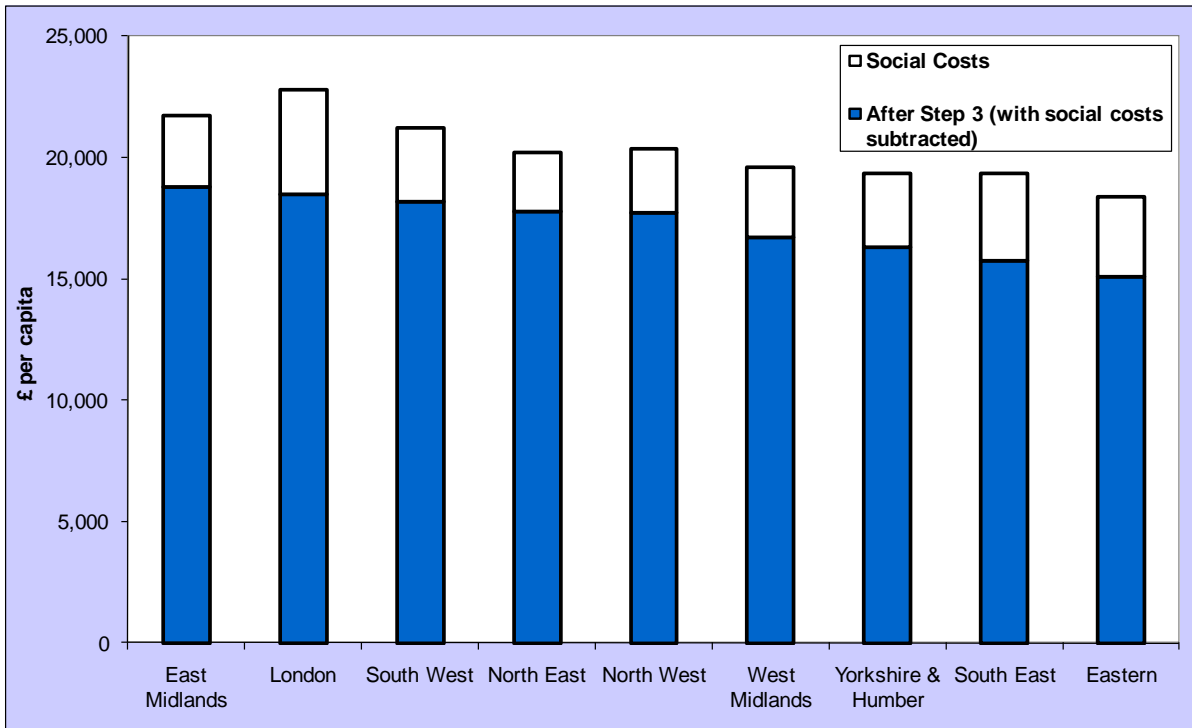


Figure 19. Subtraction of social costs per capita for each GOR in 2008 (Step 3).

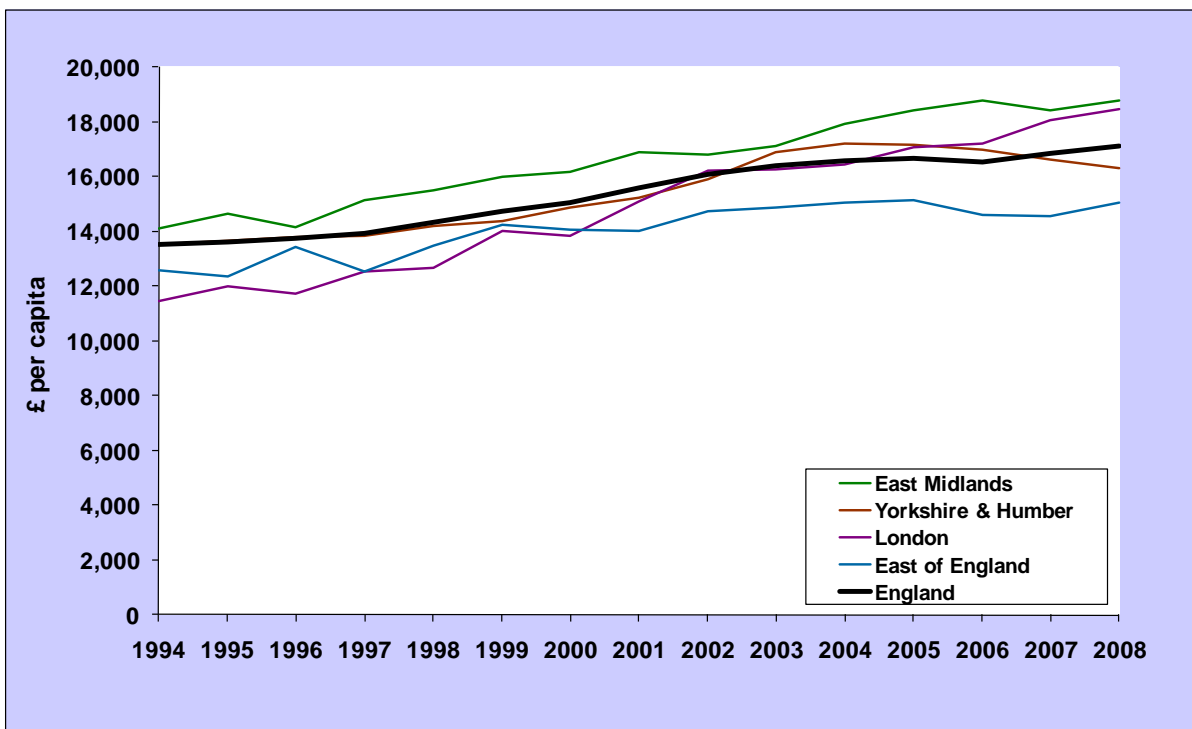


Figure 20. Results of Step 3, per capita for selected GORs.

Looking back over time, there are no substantial changes in region ranking. The most important changes appear to be a decline in the costs for the North West from £3,128 per capita in 2006 to £2,590 per capita in 2008, whilst a marginal increase in costs in Yorkshire and the Humber over the last two years move it from seventh (in

terms of costs) in 2006 to fourth in 2008. Figure 19 illustrates how this contributes to the region falling below the English average in terms of the adjusted indicator.

### 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).<sup>11</sup>
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.

It is important to remember, however, 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. This may, however, be due to some extent to our increasing reliance on non-Western countries for manufactured goods. For example, the fact that England manufactures fewer cars than in the past may have led to decreases in *local* air pollution. But 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, the environmental costs have merely been exported.<sup>12</sup> Of course, this effect can also function in the opposite direction. A region that is a net exporter to other regions may be incurring environmental costs associated with production that other regions are partly responsible for. This issue is discussed in depth in the scoping report that we produced for the RDAs.<sup>13</sup> Furthermore, in the development work currently under way, we will be able to use new Department of Energy and Climate Change data which will allow us to distribute CO<sub>2</sub> emissions to regions using energy rather than those producing them.

### **Water pollution (+1.6%)**

*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.*

No new data on water quality for 2008 was available from the Environment Agency at the time of calculation. Indeed, changes to the collection of this data may mean this component will have to be entirely revamped in the future, as the government may drop the current reporting methodology and instead report based on the new EU Water Framework Directive once every seven years.

As a result, figures for 2008 were estimated based on the trend to date from 2001 to 2007. Based on this trend, we estimate that water pollution costs remained at a low £6 per capita across England in 2008. This low figure represents a fall of 24% 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 20% of all the English waterways, whilst London has only 1%). 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 the South East actually do relatively well (as of course does the South West); it is the North West and the 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. But ironically it is 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 2007. Whilst all regions except London have seen some improvement, the greatest gains have been seen in the East Midlands, where total costs have fallen by a third since 1994, mainly because of improvements in chemical quality.

### ***Air pollution (-10.7%)***

*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 15% from England's R-ISEW total – £1,339 per capita. By 2008, the figure had dropped to just over 3% – only £374 per capita: a substantial 72% fall. Falls were most dramatic for sulphur dioxide (SO<sub>2</sub>) emissions (an 81% drop for the UK as a whole) and carbon monoxide emissions (a 65% drop), with smaller declines in particulate emissions and nitrous oxide (NO<sub>x</sub>) emissions. As a result, NO<sub>x</sub> now represent the biggest total cost of any pollutant or pollutant group (£6.7 billion in 2008 for England), whereas, until 2004, it was SO<sub>2</sub> that was the biggest problem (costing England's R-ISEW £31.5 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. These GORs, however, still remain the biggest polluters. The only change in order is that, for the last four 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<sub>2</sub> emissions. Emissions in 2007 were estimated to be *one-seventh* those only four years earlier, in 2003. Such a steep fall has not been matched in neighbouring Yorkshire and the Humber. The North East, however, has seen a sharp drop between 2007 and 2008, with overall per capita costs falling by 23%, predominantly due to, again SO<sub>2</sub> emissions falling, but also VOC (volatile organic compounds) emissions.

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 (one-third the English average). This is due to the lack of both energy generation and heavy manufacturing in the region.

### ***Pollution abatement (-24.7%)***

*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 £57 per capita in 2008. These costs are closely related to the prevalence of power generation and heavy industry. The distribution of costs is therefore not very surprising: low in London (only £34 per capita) and more southern GORs, and highest in the North East and the East Midlands (£80 per capita). Over the eight years for which actual data are available, there has been no clear trend. Whilst costs appeared to be going down between 2000 and 2005, they rose again till 2007, before falling sharply in 2008.

Unfortunately, it is important to highlight that the data for 2008 were much less comprehensive than in previous years, covering far fewer industry sectors. Two important sectors for which we have had to estimate expenditure are 'other manufacturing' and chemical and chemical production. The estimations made were

driven predominantly by the sharp fall in expenditure in the energy production sector in 2008, according to the survey of abatement expenditure.

Prior to 2000, data has been estimated and therefore the apparent declining trend should also be treated with caution.

### **Noise pollution (-2.0%)**

*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.*

The costs of noise pollution had, until 2007, been steadily increasing, to reach just over £4.2 billion for England (£82 per capita). In 2008 they fell fractionally for the first time in our time series, down to £81 per capita across England. Nevertheless, this figure is still 13% higher than that seen in 1994.

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 – 39% below the English average. Interestingly, London is also the only GOR where traffic levels have not risen since 1994; consequently costs have remained static.

Looking at data for the last two years, the only region that did not see a fall in total costs was the South West.

Of course, looking at noise from air traffic, the picture is very different. London bears almost half the cost – £83 million out of a total for England of £170 million. Whilst costs from air traffic rose more sharply than those for commuting between 1994 and 2006 (increasing by 52%), the figure for 2008 represents a sharp drop from the 2007 figure of £190 million.

### **Loss of farmlands and natural habitats (-1.5%)**

*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 Defra's June Agricultural Census.*

In the current R-ISEW, these factors only represent a modest adjustment to the overall Index. Furthermore, estimates for the loss of natural habitat are based on only two data points; we 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. This loss, however, has been so slow as to not even keep pace with population growth. As such, per capita figures for this component have remained steady at around £48 per capita.

The costs of loss of farmland and soil erosion are even slighter – £13 per capita in 2008. They tend to affect GORs that have historically been more agricultural, such as the East Midlands and the South West. It is interesting to note, however, 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. Conversely the East of England has lost 40,000 hectares of farmland since 2005 meaning that the cost of this component has increased from £15 per capita to £19 per capita.

**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 local pollution components has fallen from £1,567 per capita in 1994 to £577 per capita in 2008 (Figure 21). These amounts subtract from 12% in 1994 to 3% in 2008 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 38% increase from 1994 to 2008 (as opposed to the 26% increase in Figure 18, which did not include the costs of local pollution). A slight drop, however, can still be observed in 2006.

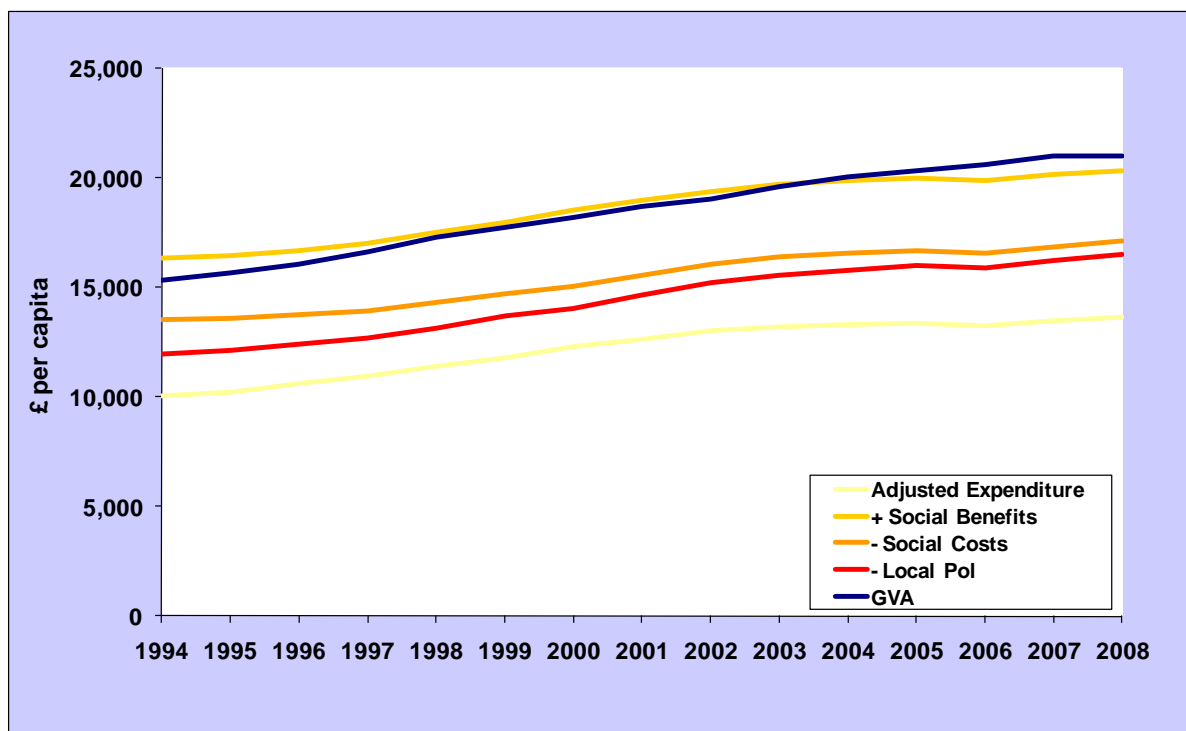


Figure 21. Steps 1 to 4 vs GVA.

Looking across GORs, the biggest total costs are seen in Yorkshire and the Humber (£931 per capita). Nevertheless, it remains ahead of the South East and the East of England in the rankings. The North East sees costs of £849 per capita and consequently falls back below the North West. Lastly, the East Midlands, with a total cost of £727 per capita, falls below London again.

The resulting order is the same in 2008 as in 2007, with the exception of the East Midlands coming second in 2008 but only third in 2007. In 1994, it came bottom, once local pollution had been added.

### **Long-term costs of climate change (+2.6%)**

*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.<sup>14</sup>*

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 2008. This amounts to £124 billion in that year, or £2,403 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, increasing at an average rate of 2.8% per year since 1994 – based on total emissions.

Given that the impacts of greenhouse gases are costed at the point of their emission rather than at 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 (£5,140 per capita is well over half its total R-ISEW for 2008), as do the East Midlands and the North East. On the other hand, London and the South West have particularly low costs (London's per capita cost being less than half the English average).

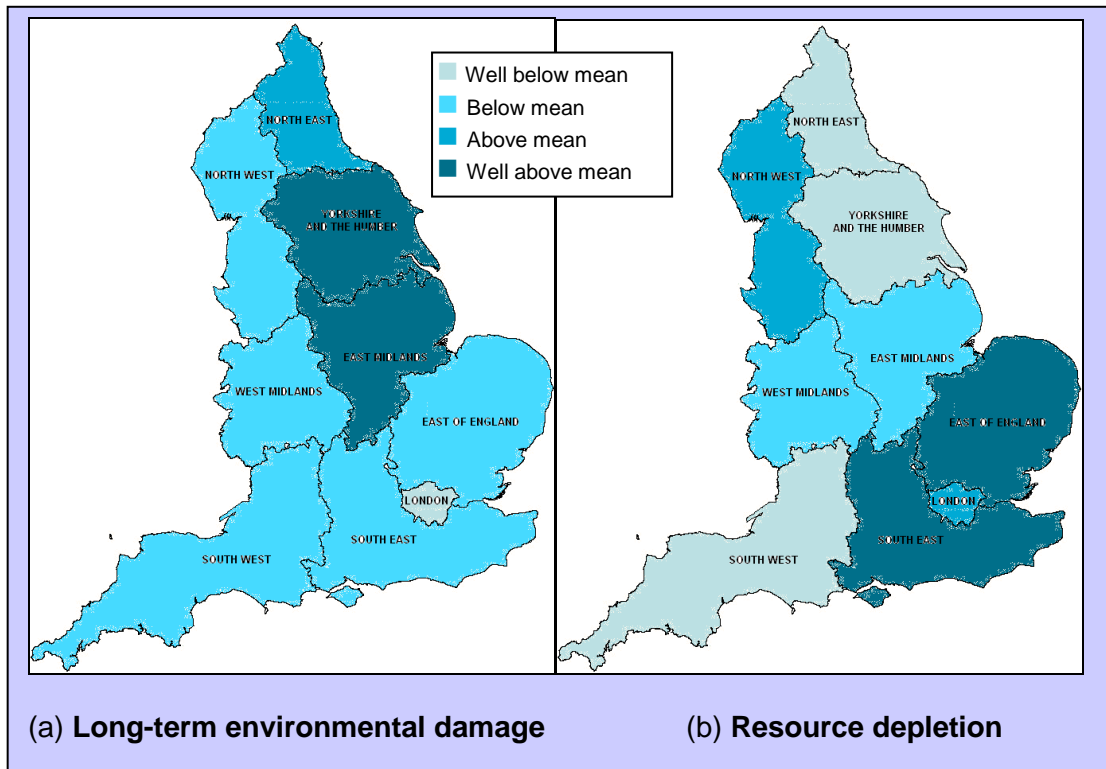
The development work to follow will calculate this component using new data from the Department of Energy and Climate Change on energy use which should limit the way that energy producing regions are penalised. We will also explore different ways of costing current and past emissions.

