MEETING THE PRODUCTIVITY CHALLENGE 2: UPDATE, 2006

REPORT ON A STUDY CARRIED OUT FOR THE SOUTH WEST OF ENGLAND REGIONAL DEVELOPMENT AGENCY

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Introduction

This report presents findings from a study commissioned by the South West of England Regional Development Agency from the University of the West of England and the University of Bath. The purpose of the study was to update and extend earlier work focusing on productivity in the region, reported in *Meeting the Productivity Challenge* (April 2005) which is available on the South West RDA website.[1]

As with the earlier work, the main findings presented here are largely based on statistical analysis of the business-level data-base available at the Office of National Statistics. Data from this source relate to 2003, the latest year for which information is available. This rolls forwards by one year the earlier analysis. It is not, however, possible to make simple comparisons from one year to the next. This is because the data are drawn in part from a sample of businesses which changes year on year. Some degree of comparison of the broad picture provided by the analysis in successive years is however possible.[2]

As described in the original report, there are different ways of measuring productivity. The analysis presented here is based on individual business units and specifically includes size of workforce in the analysis. This means that differences in productivity between the South West and other regions, or across different parts of the South West are not affected by differences in the size of the working population or patterns of commuting – as is the case with commonly-used measures of output per head of population, for example.

The key 'productivity drivers' used to explain differences in productivity are largely the same as in the previous study. These were based on extensive analysis of the existing evidence-base set out in the full report of the original study and they are described in brief in the *Summary Report* on this earlier work. No evidence has emerged in the interim to suggest that any radically different factors should be taken into account. This also provides for a degree of comparability between the two years in terms of the overall picture. One additional factor is included in the form of a more sophisticated index of 'economic potential'.[3] Discussion with the ONS has also clarified the interpretation of data on ownership including multi-national ownership of businesses.[4]

The first part of the analysis presented here focuses on productivity differentials at a regional scale across Great Britain as a whole and on the productivity gap between the South West and other regions. This largely replicates the previous analysis. It does also, however, provide greater detail on the impact of individual factors than was provided in the original study. The second part of the analysis extends the previous work, providing a sub-regional focus within the South West as a whole, again based on analysis of the business-level data-base. Finally, Appendix 1 provides a complementary picture of productivity patterns and trend information across the region drawing on the commonly-used aggregate data produced by the ONS.

Regional productivity differentials and the South West productivity gap

Looking first at regional productivity differentials, this section identifies the overall productivity gap between the South West and other regions and the extent to which this can be accounted for by a range of different factors. Business-level data indicates that there is a headline gap of some 33% between the South West and London as the leading, benchmark

region in terms of output per employee (Box 1).[5] It should be noted that this is not equivalent to the usual ONS figures for productivity based on aggregate data.

Box 1: initial productivity differentials across the countries and regions of Great Britain relative to London, 2003	
Wales	42%
North-East	33%
South-West	33%
East Midlands	32%
North West	30%
West Midlands	30%
East	28%
Scotland	27%
South East	21%
London (benchmark)	0%

The gap between the South West and London as the benchmark region appears to be comparable to that in the previous two years, 33% for 2003 compared with 30% 2001 and 34% in 2002, differences which are insignificant in a statistical sense.

The key question, however, is the extent to which we can account for the gap between the South West, London and a range of other regions and can identify the relative importance of different factors, enabling us to see the effect of these on productivity differentials measured relative to London. Table 1 presents the findings of this part of the analysis, with summary tables included in the text below. Note that the figures in Table 1, included for the more technically-minded, are 'logged coefficients' which need to be converted in order to produce the more readily intelligible percentages which are reported here in the body of the text and in the summary boxes.

What the analysis shows is that inclusion of these variables progressively reduces the productivity gap to a level that is insignificant in a statistical sense. In other words, we can explain away the productivity gap, statistically speaking at least, in terms of these known and inherently plausible factors. There is no inherent lack of productivity on the part of businesses or workers in the region that cannot be explained by these factors.

This is consistent with the findings based on data for earlier years. At one level this is unexceptional. What it does do, however, is confirm the robustness of the overall model and the earlier analysis used to explain regional productivity differentials and the level of confidence in the findings.

Detailed findings

Starting from the headline figure for the South West of 33%, we can look in detail at the extent to which adding in additional explanatory factors progressively reduces the average productivity gap between businesses in the South West and those in London.[6]

Adding capital stock into the analysis significantly reduces the productivity gap relative to London from 33% to 25% (see Box 2). This suggests that if businesses in the region had the same capital stock per worker as in London then productivity would be around 12% higher.

Adding in industrial composition reduces the productivity gap by a further 6% to 19%. This indicates that differences in industrial structure do contribute to differences in productivity but not to a major extent. The economic performance of the South West relative to London cannot simply be explained away by a lack of businesses in more productive industrial sectors or a predominance of businesses in low-productivity sectors.