### **Resource depletion (+0.0%)**

*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.<sup>15</sup> National energy use data were available from the Department for Business, Innovation and Skills.<sup>16</sup> 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 2008 (£104 billion for England as a whole, £2,015 per capita). Like long-term environmental damage, this has tended to be a growing component, with the figures for recent years some 26% above those in 1994. Since 2005, however, the component has stopped growing per capita. Indeed it fell from 2006 to 2007. This is due to falling total energy consumption, from a high of 236 million tonnes of oil equivalent (mtoe) in 2005 to 225 mtoe in 2008. The fall can be seen in all energy consumption sectors – i.e. industry, transport, domestic

and services, with the biggest falls in industry and services and the smallest fall in transport (the fall in transport is only seen in 2008).



**Figure 22. Per capita costs of long-term environmental damage and resource depletion in 2008.<sup>4</sup>**

Concurrently, of course, the three years between 2005 and 2008 saw a 24% rise in renewable energy production, from 7.4 mtoe to 9.3 mtoe. These changes mean that, despite the incorporation of an annual escalation of the substation price of oil of 2%, total costs are seen to decline.

Whereas all regions appeared to see a decline in consumption between 2006 and 2007, the pattern between 2007 and 2008 seems more complex. Based on the proxies used here, many regions actually appeared to see an increase in the costs of this component, including the North East, the North West and the South East and, to a lesser extent, the West Midlands and the South West. Of these regions, however, only the North East was estimated to actually increase its energy consumption marginally – for the other regions, the increasing cost was an effect of the oil substitution price escalation factor.

What factors explain the divergence between different GORs? It appears the most important factor is differences in changes in road traffic. Based on the original data on regional fuel consumption from the Department for Transport, consumption in the North East increased slightly between 2007 and 2008 from 1.3 million tonnes of fuel to 1.4 million tonnes, whilst that in London decrease from 3.0 million tonnes to

2.4 million tonnes.<sup>2</sup> The East Midlands and Yorkshire and the Humber also see drops in fuel consumption.

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 roughly 50%, whereas the long-term environmental damage cost would continue to increase unless money was 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% and 5% above the English average in 2008. The order of these two regions flips between 2007 and 2008 with the South East having the highest per capita costs in 2008. Whilst both regions see a decrease in industrial fuel consumption, this reversal of order appears to be due to the East of England reducing domestic fuel consumption whilst the South East increases it, and the South East also sees an increase in transport fuel consumption.

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 (5% below the English average in 2008).

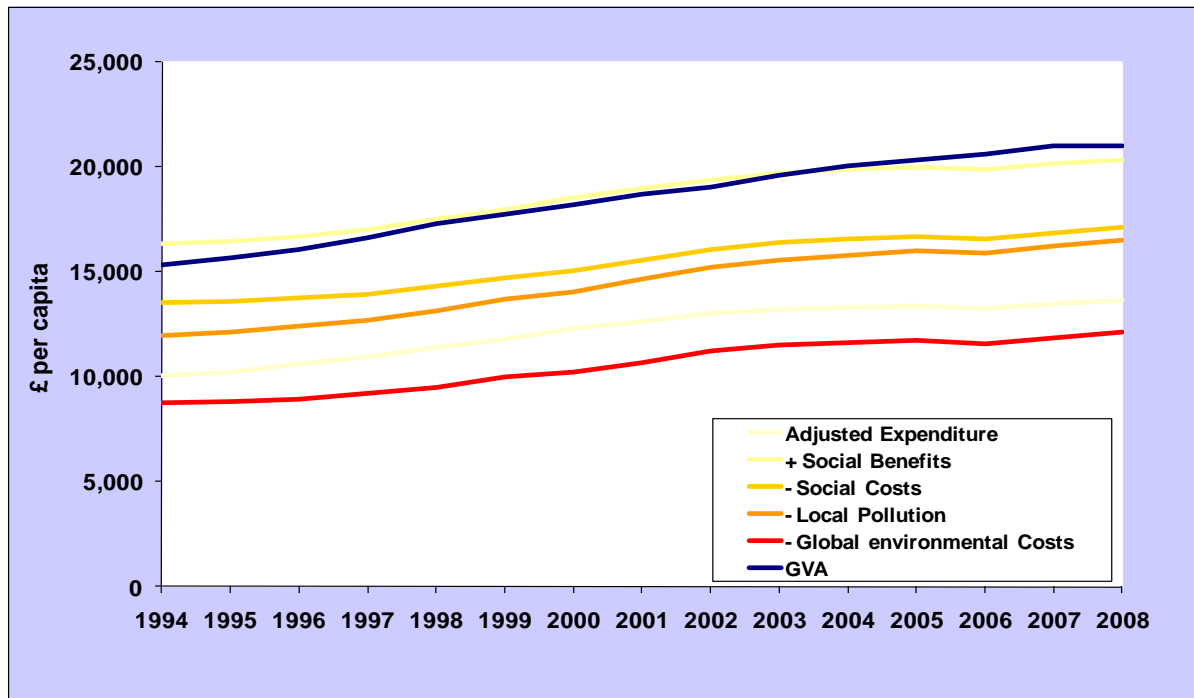
Over time, the GORs have more or less grown their consumption in step, though increases have been slower in the West and East Midlands. Looking at the differences in growth patterns between different sectors is more revealing. Here we see that increases in energy consumption by transport have been most dramatic – an increase of 17% from 56 mtoe in 1994 to 66 mtoe per year between 2005 and 2007. In 2007, this equated to 29% of overall consumption. Meanwhile, energy consumption by industry has remained more or less static over the time period at between 57 and 60 mtoe, dropping below this range in 2007.

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).

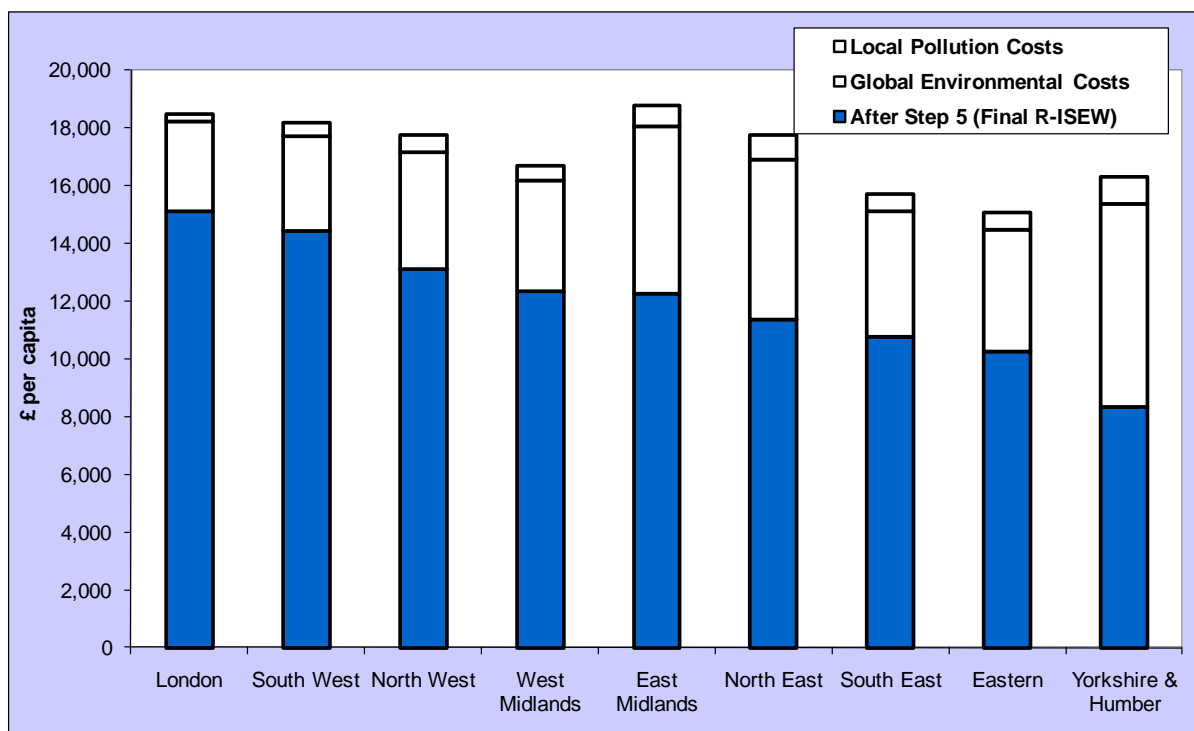
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<sup>2</sup> Note these figures are for tonnes of fuel which are used to distribute the Department of Energy and Climate Change's figures for tonnes of oil equivalent

**Step 5. Final results**



**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 in 2008, having subtracted both local and global environmental costs from the figures calculated previously for Step 3.**

Combining the total costs of local and global pollution, we see an increase in absolute terms from £4,795 per capita in 1994 to £5,000 in 2007, before falling slightly to £4,996 per capita in 2008.

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 falls from second place down to fifth place, whilst Yorkshire and the Humber drops from seventh to last. Meanwhile, the South West and the North West move up one place each, whilst the West Midlands moves up two places.

### 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 – the variation between regions.

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.

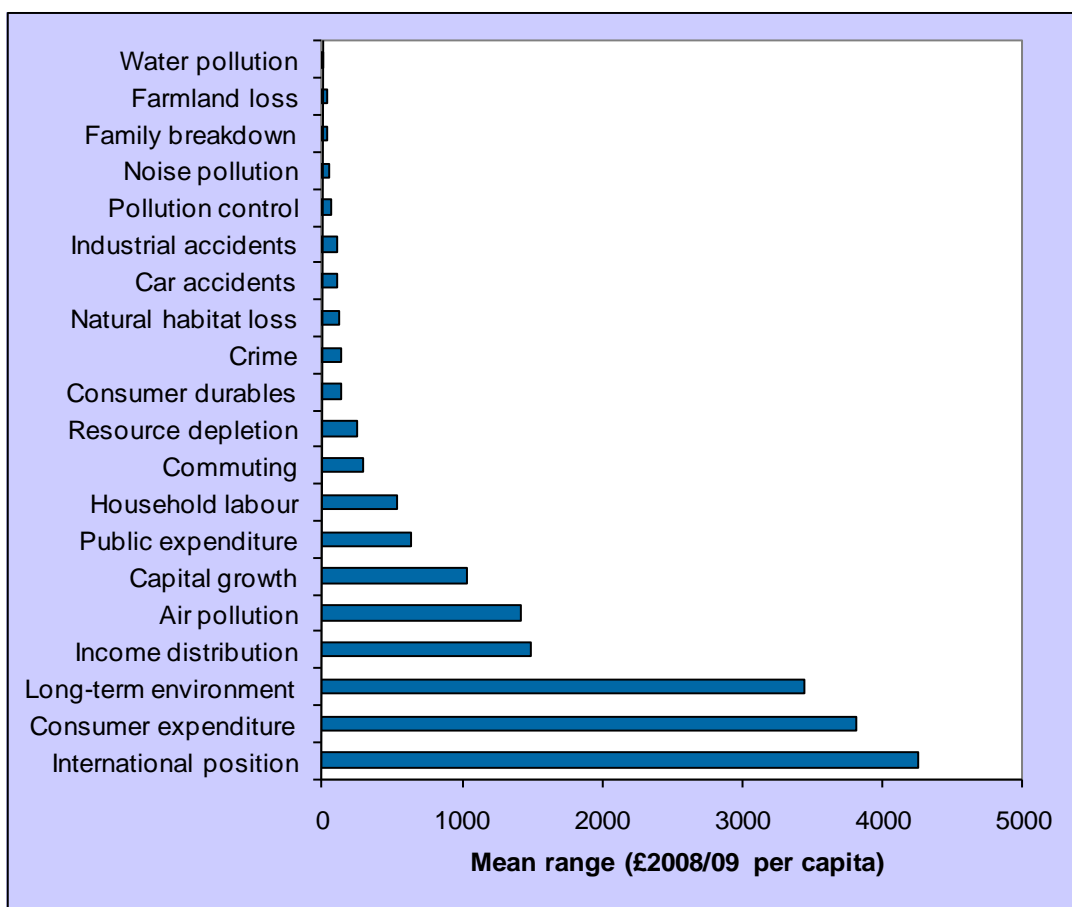
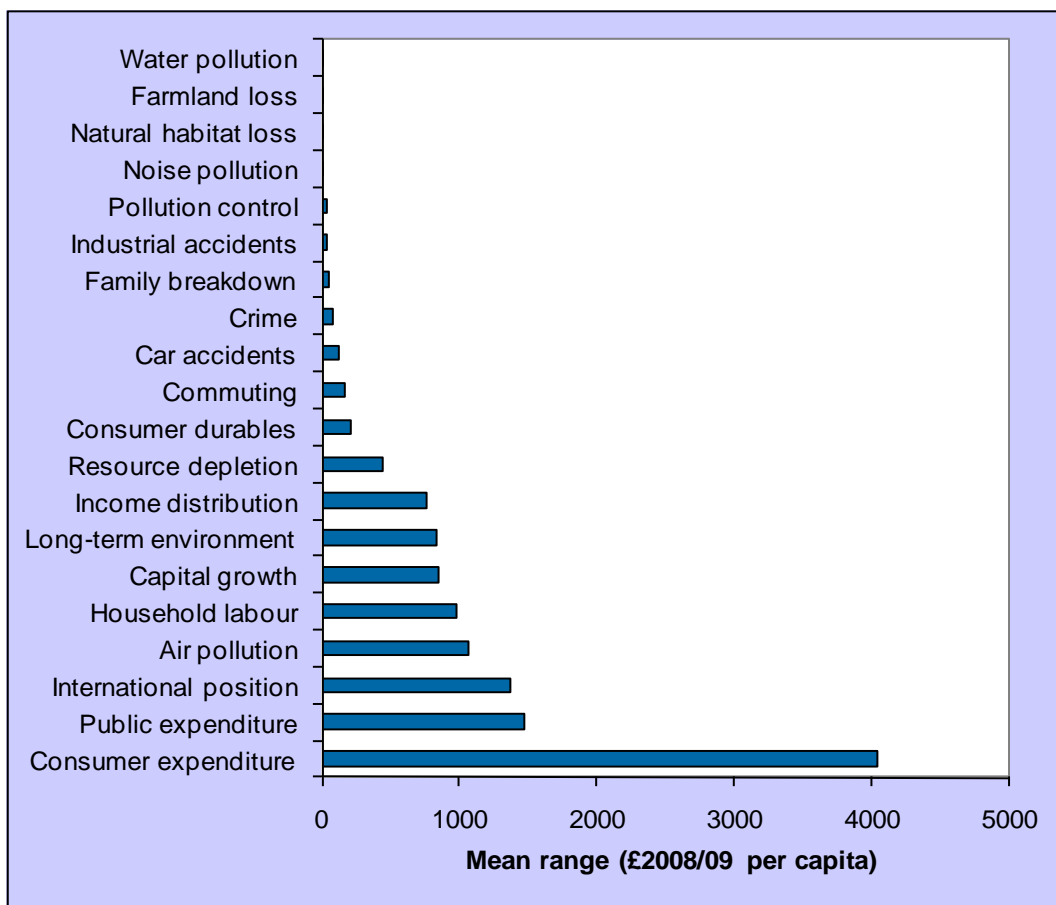


Figure 25. Mean range between GORs, over years, for each component (£ per capita).

A slightly different way of looking at this is to see which components have shaped change over the years – the variation over time. For Figure 26, the difference between the maximum value and the minimum value of a component was taken for each year over the 14-year series 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 2008/09).**

Now there is a slightly different pattern. Consumer expenditure is by far the single most important factor increasing the R-ISEW over the years, with the rise in public expenditure coming a distant second. 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. 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

We have explored the results component by component; now 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 2008, 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

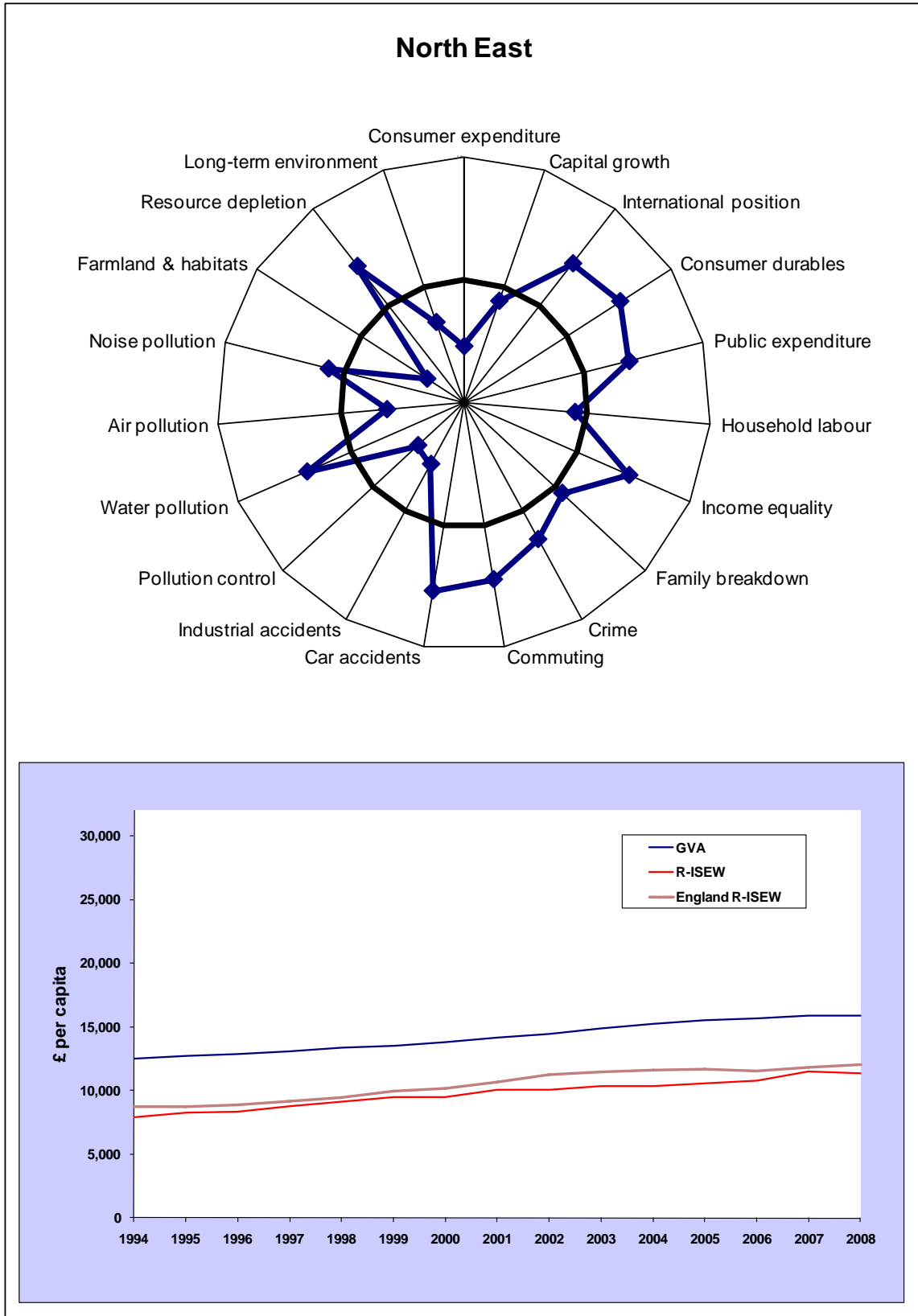


Figure 27. R-ISEW per capita for the North East.

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. When all components are combined, however, the region does not perform spectacularly poorly or well, remaining slightly below the English average throughout the 14-year period of these calculations. Its R-ISEW in 2008 was £11,385 per capita, 6% below England, in sixth place out of nine. Like the rest of England, the North East's R-ISEW remained relatively static between 2003 and 2006, indeed dropping slightly in 2004. The region's R-ISEW per capita is one of four to have fallen between 2007 and 2008.

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. Since 2003, however, these benefits have been offset by rising income inequality, rising costs of resource depletion, declining value from household labour, and the relentless increase in the costs of long-term environmental damage. Examining recent years more closely, the North East's R-ISEW appeared to jump upwards in 2007 before falling again in 2008. As we have already highlighted, this appears to be driven entirely by fluctuating consumer expenditure data. If one were to re-estimate consumer expenditure for the region in 2007 to be halfway between that in 2006 and 2008, then the kink in the R-ISEW would disappear and there would instead appear to be a steady increase.

As such, it may be more valuable to compare the figures for 2008 with those for 2006, disregarding 2007 for the moment. Doing so, we can identify the most important cause for the rising R-ISEW to be a sharp rise in the rate of increase of public expenditure, adding £297 per capita between the two years. Other key positive factors are improvements in the three economic adjustments (net capital growth, net international position, and services from consumer durables) adding a further £390 per capita. Furthermore, whilst air pollution was reported to increase in the region between 2006 and 2007, it has since fallen again sharply, adding another £112 per capita to the R-ISEW for 2008 in comparison to the 2006 figure.

Other significant changes in relative terms, are a decrease in the costs of crime (falling 24% between 2006 and 2008), as well as decreases in the costs of family breakdown and car accidents.

The spider diagram in Figure 27 helps us to understand the North East's pattern of results in 2008. The North East still has the lowest levels of per capita consumer expenditure in England. The region is also penalised by the costs of long-term environmental damage, which, per capita, is the third highest in England (£3,614 per capita in 2008). Other areas where its costs are particularly high are the loss of natural habitats, pollution control and industrial accidents (in all three cases the highest costs for any GOR) and air pollution (the North East has the second highest cost in this component, behind Yorkshire and the Humber). Of these four costs, it is air pollution which has the biggest absolute impact on the region's R-ISEW, costing it £552 per capita in 2008.

On the positive side, the North East has particularly low costs of resource depletion (the lowest in England), water pollution (second lowest), and has below-average costs in five out of the six social costs. Indeed costs of income inequality, car accidents, and commuting are the lowest in England. For example, compared to

other regions whilst car accidents cost the average English resident £198 per capita in 2008, the cost in the North East was only £168 per capita. The region also has the third lowest crime costs, with the South West and the East of England faring better.

The North East also does well on three economic components: it benefits from the highest per capita public expenditure outside London, does best on the consumer durables component, and has by far the highest net international position of all the GORs, with a surplus more than twice that of the next region, the East Midlands (£1,207 per capita compared to £575 per capita). In previous years, the region performed quite badly in terms of net capital growth, but by 2008, the region had eliminated its deficit in this component taking it closer to the English average.

North West

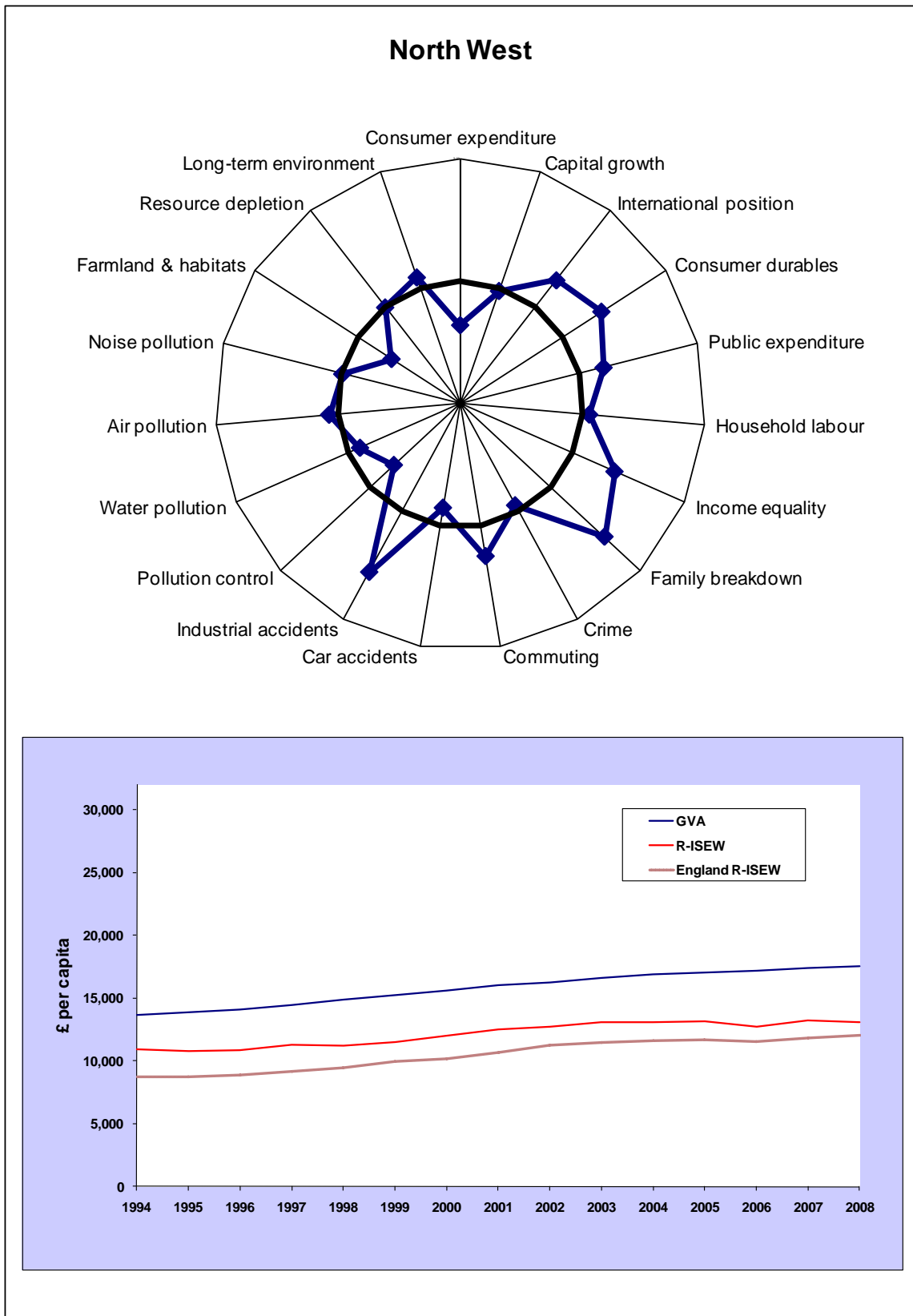


Figure 28. R-ISEW per capita for the North West.

This year's calculations see the North West maintain its third position in the R-ISEW, at £11,385 per capita in 2008. However, whilst London's R-ISEW has steadily risen since 2004, the North West's has remained stagnant, falling slightly in 2006 and then again in 2008. This contrasts with the situation where it was the highest placed GOR from 1994 to 2001. Nevertheless, the region still does well considering its GVA is 16% below the English average, and it has the second smallest R-ISEW–GVA gap at £4,462; half the English average.

What explains this relatively strong performance? The spider diagram (Figure 28) reveals that the North West, unlike the North East, is not a region of extremes. The only two components where it is the top-performing region (because of low costs) are family breakdown and industrial accidents – neither of which are particularly major components in the Index. Nevertheless these two components together save the North West £44 per capita compared to the rest of England. More importantly though, the region performs above average on most of the large-value components: international position, public expenditure, domestic labour and volunteering, income inequality, air pollution, long-term environmental damage, and commuting. It gains £1,306 over the English average because of its net international position surplus, and £514 per capita because of the relatively low costs of income inequality.

These gains more than compensate for the below-average level of consumer expenditure and, in 2008, a net capital growth figure marginally below the English average. They also compensate for higher-than-average costs of habitat loss (£49 per capita above the English average), pollution control, water pollution, and car accidents. Falling costs of crime in the region mean that they are now only marginally above the English average.

Looking at recent years, perhaps the two biggest barriers to growth in the North West's R-ISEW have been declines in consumer expenditure and declining net capital growth. The former fell from £13,341 per capita in 2003 to £13,013 in 2008, whilst the latter fell from £634 per capita in 2003 to £177 in 2008. In the case of the latter, this fall means that the North West has moved from being the region with the second highest per capita capital stock growth in 2003 to currently having below-average capital stock growth.

Over the last couple of years, aside from the net capital growth component, the components that have seen the biggest change have been the costs of family breakdown (falling by 33% from £159 per capita in 2006 to £107 per capita making it the region with the lowest costs in this component, and declining costs of the difference between expenditure and services from consumer durables (falling 28% from 2006 to 2008).

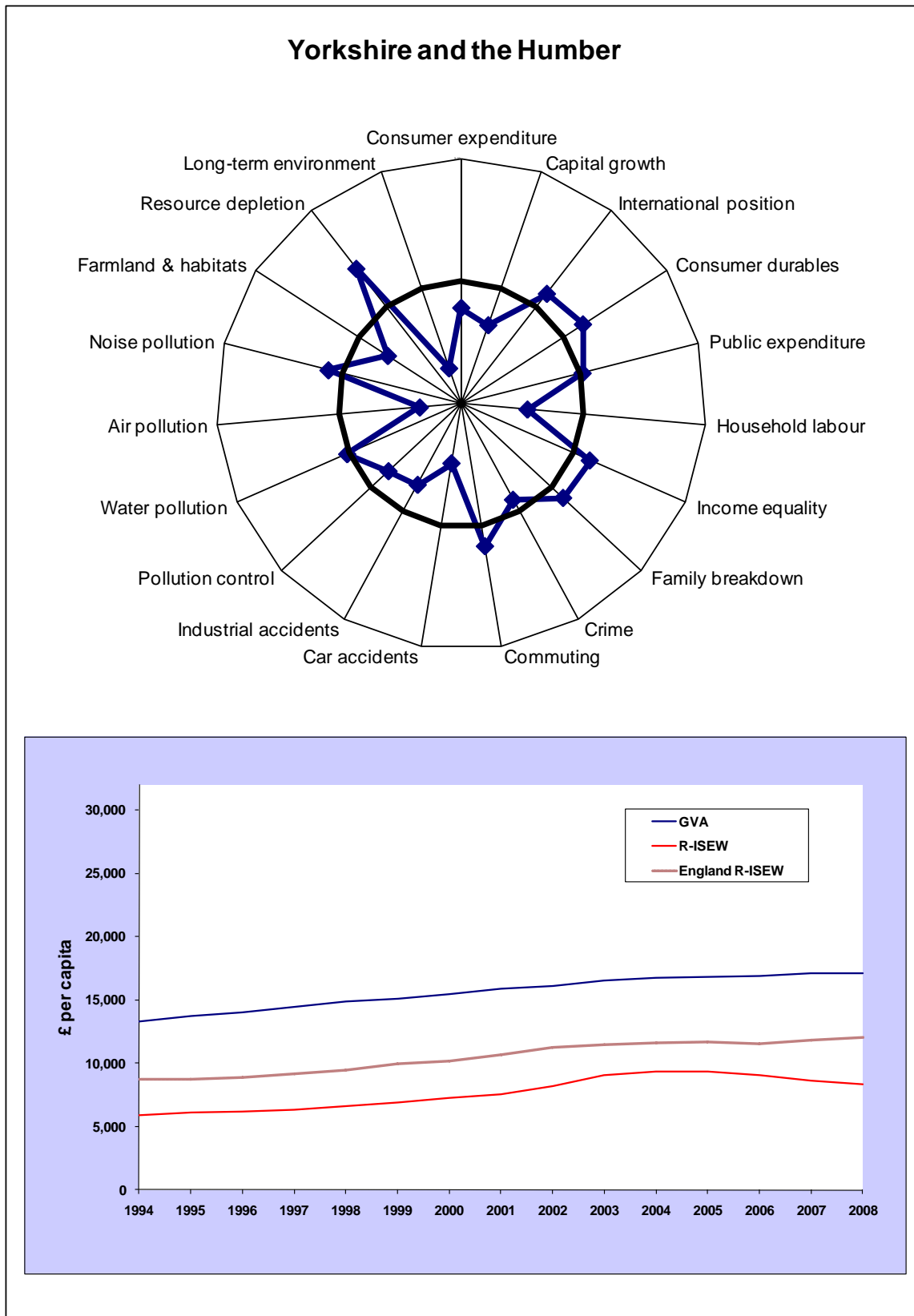


Figure 29. R-ISEW per capita for Yorkshire and the Humber.

Yorkshire and the Humber, burdened by the high pollution of heavy industry and power generation, had the lowest R-ISEW in England throughout the time series. In 2008, it is almost £2,000 per capita below the next region, the East of England. By far the greatest cost to the region is the long-term environment damage component, the cost of which increased to more than £5,000 per capita in 2007 – more than double the English average. Were this cost not factored into the R-ISEW, the region's overall figure would be closer to the average for England. More than current emissions, it is actually past emissions that bring Yorkshire and the Humber's R-ISEW down. The region's current emissions per capita are still the highest in England, but the differences are not as acute as those calculated based on past emissions.

This steadily increasing cumulative cost is partly responsible for the region's poor performance over recent years. However, as we shall see, this is not the only reason the region performs poorly on the index.

Yorkshire and the Humber has seen year-on-year declines in its R-ISEW since 2004, the current figure of £8,322 per capita being lower than the figure in 2003. The R-ISEW fell by 4.5% between 2006 and 2007, and a further 3.8% between 2007 and 2008. Above all else, the driving factor of this decline has been the conversion of a large net capital growth rate in 2003 into a substantial decline (from £964 per capita to -£353 per capita). The region has gone from top place in this component between 2002 and 2004, to second to bottom in 2008. This alone has shaved £1,202 per capita off the region's R-ISEW since 2004. After this, and of course the increase in the costs of long-term environmental damage, the next biggest change has been increasing income inequality. A sharp rise in inequality in the region took these costs from £1,420 per capita in 2007 to £1,684 per capita in 2008. As a result, income-distribution-adjusted personal consumption fell by £299 per capita between 2004 and 2008.

It is worth highlighting one of the more positive trends in the region as well: air pollution decreased in the region from a cost of £2,323 per capita in 1994 to only £689 per capita in 2008 – a 70% fall.

Between 2006 and 2008, the other important factor that emerges is the decline in consumer expenditure. In last year's report we reported a decline from 2006 to 2007 with some hesitation. However, new data suggests the decline has continued to 2008, suggesting the validity of the figures.

Other significant changes seen since 2006 are a 38% decrease in the international position deficit from £292 per capita to £182 per capita, a 20% decrease in the costs of crime, and a 21% decrease in the costs of family breakdown. In the case of the latter, this is part of a longer trend, which has taken Yorkshire and the Humber from having the second highest costs in 2004 to the third lowest in 2008.

Looking at the region's pattern in 2008, aside from long-term environmental damage, the region has had the largest per capita costs of any region for air pollution since 2005, and for car accidents since 2006. At £226 per capita, car accidents cost the region more than crime does, despite the region actually having the highest costs of crime outside London (also since 2005). It also has higher-than-average costs for loss of farmland and natural habitats, pollution control, and

industrial accidents. It also has the lowest levels of household labour and volunteering outside London.

On the positive side, the costs of resource depletion are the second lowest in the country, and those of commuting are the third lowest, despite the high rate of car accidents.

East Midlands

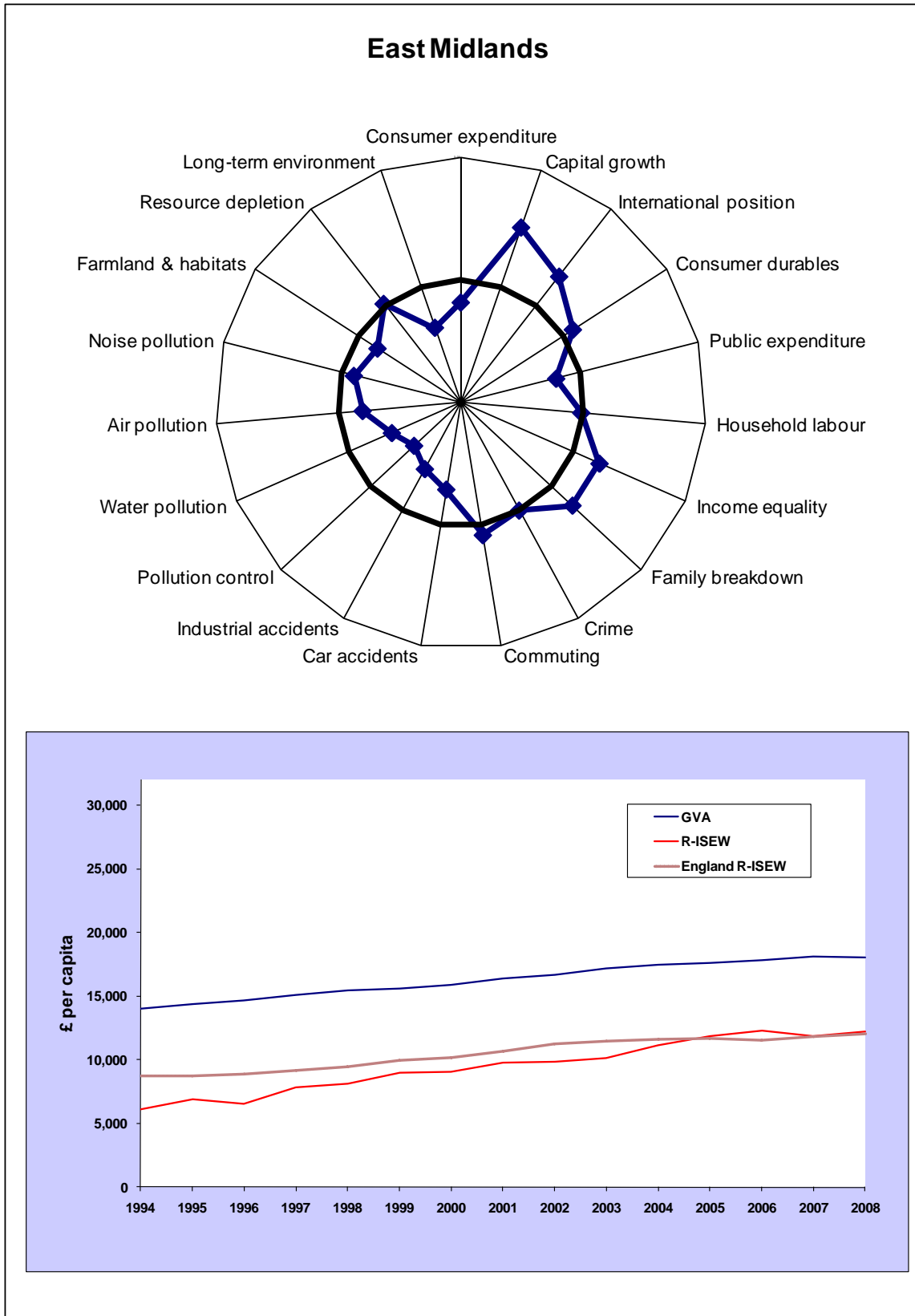


Figure 30. R-ISEW per capita for the East Midlands.

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 £6,131 compared to £5,912), it has successfully moved from second-to-last to being above the English average as of 2005. Its R-ISEW had doubled by 2008, representing the fastest growth of any English region. Whilst most GORs stagnated in the years since 2003, its R-ISEW increased by 21% between then and 2006 leading it to overtake the East of England, the North East, the South East and the neighbouring West Midlands in a three-year period. However, since then its R-ISEW has fallen slightly, taking it back behind its West Midlands neighbour and placing it only fractionally above the English average in 2008.

Setting aside the last two years, growth above that for England up to 2006 can be predominantly explained by the two macro-economic components – net capital growth and net international position. The region's net international surplus grew from £639 per capita in 2001 to £981 per capita in 2006. Meanwhile, the net capital growth rate more than tripled from £338 per capita in 2002 to £1,125 per capita in 2006. This is due to growing levels of per capita capital expenditure. Capital expenditure per capita per year in 2006 in the East Midlands was 32% higher than in 2002, and continued to grow in 2007. Indeed, whilst the region's net international position has fallen back somewhat in the last three years, it has just about preserved its top position in terms of capital growth, staying ahead of London.

The other main reason for the change in the region's relative position is the rapid drop in the costs of air pollution, even faster than in other GORs that previously were heavy polluters, such as Yorkshire and the Humber. In 1994, air pollution was the single greatest cost to the region at £3,366 per capita. By 1996, air pollution costs had fallen to £2,681 and had been overtaken by long-term environmental damage as the region's greatest cost. By 2008, the cost was only £470 per capita, less than the costs of commuting. As has been noted, the region's rise appeared to peak in 2006. The key restraining factor has been, as has been mentioned, the decline in the region's net international position, falling from a surplus of £981 per capita in 2006 to £575 per capita in 2008.

Focusing on the spider diagram for 2008 (Figure 30) highlights some other areas of note. The excellent performance on the economic adjustments manifests itself in the top-right corner of the diagram. The diagram, however, also reveals better-than-average performance on three social components, including income inequality, family breakdown and commuting. The region then performs below the English average for all other components except resource depletion. The costs of pollution control are particularly high relative to other regions, second highest in England, as are the costs of water pollution and industrial accidents.

But of course it is still the cumulative cost of *past* greenhouse gas emissions which brings the region down the most in absolute terms.

West Midlands

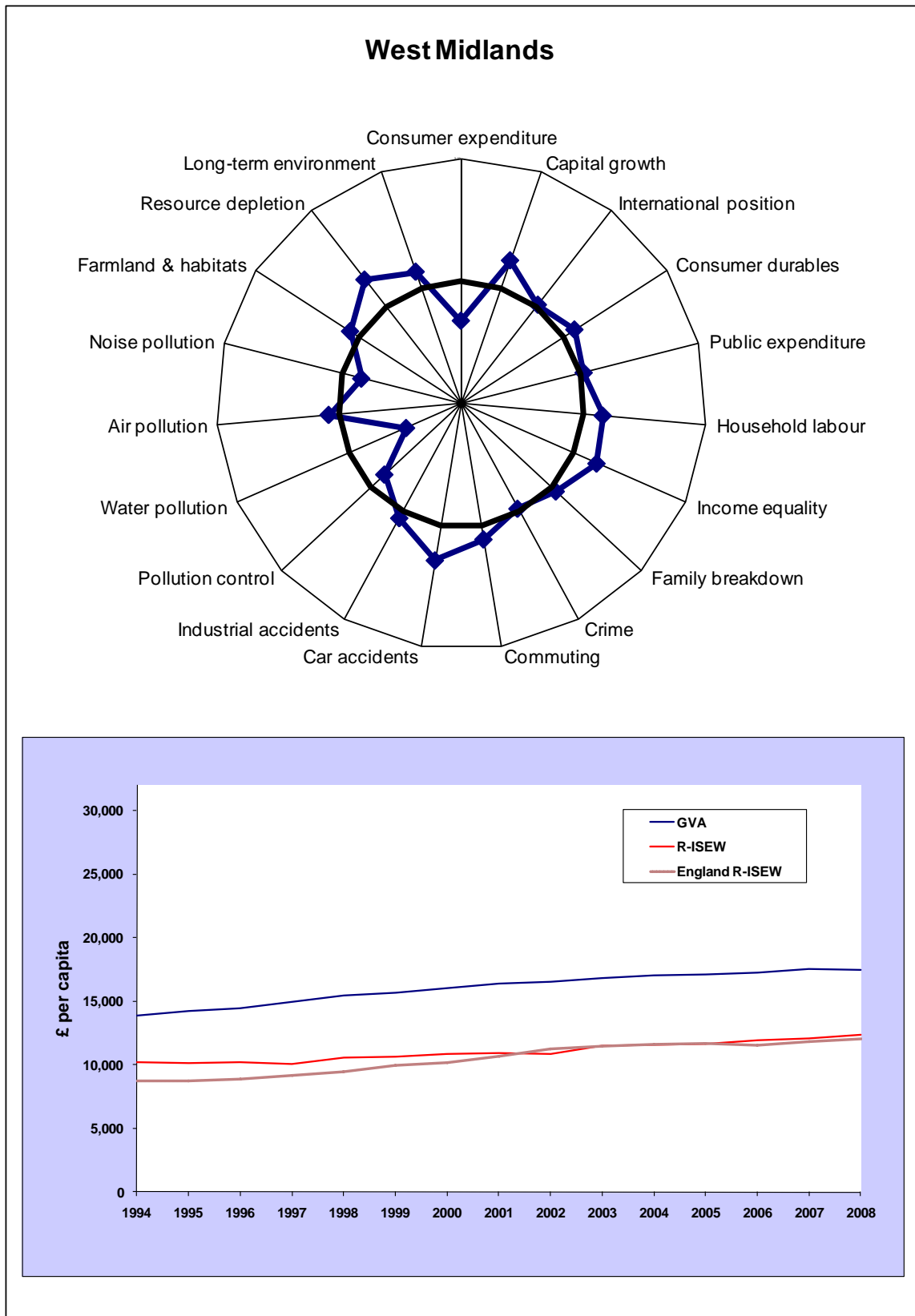


Figure 31. R-ISEW per capita for the West Midlands.

Along with the East Midlands, the West Midlands takes its place in the centre of the R-ISEW rankings, with a per capita figure of £12,357 per capita, £100 per capita above its Eastern neighbours. However, here the similarities end. Whereas the East Midlands has seen the largest rise in R-ISEW over the 14-year time period, the West Midlands has seen one of the shallowest rises – the R-ISEW only increasing by 21% from 1994 to 2008, whilst GVA per capita increased by 26%. By 2002 the region was below the English average. Since then, however, it has kept pace with the average and holds fourth place in the current rankings.

Why did the West Midlands lose its earlier comparative advantage? Consumer expenditure plays an important part in the explanation. Whilst it grew at 3.1% per annum per capita across England overall between 1994 and 2002, it only grew by 2.5% per annum in the West Midlands during that period. The most important factor in the region's decline, however, has been its steadily worsening net international position – from a surplus of £934 per capita in 1994 (second highest in England), to a deficit of £855 per capita in 2006 (third lowest). As we saw in Section 2.1, this decline has been driven predominantly by a shift from a balance of goods surplus to a balance of goods deficit.

On the positive side, the region's costs of resource depletion have not increased at the same rate as those for England as a whole. Whilst the West Midlands had above-average per capita costs in 1994, these had fallen to £66 per capita below the English average in 2008.

Looking at recent years, the region has seen a slight increase in consumer expenditure and overtook the North West in per capita terms in 2008. Conversely, costs of income inequality rose sharply in the last two years from £1,391 per capita in 2006 to £1,602 per capita in 2008. This increase has served to entirely neutralise the increase in consumer expenditure over that period. The other major change relative to the rest of England has been improvement in the region's net capital growth rate, from £213 per capita in 2004 to £647 per capita in 2008. The region saw a decline in car accidents in 2008, with costs falling by 15% from 2007.

Looking at the values for 2008, the West Midlands performs marginally above average for all the components on the spider from international position to commuting. It now does quite well on capital growth (the third highest value), and on car accidents. On the reverse side it still, of course, has low consumer expenditure relative to the English average, and has the highest costs of water pollution of any region.

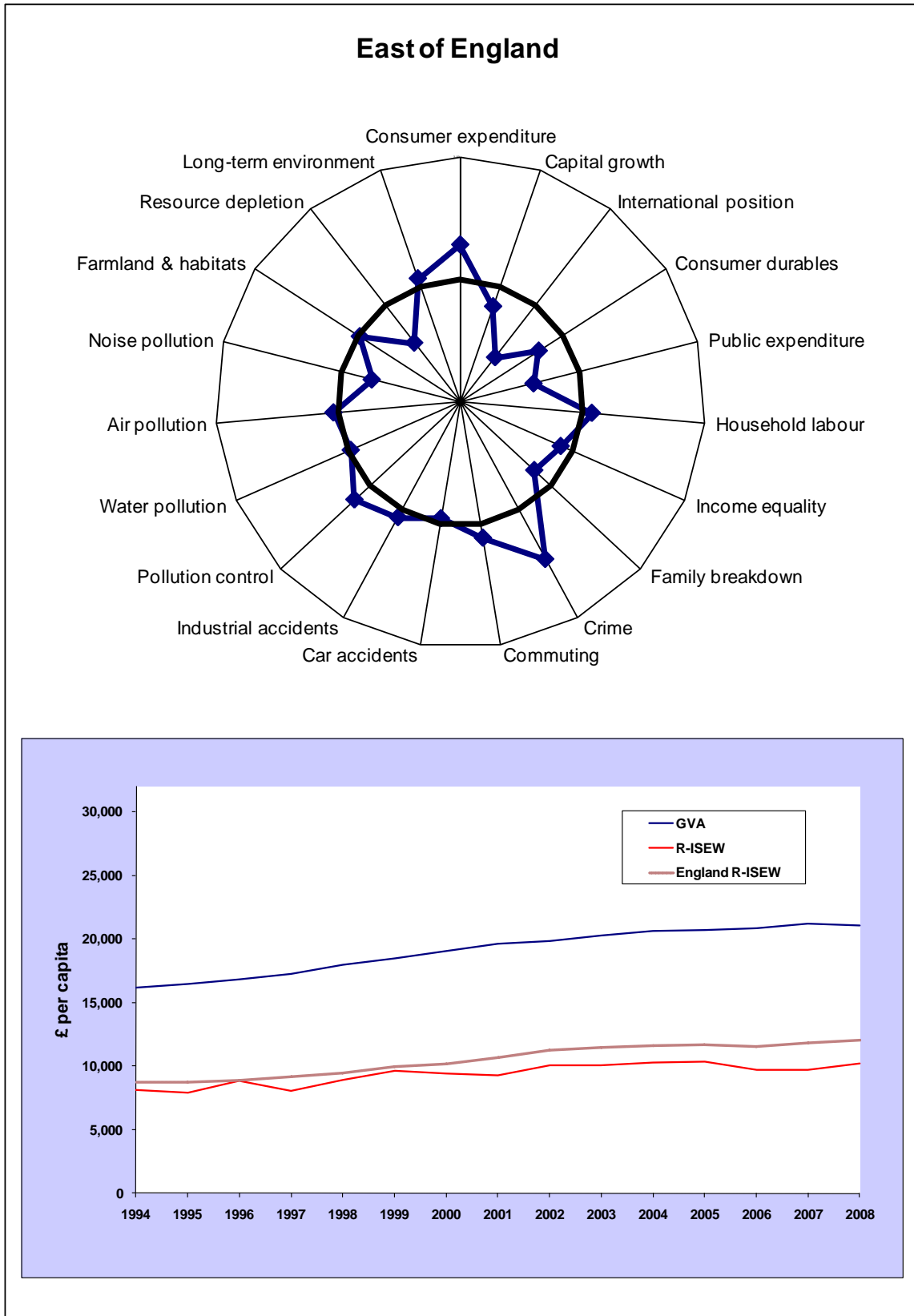


Figure 32. R-ISEW per capita for the East of England.

The East of England is a wealthy region with above-average per capita GVA and consumer expenditure – the latter even rising above consumer expenditure in London in 2008. However, the region has consistently stayed below the English average since 1994 and has been vying with its neighbour the South East for seventh and eighth spot since 2005. In 2007 and 2008, it is the South East that has a higher R-ISEW, the East of England reaching £10,244 in 2008, only topping Yorkshire and the Humber. The region's R-ISEW fell considerably in 2006, reaching a low of £9,707 per capita in 2007 – a figure little higher than it had in 1999.

The reasons for this relative decline since 1994 again relate to economic adjustments. The region's deficit more than tripled from £899 per capita in 1994 to £3,417 per capita in 2007. This process has been steady, with only a slight reprieve in 2008, with it decreasing slightly to £3,377 per capita. Meanwhile net capital growth, which had remained roughly at the English average until 2005, fell sharply in 2006 to -£43 per capita, and then further to -£145 per capita in 2007.

However, the region's R-ISEW has increased again since 2007, partly as a result of rising consumer expenditure but also, it appears, through the amelioration of the costs of economic adjustments, falling £166 per capita between 2007 and 2008. Less important to the overall R-ISEW, expenditure on pollution control also fell 27% to 2008.

In 2008, the region's main problems with regard to the R-ISEW are still its low net international position (lowest in the country, despite improving slightly from 2007), the lowest public expenditure in the country, and the second highest cost of resource depletion (behind the South East). In 2007, it also did poorly in terms of income inequality, but this cost has come down slightly in 2008.

On the positive side, aside from its high consumer expenditure levels, the region is also characterised by having the lowest per capita costs of crime –22% below the English average. This has been the case for most of the 14-year time period.

London

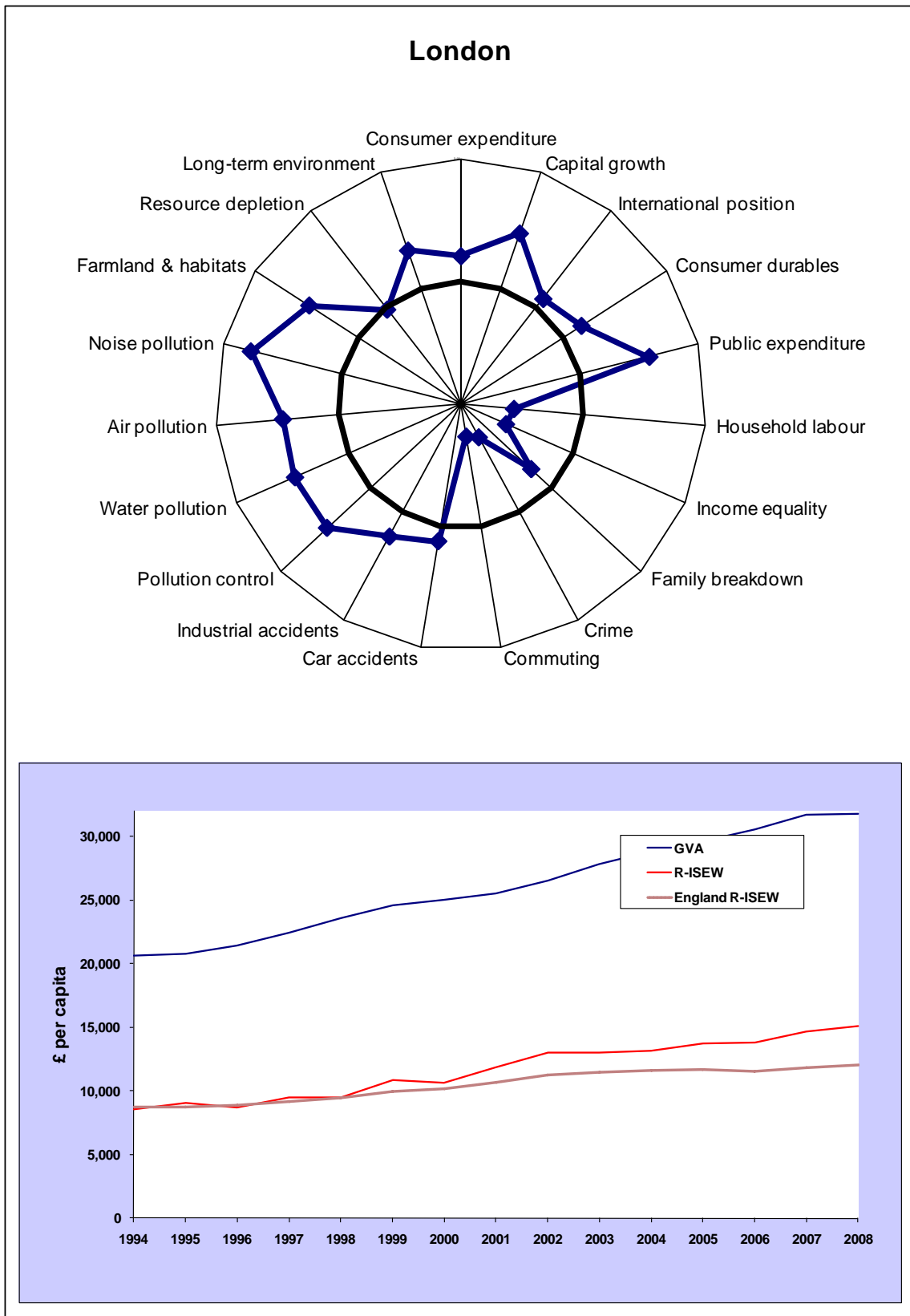


Figure 33. R-ISEW per capita for London.

London is the smallest GOR in England in terms of land area, but the second largest in terms of population. It has by far the largest GVA per capita of any GOR – now over 50% above the English average and 36% above the next richest GOR, the South East. Furthermore, these ratios have grown considerably since 1994, suggesting growing cross-regional inequality. For the first time since we started calculating R-ISEWs, London now tops the regional Index, moving ahead of the South West in 2007 according to our latest calculations. Despite this, London's R-ISEW was only 25% above the English average in 2008, and only 4% above the next region, the South West.

What explains these differences? The answer is almost entirely to do with the differences between regional GVAs and consumer expenditures. Whilst London has above-average consumer expenditure, it is actually lower than that of the South East and the East of England, and only marginally higher than that of the South West. Indeed, between the years 2000 and 2004, consumer expenditure in London fell from £15,530 per capita to a low of £14,694. This is perhaps partly related to the migration of wealthier families to the commuter belt towns of the South East and the East of England.

Whilst London's per capita consumer expenditure has risen again since then, so has expenditure in the neighbouring regions. In short, London's exceptionally high GVA is not matched by equally high consumer expenditure. Its high R-ISEW is therefore due to other reasons. In 2008, the main factors are three: first, London has, and always has had, the highest levels of public expenditure per capita in England. At £3,600 per capita in 2008, this is £522 per capita more than the English average, and £330 per capita higher than in London itself in 2006 – a 10% increase. Secondly, lacking any electricity production facilities, the region has the lowest per capita costs of long-term environmental damage – less than half the English average. Thirdly, London has seen huge leaps in capital growth in the last five years – from a net deficit of £278 per capita in 2003 to growth of £1,081 per capita in 2008. This last component alone explains how the region has moved ahead of the South West. London also has the lowest per capita costs for all local pollution components, including pollution control, water pollution, air pollution, noise pollution, and loss of farmland and habitats. The only environmental component it has a high cost for is resource depletion, but even here it is only £5 per capita above the English average (£2,020 per capita versus £2,015 per capita).

Where London does particularly poorly is in terms of social costs. Aside from industrial and car accidents, London has above-average costs for all these components. In particular, it has the largest per capita costs of income inequality (£2,711 per capita), commuting (£895 per capita, mostly due to the value of the *time* spent commuting, rather than the direct costs) and crime (£259 per capita). London is the only region for which the costs of inequality are larger than both the costs of resource depletion and long-term environmental damage. Lastly, London has the lowest rates of household labour and volunteering in the country.

Looking at the change from 2006 to 2008, the most important features in absolute terms are, aside from the aforementioned increases in public expenditure and net capital growth, the increase in consumer expenditure (up from £15,118 to £15,427 per capita) and the decrease in income inequality. The costs of resource depletion

have also fallen rather faster in London than the rest of England – a 3% decline compared to only 1% for England as a whole, and no significant decrease in the neighbouring South East.

South East

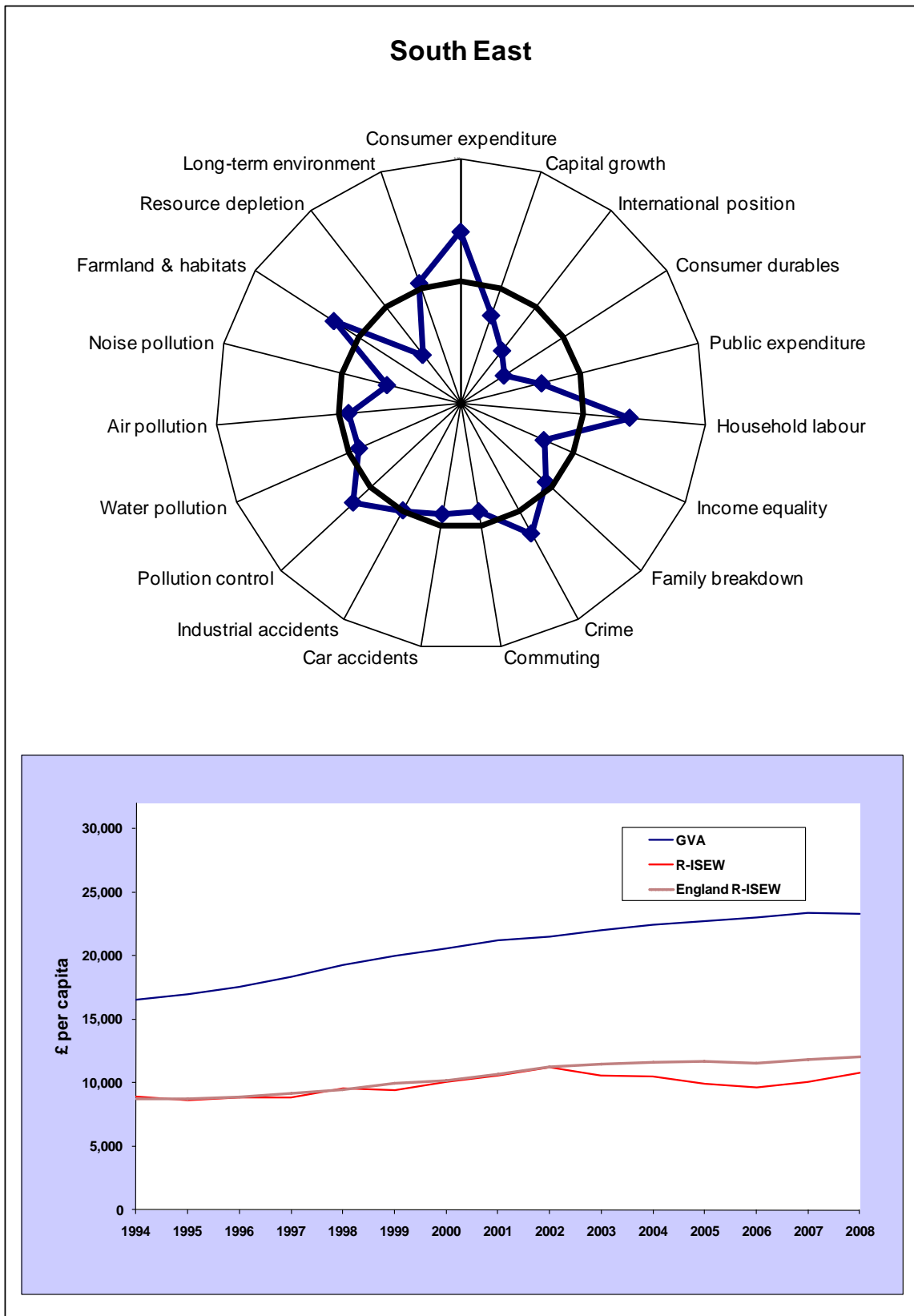


Figure 34. R-ISEW per capita for the South East.

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. Its R-ISEW, on the other hand, is the third lowest in the country, ahead only of the East of England and Yorkshire and the Humber. Furthermore, it suffered a large drop from 2002 onwards. Whilst it recovered somewhat in the last two years, it is still below 2002 levels, at £10,763 per capita.

The biggest cost to the South East's R-ISEW is its huge apparent balance of payments deficit – £2,968 per capita in 2008. Looking at the original source 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 highest income inequality outside London, the highest levels of noise pollution thanks to its reliance on the automobile, and the 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 seven minutes per week more on volunteering.

The South East's declining R-ISEW in the years 2002 to 2006 is mainly due to growth in its balance of payments deficit and to the net capital growth component turning from a healthy positive (joint highest in 2001), to a large negative (second lowest in 2007). Like elsewhere in England, global environmental costs associated with resource and energy consumption also play a part, whilst increasing income inequality wiped out any gains from increasing consumer expenditure. Lastly, the South East saw increasing per capita costs of crime between 2001 and 2006 and, by 2008 it had the fifth highest costs, whereas in 2002 and 2003 it had the lowest per capita costs.

The upturn since 2006, taking the South East back ahead of the East of England, is entirely due to improvements in its net international position. This appears to be due to changes in the balance of goods trade. Between 2006 and 2008, goods imports to the South East only increased by 5% whereas exports increased by 17%. For comparison, imports to the East of England increased by 20% in that period whilst its exports increased only by 9%.

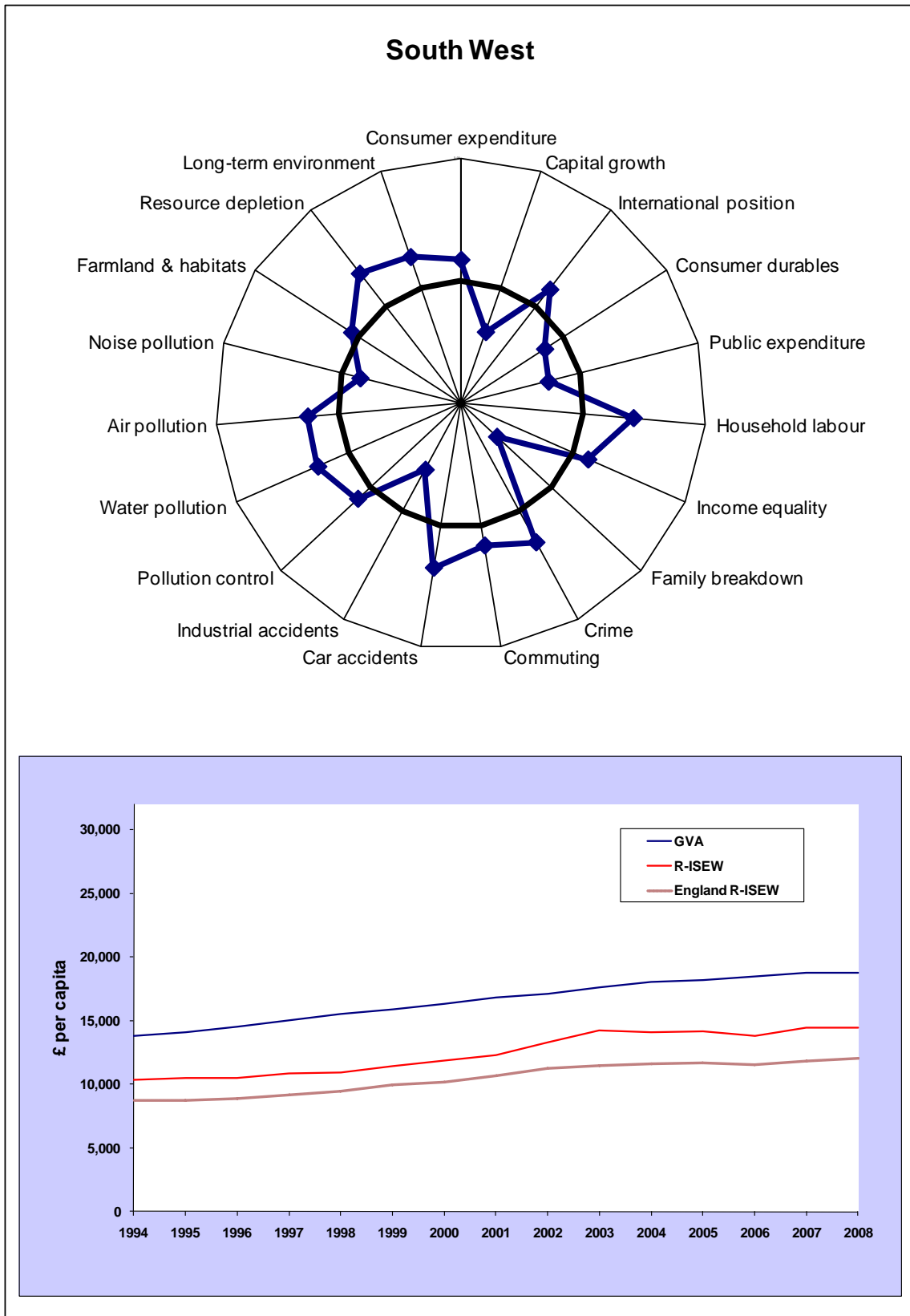


Figure 35. R-ISEW per capita for the South West.

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 second highest R-ISEW in England – £14,454 per capita, 19% above the English average. The story for this region, however, is not all positive. It, too, has suffered some fluctuations since 2003, with a negative trend between that year and 2006, a rise in 2007, then a fall again in 2008. As a result, London has caught up and overtaken the region.

The spider diagram (Figure 35) 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. In terms of household labour and volunteering, it has the highest per capita value at £3,809. It even achieves a slight balance of trade surplus (£12 per capita), something that only three other regions manage. As a result, it is in third place behind the East Midlands and London as soon as consumer expenditure has been economically adjusted, before social and environmental costs are subtracted. It overtakes the East Midlands once the costs of long-term environmental damage are factored in.

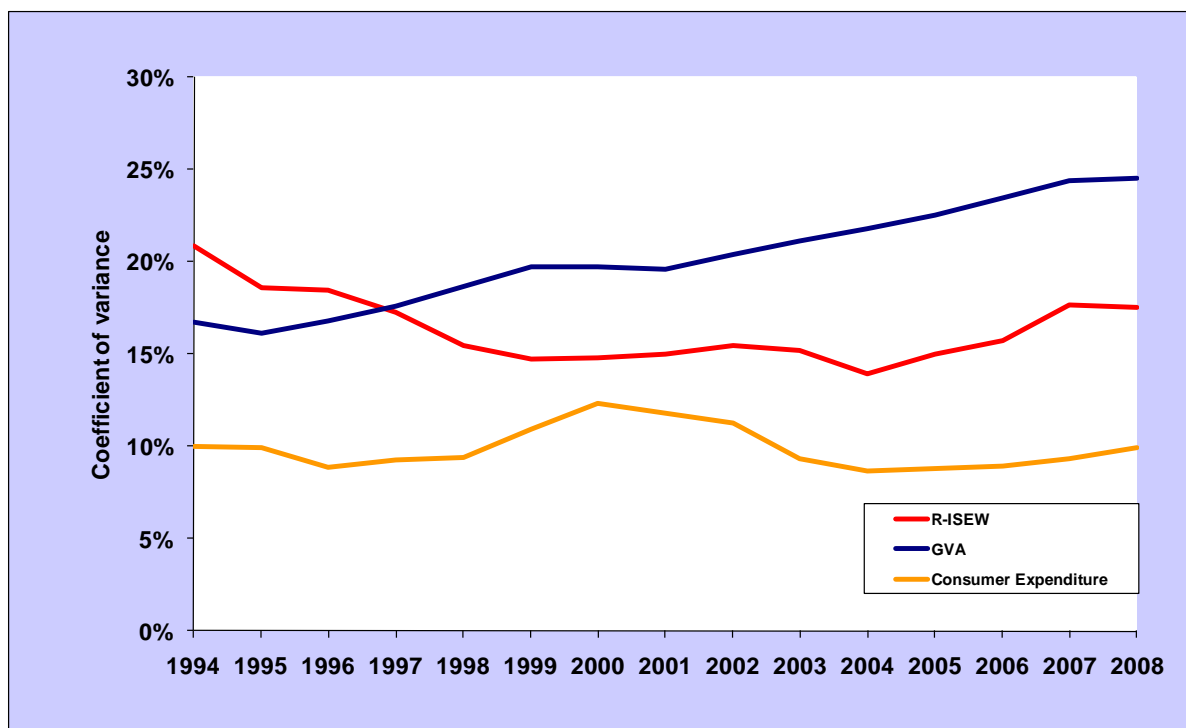
The South West also has relatively high consumer expenditure (despite its GVA per capita being below the English average). This is a relatively new pattern of results – until 2002, the region's consumer expenditure was below the English average.

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, dropping in tandem with the South East, whilst the costs of commuting have grown marginally, having gone down the previous three years. Another relevant factor may be increasing income inequality, costs growing 20% between 2002 and 2007, compared to only a 2% increase in the neighbouring South East, and a 5% *decrease* in London. Resource depletion costs had also been increasing at a faster rate than in other regions, though this has tailed off in the last couple of years.

For reasons which are not clear, the South West has the highest rates of divorce in England, performing particularly badly in 2007, and it suffers the joint second highest per capita costs from industrial accidents.

### 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 rose from 17% in 1994 to 25% in 2008), regional R-ISEWs seem to be converging slightly, or at least did so between 1994 and 2004. The coefficient of variance has fallen from 21% in 1994 to around 15% in more recent years. The last two years of our time series, however, saw the coefficient increase again to 18%, as high-scoring regions such as London and the South West increased their R-ISEW, whilst bottom-placed Yorkshire and the Humber continued to fall. 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 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.

In last year's report we demonstrated that the coefficient of variance of social costs as a whole hasn't declined. In Figure 37, we replicate the falling coefficient of variance for air pollution, but then also find that, for two social costs – crime and car accidents, there does appear to be a slight decrease in variance.

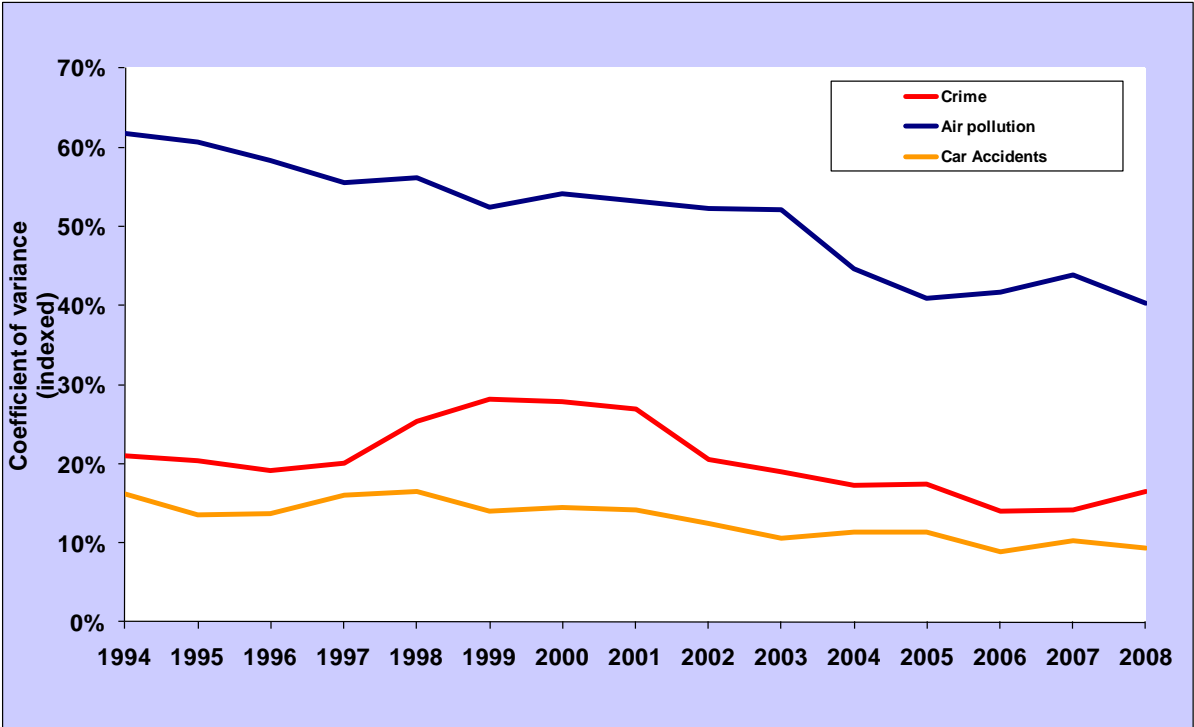


Figure 37. Coefficients of variance over time of selected components and component sets.

## 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. Rolling averages over several years affected by new data.
4. 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

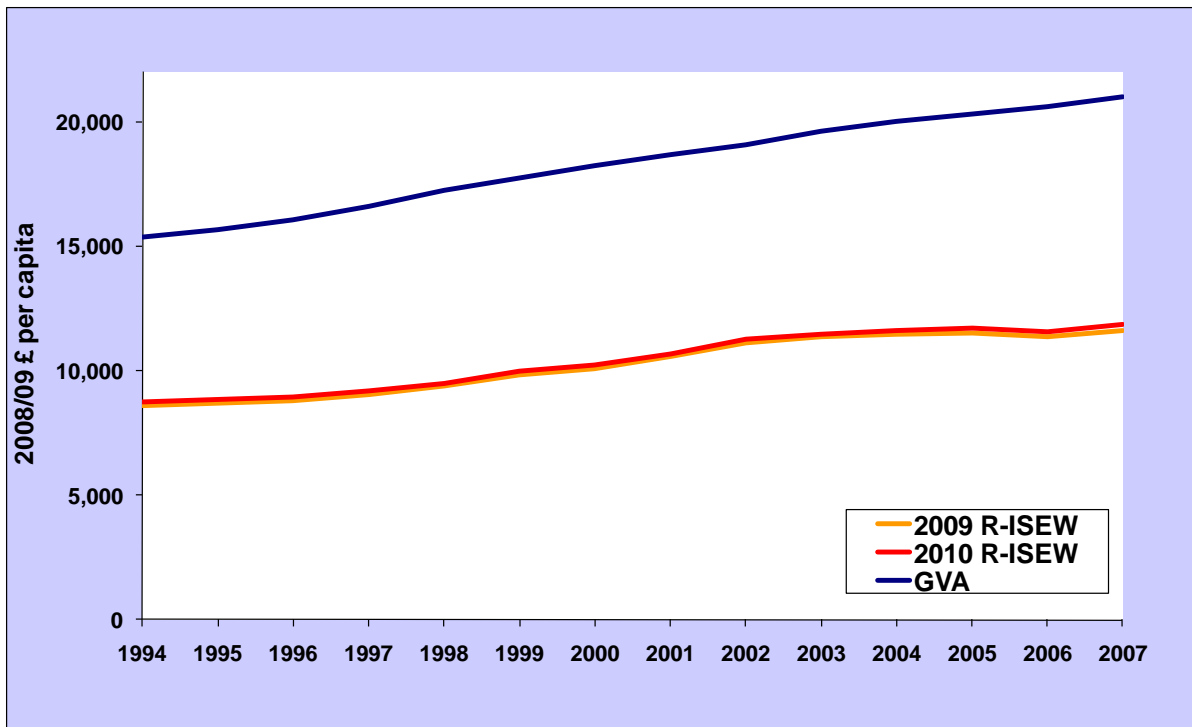
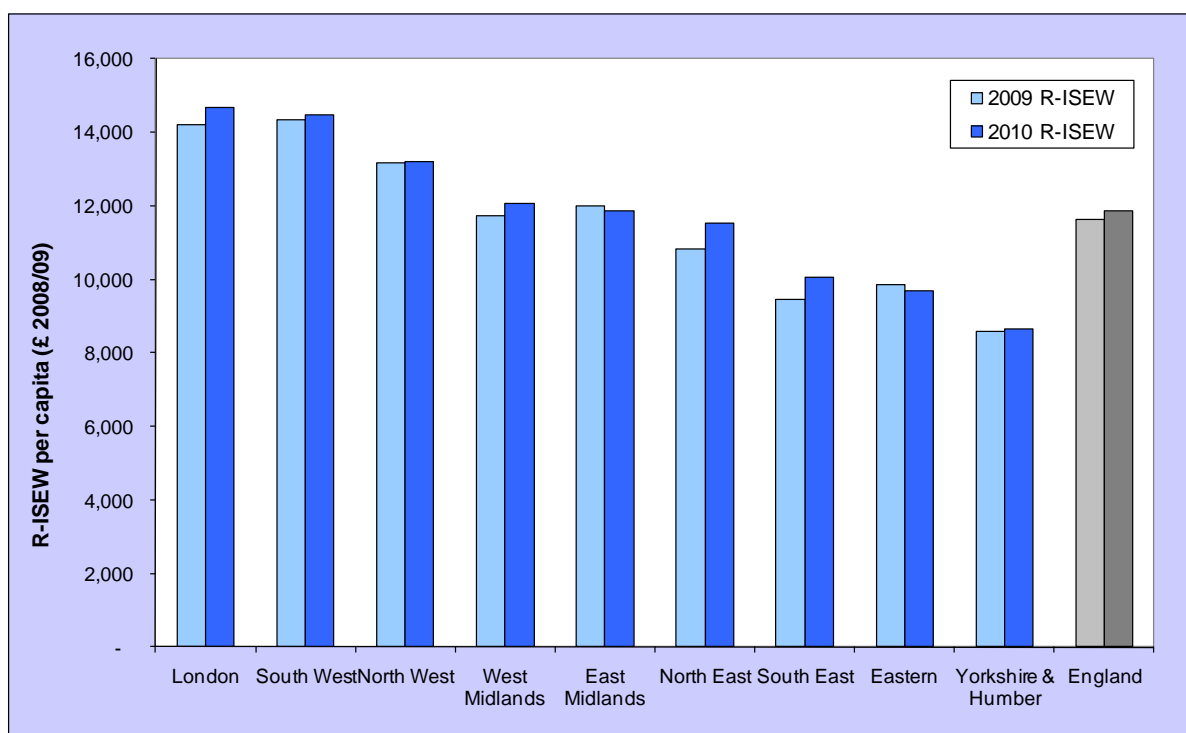


Figure 38. This year's R-ISEW per capita for England compared with last year's R-ISEW.

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 2008/09 prices. Overall, there is a general trend of having increased the UK R-ISEW for most years, particularly the most recent ones. A median increase of 1.5% can be seen across the time series, rising to 2.1% for the last year calculated in both reports, 2007. These changes are of a similar order to those found comparing the results of the 2009 report with those of the 2008 report.

Re-calculations, however, have had a more substantial effect on the ordering of GORs (Figure 39). The new estimate for the South East's R-ISEW in 2007 is 6.5% higher than that calculated for it in the previous report lifting it from eighth to seventh place ahead of the East of England. Meanwhile a slight increase (of 3.5%) in the R-ISEW for London for 2007 sees it rising above the South West into top spot, whilst a slight decrease in the R-ISEW for the East Midlands (-1.5%) sees it drop behind the West Midlands in 2007. Whilst most of these changes are specific to 2007, three regions see general increases to their R-ISEW estimates across the time series, namely the North East, Yorkshire and the Humber and the East Midlands. Another feature that can be noted is that regional estimates for the year 1999 have increased across the board (by an average of 4.4%) whilst the estimate for England for that year has not increased so substantially.

The average absolute change for any given year for any given region is 1.9%, lower than 3.3% average reported in the last update. More detail can be seen in Appendix 1: Table A4.



**Figure 39. This year's R-ISEW per capita for each GOR, compared with last year's R-ISEW (data here for 2007).**

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

## **Deflation figures**

Changes in deflation factors again play an important role in explaining the change in the calculations compared to the previous report. This time, however, the effect has been much more systematic – the new deflation factors lead to an increase of all values by about 0.42%, with the exception of values from the last four years of the time series. So a value of £1,000 at 1994/95 prices, would have been inflated to £1,427 in 2008/09 prices using the older factors, but £1,433 using the updated ones. This can have quite substantial effects on large components. Indeed, looking across the different components and how they differ from the old report to the new, acknowledging this change appears to account for the change seen in almost all components. The exceptions are considered below.

## **Long-term environmental damage**

As in the previous update, the long-term environmental damage component is responsible for the largest absolute value change. The estimated costs of long-term environmental damage are down by just over £100 per capita over the time period. This has come from two changes to the underlying data.

First, and most importantly, the latest data from the National Atmospheric Emissions Inventory (NAEI) now includes estimates of nitrous oxide (N<sub>2</sub>O) emissions back to 1970, whereas previously they only went back to 1990 and we had to create our own estimates beyond that based on a linear trend. The difference between our earlier crude estimates and the new NAEI figures is substantial – with the NAEI reporting a total of 113 ktonnes of N<sub>2</sub>O emitted in 1970, compared to our estimate of 328 ktonnes. The reason for this discrepancy is clear. N<sub>2</sub>O emissions dropped dramatically between 1990 and 2008, meaning our linear trend assumed that this drop was part of a continuous and larger drop since 1970 (CO<sub>2</sub> emissions, for example have seen a steady drop since 1970). However, the new data reveal that actually N<sub>2</sub>O emissions had been rising steadily over that period, peaking in 1990.

They also reveal a discontinuity whose origin we have not been able to identify, with emissions sharply rising from 138 ktonnes in 1989 to 211 ktonnes in 1990. This rise can be attributed entirely to emissions associated with the production of adipic acid (which is used to produce nylon), localised at a single plant in Wilton in the North East. The NAEI do not have any suggestions for estimating figures prior to 1990, and we were unable to ascertain when the factory started production of adipic acid. As such, we are forced to leave the data as is for now.

In any case, it is likely (looking at GVA associated with the manufacture of textiles and man-made textiles) that emissions did indeed increase substantially between 1970 and 1990 and that the new figures represent a better estimate of past emissions than the ones we were previously using.

A second reason for a decline in the estimated cost of long-term environmental damage is a decline in estimates of total UK CO<sub>2</sub> emissions, from the NAEI, having been reduced by approximately 0.3% for the years 1990 onwards.

Combined, these two changes in the underlying data appear to be responsible for more than half of the change in the total R-ISEW between 2009 and 2010. If we

were to simply insert the NAEI figures used last year into the new R-ISEW, the median difference for the English R-ISEW estimates comparing this year's report to last year, drops to 0.8% from 1.5%. Similarly the average absolute change looking at all regions in all years drops from 1.9% to 0.8%.

### ***Air pollution***

Changes in the underlying NAEI data are also responsible for the second largest component change – air pollution. In this case, however, cost estimates have gone up rather than down, by an average of around £30 per capita each year. This is due to upward revisions of total UK emissions for several gases, particularly carbon monoxide (CO) and VOCs. Closer inspection reveals these increases are entirely due to upward revisions of the emission factors associated with transport – this was confirmed in discussion with the researchers responsible for the NAEI.

The NAEI includes an update of total UK emissions back across the entire period, but no recalculation of regional emissions has been undertaken. As such we were required to carry out a new estimation of regional emissions for previous years ourselves, by multiplying regional CO and VOC emissions associated with transport by a factor equivalent to the change in the estimates for emissions at the national level. This method appeared to lead to very accurate regional estimates, with the total for all regions (including Wales, Scotland, and Northern Ireland) reaching within 1% of the total for the UK as a whole.

### ***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 new figures can be substantially different from previous ones.

In terms of net capital growth, in this year's update beneficiaries are the North East, the West Midlands and, most substantially, London. For the latter region, the estimated value of this component for 2007 more than doubled from £2.3 billion in the 2009 report to £5.4 billion this time (a change worth £405 per capita). Meanwhile, the North East's deficit has been reduced from £704 million in the previous report to only £41 million this time (worth £259 per capita). As we have seen in the past, these changes stem from the underlying Annual Business Inquiry data. For example, the Inquiry reported a sharp increase in net capital expenditure in London between 2007 and 2008, from £17 billion to £22 billion. Meanwhile, in some regions, such as the South West, which had seen increases previously, net capital expenditure fell for the first time. The rolling average methodology serves to spread these sharp changes across several years resulting in the changed estimates for past years.

A similar, albeit smaller, effect can be seen with net international position, with the estimate for the South East for 2007 increasing by about £73 per capita, whilst that for the East Midlands falls by £30 per capita.

It is these two changes to the economic adjustments that lift the R-ISEW for the later years of the time series for London, the South East, and the North East. Without them London would (in 2007 at least) come second to the South West, and

the South East would remain below the East of England. Accounting for them, along with the changes in the NAEI data, means that no deviation between this year's R-ISEW values and last year's differs by more than 2%, with the exception of estimates for the year 1999.

### **Consumer expenditure**

The differences in 1999 can be explained by a slight improvement in the methodology for calculating consumer expenditure, the largest component of the R-ISEW. Typically, average household size for each region has been reported by the *Expenditure and Food Survey* to two decimal places. This accuracy is important as per capita expenditure is derived from per household expenditure in each region using these figures. In 2008 and in 1999, average household size for regions was only reported by the Office for National Statistics (ONS) to one decimal place. This reduction in detail led to our estimates for the sum of the totals for consumer expenditure for each region not equalling our estimate for consumer expenditure for England as a whole. This year we put this right by simply scaling up/down the regional figures so that they match the England total. This only had a significant effect for 2008 and 1999, decreasing the figures for the English regions by 2.3% for 2008 and increasing them by 2.6% for 1999. As well as the direct effect on the consumer expenditure component, this difference also shapes several other components including the income distribution component and consumer durables component.

If this slight methodological improvement were to be undone, along with all the other changes we have reviewed in this section, then no single R-ISEW estimate for any region for any year would be greater than 2% above or below the estimates in last year's report. Indeed the median difference between 2009 estimates and 2010 estimates would be 0.5%, which can be almost entirely explained by the change in deflation factors noted earlier.

### **Other changes**

A few other minor changes were made to the calculations this year, and are listed here by component:

- Resource depletion: Total energy consumption figures from the Department of Energy and Climate Change were revised up slightly (by about 1 mtoe each year) for the years 2005 to 2007.
- Industrial accidents: Upward revision of numbers of accidents reported by the Health and Safety Executive increased costs by about £50 million across England for 2007.
- Consumer durables: As well as the changes caused by scaling up the regional totals for consumer expenditure to meet the English total, there was also a change in the estimate of total consumer expenditure on consumer durables, taken from the *ONS Blue Book*, with UK totals falling by about £1 million per year in recent years.
- Commuting: Some substantive changes resulted from the incorporation of new regional data from the Regional Travel Survey 2007/2008. Previously,

the newest data available was for 2005, and values for 2006 and 2007 had to be estimated based on crude averages. These changes, along with the introduction of matching the total of all regions to that for England, lead to the cost of this component increasing for the South West in 2007 by £71, whilst it decreases for the North East by £12.

- Pollution abatement: The 2008 survey of expenditure on pollution abatement was substantially diminished, with much fewer sectors covered. Figures for these sectors were estimated based on the change in expenditure from 2007 to 2008 for those sectors for which data were available. Meanwhile a couple of slight errors in the calculations involved were corrected.

## 5. Concluding remarks

This year's results seem somewhat paradoxical. Whilst the UK economy hit the buffers in 2008, the R-ISEW presents a mixed picture. Although the R-ISEW fell in 2006, the figures for 2007 and 2008 both represent year-on-year growth. Two years ago we tentatively suggested that the fall in 2006 might be an early warning of the impending recession. Now, such an interpretation is a little harder to make. Why should the R-ISEW have fallen two years before GDP did, only to rise again the next year? Should the different patterns of growth and decline in different regions be interpreted in any way? London is where the largest absolute growth in the R-ISEW was to be seen between 2006 and 2008, a 9% growth adding £1,287 per capita to the total. Meanwhile falls in the R-ISEW were seen in Yorkshire and the Humber and the East Midlands. And yet it is in London where the recession can be said to have begun, as a result of the crisis in the financial sector.

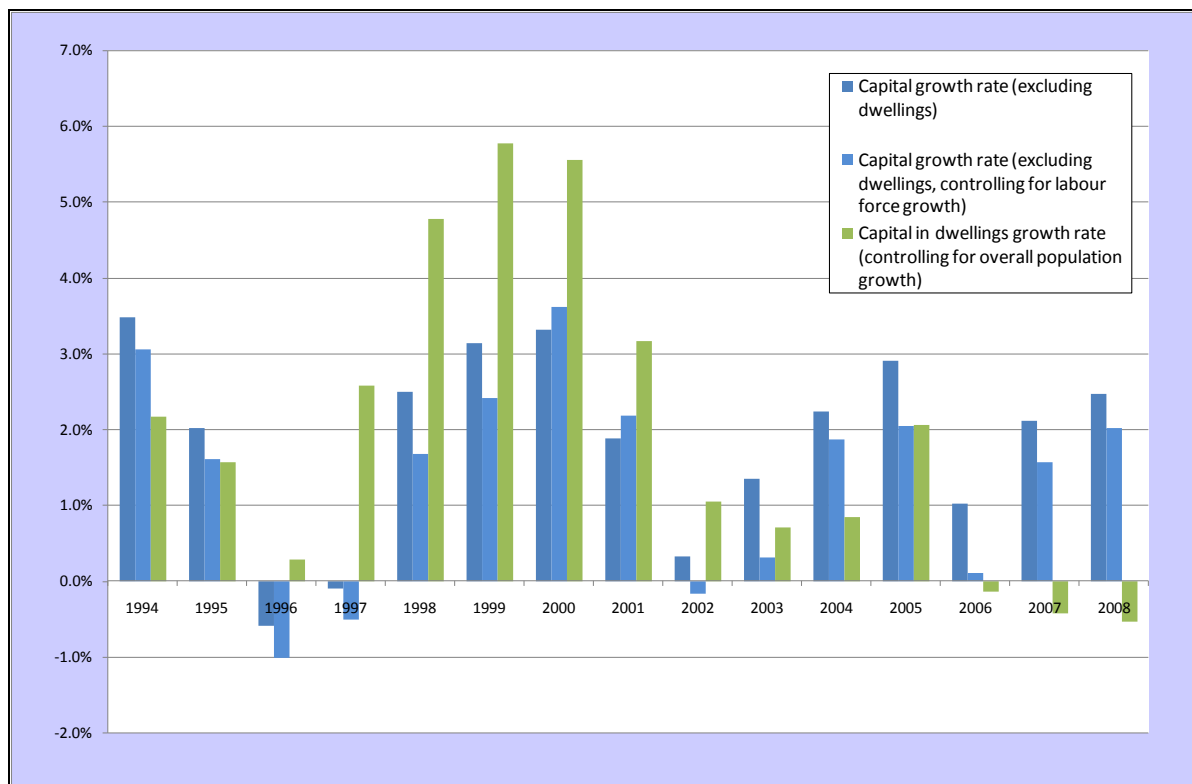
It is perhaps over-ambitious to expect the R-ISEW to be able to presage economic problems, as few components could be linked to it theoretically. The costs of long-term environmental damage are precisely that – long term – and so there is no reason to expect them to instigate medium-term effects, such as recessions. The costs of resource depletion, similarly, play out on a longer timeframe. One might expect rising social or local environmental problems to potentially be able to trigger economic decline but the reality is that most of these costs have declined over the years 2003 to 2008. In that time period, the costs of crime fell by 21%, the costs of air pollution by 39%.

*Prima facie*, the only clues to the recession that could be identified in the R-ISEW relate to more economic factors. From 2002 to 2006, the period during which R-ISEW growth was lower than GVA growth, only three components saw steady year-on-year deterioration. One of these is long-term environment damage, and we have already discounted using that as a predictor of economic problems. The apparent decline in household labour and volunteering may be significant, indicating a hollowing out of the core economy, but must be interpreted with caution as we only have a few years of data, most years relying on linear trends for estimation.

The third component is net capital growth, which has declined until 2007. This could indeed be seen as linked to approaching economic problems, as less investment is made in the real economy. In reality, the calculations of this component make such interpretation a little opaque. Capital stock data is only available for the UK as a whole – estimates of changes in capital stock in relation to changes in population are made for the regions using data on capital expenditure and a lot of smoothing. If we just look straight at the UK capital stock figures, and calculate year-on-year

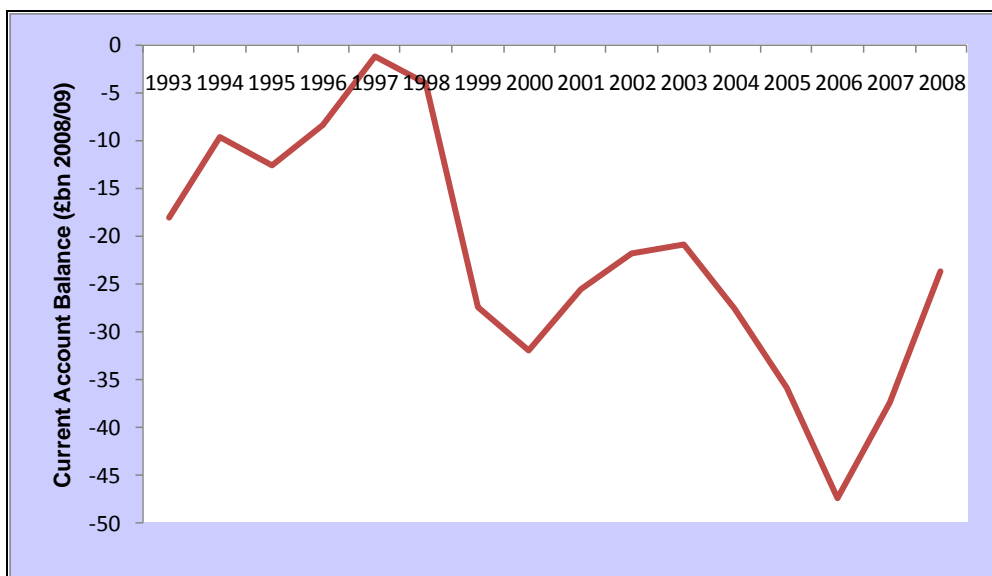
change, we can see that there has not been any clear pattern of decline leading up to 2008 (see Figure 40 – blue bars). We can also subtract the growth rate of population of working age in an attempt to estimate net capital growth, and yet a pattern still does not emerge (light blue bars).

Indeed, a pattern only emerges when we look at capital growth for dwellings, which is not included in the R-ISEW. Here, we can see that, controlling for the overall population growth, capital held in dwellings began to fall starting in 2006, coinciding with the point at which the R-ISEW dipped. These declines continued and grew in size on to 2008.



**Figure 40. Year on year growth in UK capital stocks.**

The relationship between real estate and the credit crunch is well known and so should not come as a surprise. Unfortunately, it is not clear how this could be incorporated within the R-ISEW itself as an indicator of economic crisis. Furthermore, it is not entirely clear why our approach to estimating net capital growth figures for regions produces such a different pattern to that shown in the figure above. This is something that we will explore in the development paper. In any case, the improvement between 2007 and 2008 in this component only takes it back to 2006 levels, so can't explain the overall increase in the R-ISEW.



**Figure 41. UK current account balance, 1993 -2008, from the ONS Blue Book.**

The other key economic adjustment made in the R-ISEW is the net international position component. This component deteriorated from 2004 to 2006 and is perhaps the clearest explanation for the fall in the R-ISEW in that period. Looking at the UK data (Figure 41), this is clearly not just an artefact of our methodology – 2006 saw the worst trade balance in the UK over the time period covered. It is theoretically plausible that this trade deficit, ultimately driven by growing goods imports, may have partially contributed to the economic crisis. But what is not clear is why the crisis was not averted despite the deficit coming down in the last two years.

Table 2 shows the changes in per capita values for selected components for England for three two-year periods, from 2004 to 2006, from 2006 to 2008, and from 1996 to 1998 – chosen as this two-year period saw a similar increase in the R-ISEW as in the last two-year period. Changes are presented such that positive figures are those that increase the R-ISEW, whilst negative figures are those that reduce it (in other words we have reversed the values for costs).

Comparing the last two columns, we can see that the biggest differences in absolute terms are in six components: consumer expenditure, income distribution, public expenditure, non-renewable resources, net capital growth, and net international position. The reduction in the increase of the costs of income inequality cancels out the reduction in the increase in consumer expenditure. As a result the key factors leading to the increase in the R-ISEW appear to be the growth in the increase in public expenditure and most importantly, the aforementioned turnaround in the net international position.

Comparing the recent increase in the R-ISEW with that seen between 1996 and 1998, we can see quite different reasons. Then, net international position was on the decline, and public expenditure was not rising quite as fast. Rather, the single most important factor was increasing consumer expenditure.

	1996–1998	2004–2006	2006–2008
<b>Consumer expenditure</b>	940	217	157
<b>Effects of income distribution</b>	-251	-85	-12
<b>Household labour and volunteering</b>	-116	-124	-156
<b>Public expenditure on health and education</b>	172	152	234
<b>Services from and expenditure on consumer durables</b>	-66	51	70
<b>Costs of commuting</b>	-56	5	10
<b>Costs of crime</b>	16	16	35
<b>Costs of family breakdown</b>	14	24	19
<b>Costs of car accidents</b>	17	18	36
<b>Costs of industrial accidents</b>	1	0	12
<b>Cost of pollution control</b>	3	-4	10
<b>Costs of air pollution</b>	164	111	74
<b>Depletion of non-renewable resources</b>	-66	-35	26
<b>Long-term environmental damage</b>	-103	-115	-122
<b>Net capital growth</b>	-8	-70	2
<b>Change in net international position</b>	-74	-226	143
<b>Overall R-ISEW</b>	<b>584</b>	<b>-63</b>	<b>540</b>

*Table 2. Changes in selected components for England per capita for selected periods.*

The R-ISEW is still some way off serving the purpose of presaging medium-term or short-term economic crises. Rather, it is better suited to understanding the long-term effects of unsustainable economic activity. Here we see how, the adjustments made in calculating the R-ISEW take £8,909 of the per capita GVA of the country, indicating that our economic welfare is not as high as traditional indicators suggest. Even in this respect, however, there are question marks. Most importantly, it seems paradoxical that the R-ISEW should continue to rise whilst England still fails to really tackle the issue of climate change. Our local CO<sub>2</sub> emissions have marginally fallen, but only through greater imports of goods produced elsewhere and, therefore, CO<sub>2</sub> emissions elsewhere. Furthermore, even if we were to greatly reduce our embedded CO<sub>2</sub> emissions, this would not mean that we are fully on the road to sustainability. Sustainability would also require substantial adaptive measures to deal with the effects of climate change which are now seemingly inevitable.

The R-ISEW reveals that the pattern of economic welfare across the country is not consistent with the pattern suggested by the GVA. Whilst London does best according to the two indicators, here similarities end. Whilst the South East and the East of England are amongst the richest regions according to the GVA, they are amongst the poorest according to the R-ISEW, due to poor performance on the

economic indicators and high costs of resource depletion. Meanwhile, the South West, not a particularly wealthy region according to the GVA, has the second highest R-ISEW.

This is the last year that we will be calculating the R-ISEW using the methodology we have been using to date. Parallel development work has been carried out to improve the methodology. In particular, it is important the R-ISEW can produce meaningful results for policymakers. For example, is it appropriate that Yorkshire and the Humber should have the lowest R-ISEW almost entirely because of its past as an energy producing area? Similarly should fluctuations in the net capital growth component, which involves quite a lot of estimations, be allowed to determine to such a large extent the results of the calculations? Should the cost of the loss of natural habitats be so low, less than the costs of pollution control? What other aspects of public expenditure should be incorporated? These are issues that will be explored in the forthcoming development report.

## Appendix 1. The numbers

### A.1 R-ISEW by GOR (£m 2008/09)

	North East	North West	Yorkshire & the Humber	East Midlands	West Midlands	Eastern	London	South East	South West	England
1994	20,394	74,875	29,321	24,966	53,610	41,901	58,582	68,778	49,298	421,741
1995	21,277	73,871	30,236	28,203	53,266	41,066	62,743	67,019	50,327	428,022
1996	21,500	74,035	30,739	26,934	53,741	46,292	60,461	69,151	50,180	433,043
1997	22,472	76,664	31,458	32,351	53,156	42,240	66,618	69,736	52,525	447,226
1998	23,434	76,119	32,697	33,623	55,561	47,121	67,232	75,278	53,166	464,229
1999	24,190	78,136	34,133	37,193	56,092	51,513	77,649	74,798	55,924	489,622
2000	24,206	81,491	35,971	37,793	57,269	50,607	77,037	80,219	58,478	503,052
2001	25,636	84,517	37,435	41,088	57,878	50,219	86,699	84,979	60,702	529,128
2002	25,553	86,063	41,059	41,484	57,639	54,549	95,816	90,327	66,191	558,657
2003	26,373	89,145	45,658	43,036	60,993	55,250	95,747	85,706	71,151	573,036
2004	26,303	89,431	47,330	47,966	61,654	56,724	97,087	85,419	71,151	583,040
2005	26,919	89,965	47,724	51,452	62,517	57,648	102,362	80,943	72,217	591,723
2006	27,546	87,470	46,557	53,581	63,894	54,535	103,741	79,264	70,854	587,416
2007	29,551	90,723	44,766	52,217	64,972	54,952	110,971	83,703	74,924	606,802
2008	29,317	90,023	43,382	54,325	66,863	58,687	115,036	90,190	75,290	623,084

## A.2 R-ISEW per capita by GOR (£ 2008/09)

	North East	North West	Yorkshire & the Humber	East Midlands	West Midlands	Eastern	London	South East	South West	England
1994	7,877	10,948	5,912	6,131	10,213	8,092	8,522	8,918	10,363	8,745
1995	8,237	10,819	6,095	6,892	10,132	7,888	9,076	8,633	10,524	8,847
1996	8,346	10,872	6,196	6,557	10,211	8,846	8,669	8,866	10,469	8,925
1997	8,751	11,284	6,345	7,852	10,102	8,020	9,497	8,880	10,882	9,190
1998	9,150	11,207	6,595	8,135	10,541	8,887	9,516	9,542	10,964	9,509
1999	9,486	11,536	6,887	8,958	10,640	9,648	10,854	9,403	11,458	9,986
2000	9,519	12,030	7,254	9,067	10,867	9,415	10,645	10,039	11,893	10,218
2001	10,093	12,479	7,522	9,806	10,960	9,300	11,841	10,592	12,280	10,700
2002	10,056	12,697	8,209	9,826	10,886	10,040	13,015	11,225	13,310	11,251
2003	10,379	13,109	9,081	10,117	11,482	10,091	13,002	10,598	14,216	11,492
2004	10,347	13,113	9,346	11,178	11,574	10,293	13,139	10,513	14,112	11,635
2005	10,557	13,153	9,343	11,888	11,683	10,363	13,729	9,889	14,196	11,725
2006	10,777	12,764	9,054	12,278	11,905	9,726	13,810	9,622	13,828	11,572
2007	11,525	13,217	8,647	11,867	12,072	9,707	14,685	10,074	14,470	11,877
2008	11,385	13,092	8,322	12,255	12,357	10,244	15,097	10,763	14,454	12,111

### A.3 R-ISEW per capita by component for England (£ 2008/09)

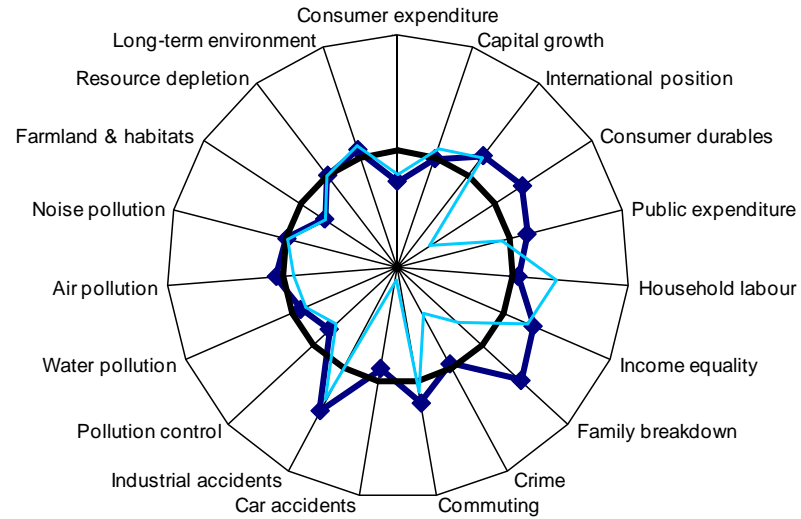
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Consumer expenditure	10,739	10,926	11,269	11,650	12,210	12,767	13,292	13,543	13,741	13,974	14,161	14,395	14,378	14,580	14,535
Effects of income distribution	1,362	1,411	1,457	1,557	1,708	1,730	1,985	1,871	1,761	1,816	1,789	1,852	1,875	1,835	1,887
Household labour and volunteering	9,377	9,515	9,812	10,093	10,501	11,037	11,307	11,672	11,980	12,157	12,372	12,543	12,504	12,744	12,648
Public expenditure on health & education	4,607	4,535	4,475	4,408	4,359	4,299	4,206	4,093	4,025	3,978	3,901	3,830	3,777	3,701	3,621
Net service flow from consumer durables	1,668	1,685	1,621	1,660	1,792	1,879	2,039	2,216	2,322	2,542	2,692	2,827	2,844	2,964	3,078
Costs of commuting	-252	-279	-336	-396	-402	-404	-415	-441	-414	-411	-377	-350	-326	-333	-256
Costs of crime	560	577	601	649	656	694	701	669	651	641	686	689	681	701	672
Costs of family breakdown	219	212	211	196	195	199	192	205	237	243	245	242	229	208	193
Costs of car accidents	167	169	171	161	156	157	157	177	183	182	180	162	156	153	136
Costs of industrial accidents	328	318	321	318	305	297	293	289	282	272	253	242	235	223	198
Costs of pollution control	181	181	180	180	179	179	178	178	172	183	175	171	175	168	162
Costs of water pollution	85	82	80	78	77	73	76	75	60	71	63	59	67	76	57
Costs of air pollution	8	8	8	8	7	7	6	6	6	6	6	6	6	6	6
Costs of noise pollution	1,339	1,216	1,115	988	951	808	777	722	659	614	559	477	448	419	374
Costs of loss of natural habitats	71	73	74	76	77	78	78	79	80	81	82	81	82	82	81
Costs of loss of farmlands	48	48	48	48	49	48	48	48	48	48	48	48	47	47	47
Depletion of non-renewable resources	16	15	15	14	15	15	16	13	16	14	14	14	13	13	13
Long-term environmental damage	1,595	1,628	1,748	1,749	1,814	1,838	1,897	1,950	1,923	1,970	2,006	2,039	2,041	2,015	2,015
Net capital growth	1,634	1,682	1,733	1,784	1,836	1,887	1,940	1,994	2,050	2,107	2,166	2,221	2,281	2,342	2,403
Change in net international position	170	107	98	63	89	183	285	364	404	350	291	242	221	189	223
<b>R-ISEW</b>	<b>8,745</b>	<b>8,847</b>	<b>8,925</b>	<b>9,190</b>	<b>9,509</b>	<b>9,986</b>	<b>10,218</b>	<b>10,700</b>	<b>11,251</b>	<b>11,492</b>	<b>11,635</b>	<b>11,725</b>	<b>11,572</b>	<b>11,877</b>	<b>12,111</b>
<b>GVA</b>	<b>15,354</b>	<b>15,665</b>	<b>16,058</b>	<b>16,623</b>	<b>17,279</b>	<b>17,771</b>	<b>18,220</b>	<b>18,700</b>	<b>19,071</b>	<b>19,619</b>	<b>20,046</b>	<b>20,310</b>	<b>20,609</b>	<b>21,024</b>	<b>21,020</b>

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

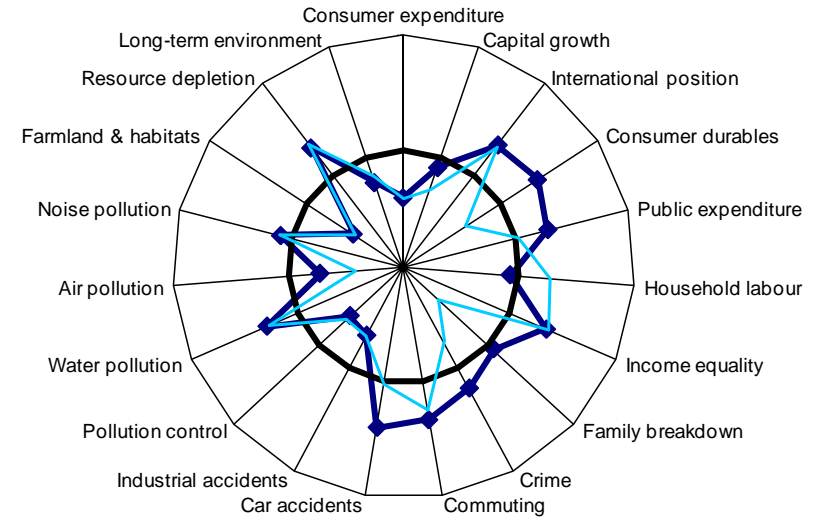
	North East	North West	Yorkshire & the Humber	East Midlands	West Midlands	Eastern	London	South East	South West	England
1994	3.8%	1.7%	3.9%	3.3%	1.5%	2.1%	1.0%	1.7%	1.3%	1.5%
1995	3.5%	1.5%	3.6%	2.8%	1.4%	1.9%	0.8%	1.6%	1.2%	1.6%
1996	2.9%	1.0%	2.6%	2.0%	0.8%	1.1%	0.0%	0.9%	0.7%	1.6%
1997	3.2%	1.3%	3.1%	2.2%	1.1%	1.6%	0.4%	1.3%	1.0%	1.3%
1998	3.0%	1.2%	3.0%	2.0%	1.1%	1.5%	0.4%	1.2%	1.0%	1.3%
1999	5.6%	3.4%	6.7%	4.8%	3.4%	4.4%	3.1%	4.4%	3.2%	1.5%
2000	2.7%	0.9%	2.3%	1.5%	0.8%	1.1%	0.1%	0.7%	0.7%	1.2%
2001	2.7%	1.0%	2.4%	1.6%	0.9%	1.3%	0.3%	0.9%	0.8%	1.1%
2002	2.7%	1.0%	2.2%	1.5%	0.9%	1.2%	0.3%	0.9%	0.7%	1.2%
2003	2.8%	1.1%	2.1%	1.6%	0.9%	1.3%	0.4%	1.1%	0.8%	1.2%
2004	3.8%	1.4%	2.8%	1.9%	1.4%	1.8%	0.6%	1.6%	1.4%	1.6%
2005	4.1%	1.6%	3.0%	2.1%	1.6%	2.1%	1.0%	2.0%	1.4%	1.8%
2006	6.0%	0.9%	0.1%	1.3%	2.5%	0.3%	3.1%	1.9%	1.0%	1.6%
2007	6.3%	0.4%	0.7%	1.2%	3.0%	1.5%	3.4%	6.4%	1.0%	2.1%

## Appendix 2.

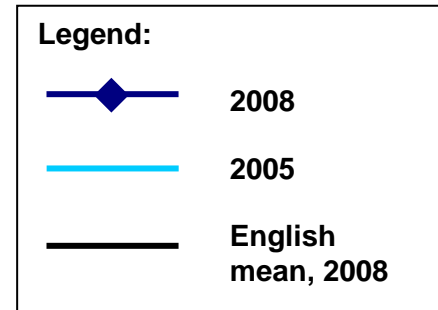
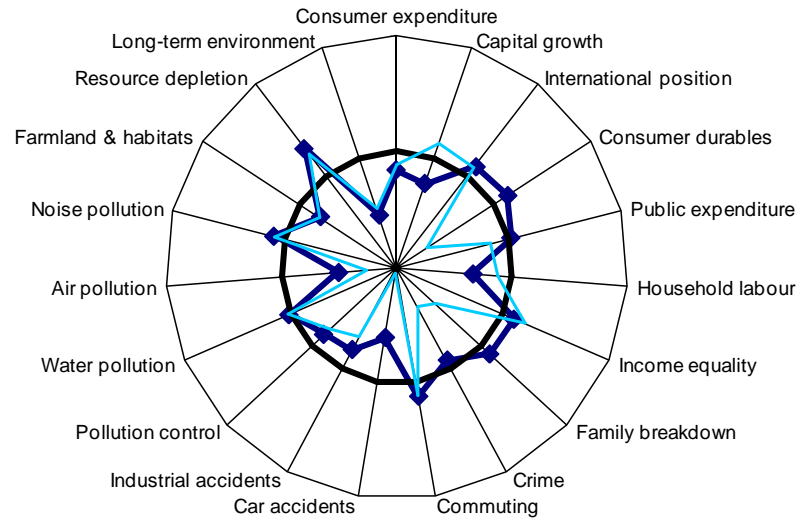
**North West**



**North East**

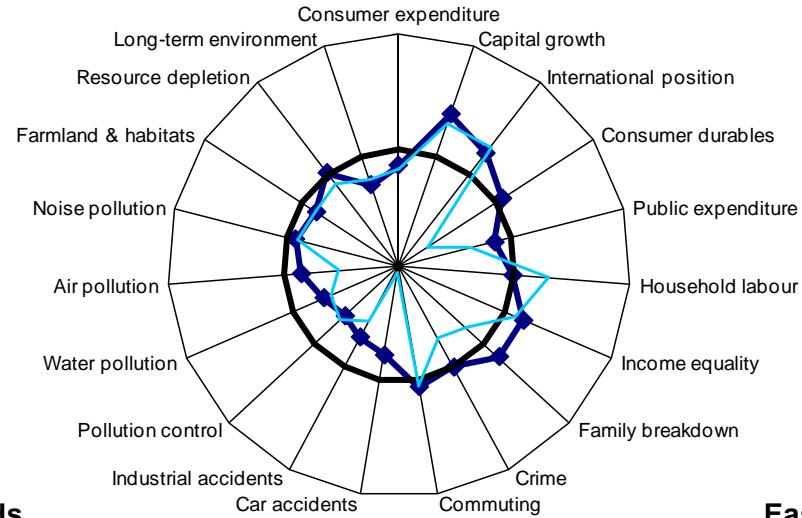


**Yorkshire and the Humber**

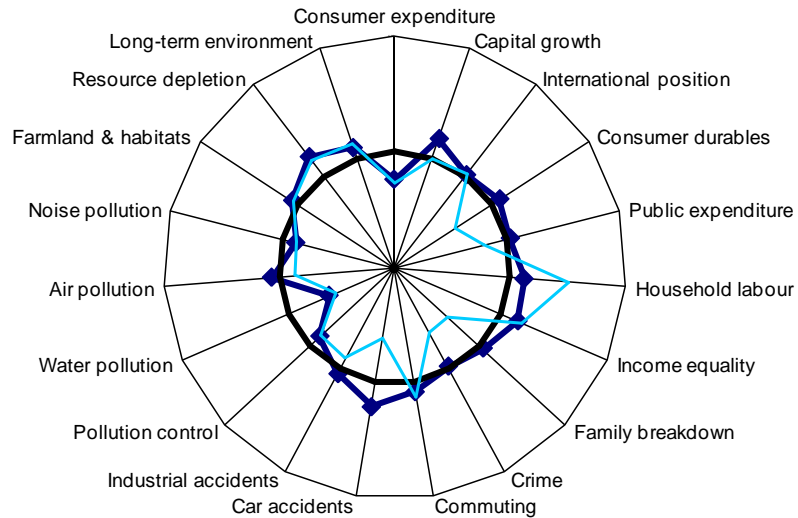


**Spider diagrams for each GOR showing relative performance on each component**

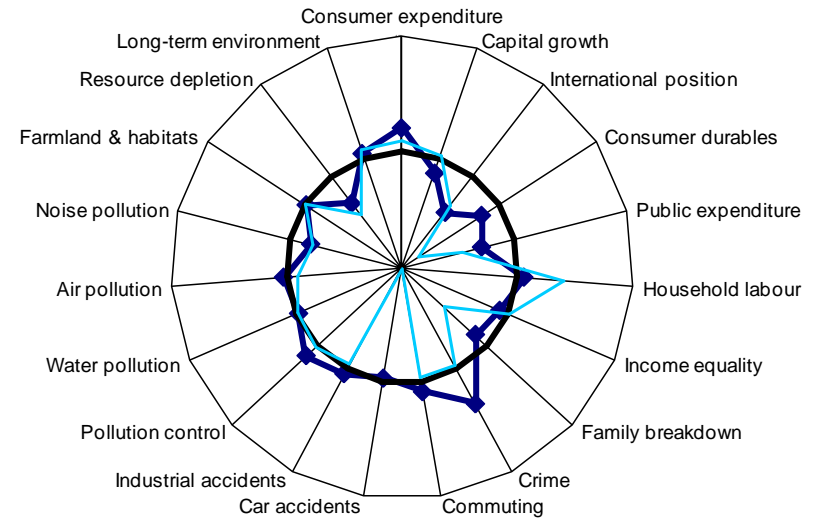
### East Midlands



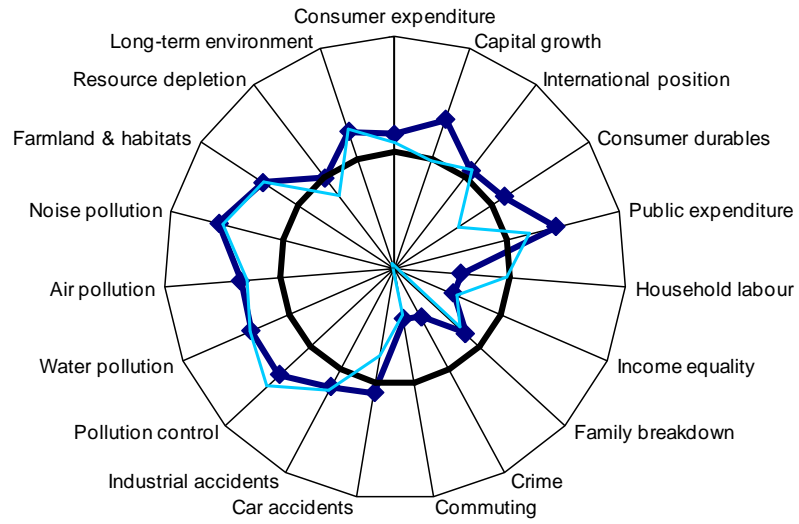
### West Midlands



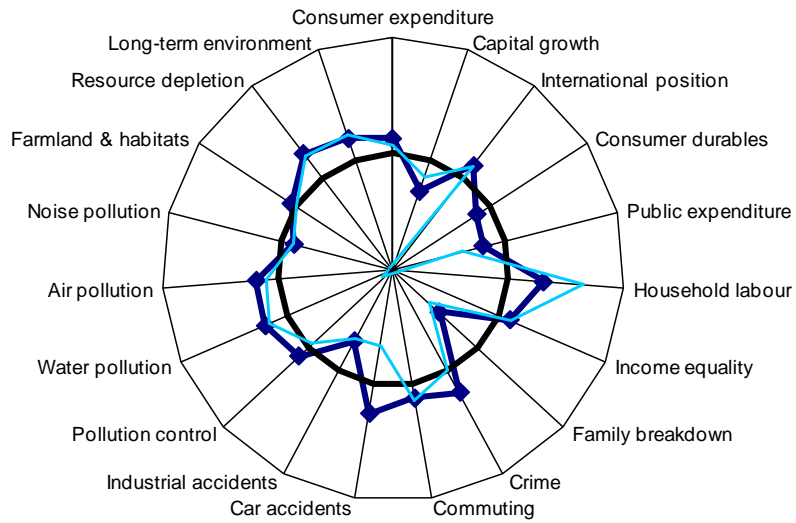
### East of England



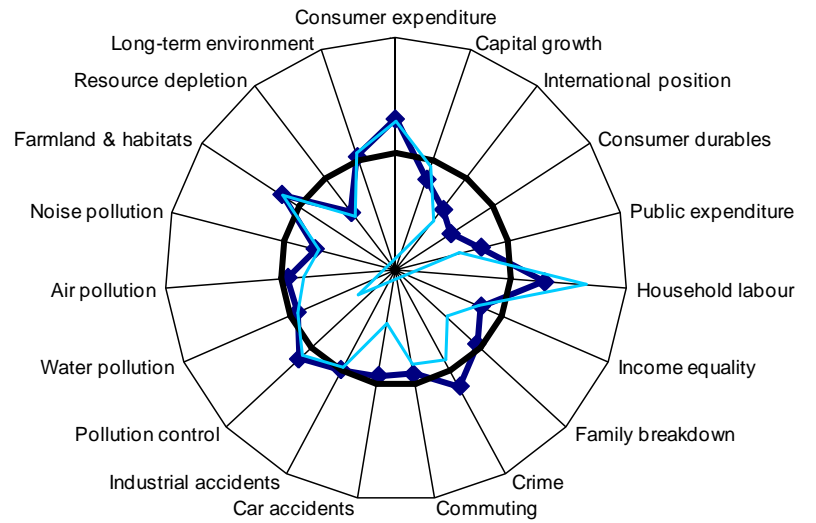
# London



# South West



# South East



## Endnotes

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- <sup>1</sup> 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**) – this is the first of the four reports.
- <sup>2</sup> 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).
- <sup>3</sup> Ranks in green denote the top three GORs, ranks in red denote the bottom three GORs, whilst the amber colour denotes GORs in the middle of the ranking.
- <sup>4</sup> Jackson *et al.* (2008) *op. cit.*
- <sup>5</sup> Abdallah S, Jackson T and Marks N (2009) *The R-ISEW (regional index of sustainable economic well-being) technical specification*. Available on request from **nef** and **emda**.
- <sup>6</sup> ‘-0.3%’ indicates that per capita consumer expenditure fell by 0.3% between 2007 and 2008 for England overall.
- <sup>7</sup> As of 2008, this data has been collected as part of the Integrated Household Survey.
- <sup>8</sup> Looking at *total* figures, increases in both consumer expenditure and GVA of course appear more dramatic (44% and 46% respectively).
- <sup>9</sup> The negative figure here represents a decrease in the deficit, i.e. a positive outcome for the R-ISEW.
- <sup>10</sup> The use of the Atkinson Index methodology allows one to vary the importance of inequality to people’s well-being using a parameter called  $\epsilon$ . This parameter represents the degree to which the marginal utility from increased income falls with increasing income. We used a value of 0.8, as suggested by the literature. This is discussed further in Jackson T, Marks N, Ralls J and Szymne S (1997) *Sustainable economic welfare in the UK 1950–1996* (London: **nef**).
- <sup>11</sup> 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.
- <sup>12</sup> Simms A, Johnson V and Smith J (2007) *Chinadependence: The second UK interdependence report* (London: **nef**).
- <sup>13</sup> Abdallah *et al.* (2009) *op. cit.*
- <sup>14</sup> See Appendix 4 of Jackson *et al.* (2008) *op. cit.* for details.
- <sup>15</sup> Cobb C and Cobb J (1994) *The green national product* (University of Americas Press: Lanham, MD).
- <sup>16</sup> Formally the Department for Business, Enterprise, and Regulatory Reform