Adding in ownership structure, the ratio of full-time to part-time employment, the qualification level of the local workforce, an index of economic potential and population density reduces the gap relative to London by a further 9% leaving only a further 10% to be explained (these factors are unpacked in more detail below in order to identify their individual impacts).[7]

Box 2: Explaining the productivity gap between the South West and London	
Headline gap in GVA per employee	-33%
Capital stock	-25%
Industry structure	-19%
Ownership, full/part time ratio, skills, gravity-type effect and population density	-10%
Travel-time	(-3%)

Finally, adding in two travel-time variables, the average travel-time to London and the next four largest conurbations (Birmingham, Manchester, Leeds and Glasgow), and the minimum time to any one of these, reduces the productivity gap between the South West and London to a level that is, statistically speaking, zero.[8] As in the previous study, travel time alone accounts for a considerable share of the overall productivity gap between the South West and London. Significantly as well, travel-time also has particularly strong effects on a number of the more peripheral regions including Wales, the North West, the North East and Yorkshire and Humberside (comparing columns 4 and 5 in table 1).

We can, therefore, effectively account for the apparent productivity gap in terms of a relatively limited set of straightforward and essentially plausible factors.

A more detailed analysis of the impact of individual factors is included later in this section. We can also look at the effect of a given level of change in different factors on the productivity of the average firm (Box 3).

Box 3: Effect of different factors on the productivity of the average firm	
A 10% increase in the ratio of full-time to part-time employment	+3.4%
A 10% increase in % of local labour force with medium level qualifications	+1.6%
A 10% increase in % of local labour force with NVQ4+	+1.2%
An extra 100 miles from London and the 4 next largest cities	-0.7%

As indicated, an increase in the proportion of full-time to part-time employment is reflected in higher levels of productivity. This mainly reflects simply the additional hours worked by full-time workers rather than the fact that full-time workers are more productive per hour worked that part-timers.

As with the previous analysis, skill levels in the local labour force are seen to be an important factor. Both medium-level and higher-level skills are associated with higher levels of productivity.

Travel time to London and the next four largest cities in the UK, and population density are also shown to be associated to a significant degree with productivity levels. The actual time or cost penalty of increased peripherality is likely to be only a small part of the effect that is being identified here. There is a large body of work now which suggests that both of these factors are probably picking up the positive impacts on productivity of proximity to large centres of population, employment and economic activity – and the negative impacts of peripherality.

These include the beneficial effects of scale per se including markets. They also include proximity to large concentrations of specialist suppliers and sub-contractors, skilled labour, specialist services and infrastructure and opportunities for contact and collaboration with other businesses – what economists call 'agglomeration' effects or the benefits of clustering in space.

We can also look at differences in productivity between branches of USA multinational businesses, branches of other non-UK multinationals, UK branches of multi-site UK-owned businesses and of UK single-site businesses (Box 4).[9] The benchmark is the average non-US foreign multinational. UK branches of US multinationals are found to be considerably more productive than those of other foreign multinationals. UK-owned multi-site businesses are also more productive than non-US foreign multinationals but the difference is much less marked. UK single-site businesses are slightly less productive again – and overall, UK single-site businesses are some 30% less productive than branches of US multi-nationals.

Box 4: Difference in productivity compared the average non-US foreign multinational	
US multinational	+28%
UK multi-site business	+9%
Other multi-national	0.0% *(Benchmark)*
UK single-site business	-2%

More detailed analysis of different factors

It is possible to provide a more detailed breakdown of the apparent impact of different factors on regional productivity differentials. This can be done by adding in potential explanatory variables one by one rather than in groups as in Box 2 above. The results of this more detailed analysis are summarised in Box 5, below in percentage format. The results of the more detailed model are set out in Table 3, below. Note that the initial productivity gap is slightly smaller than that in the version of the analysis presented earlier. This reflects a slight difference in the initial model.[10]

From a statistical point of view the results of the step-by-step analysis only give an indicative picture of the impact of different factors on the gap in productivity. The apparent impact of different factors will vary depending on the order in which they are added into the model. This is due to the relationships between the individual factors. It also explains why those factors added in last do not apparently add much to the explanation of the overall gap. The final model (column 10 in table 3) indicates that these variables (including the two ownership variables and absence of web site) do have a statistically significant effect on productivity levels in the context of the model as a whole.

Box 5: explaining the productivity gap between the South West and London	
Headline gap in GVA per employee	-31%
Capital stock	-23%
Full:part-time employment	-19%
Industry structure	-17%
Qualifications	-11%
Population density	-9%
Travel time to London and main cities	-2%
Ownership – multinational by country	-2%
Ownership - private or public sector	-1%
No web site for external use	-1%

This full model including the complete range of variables is statistically speaking the most reliable picture of the importance of the different variables. Most of the variables are statistically significant and the size of the coefficients attached to the different variables gives an indication of the relationship between individual variables and levels of productivity.

As with the earlier analysis it is possible to set out the effects on productivity of different factors, statistically speaking (Box 6). These are derived from column 10 of the full model (table 3).

Box 6: effect of different factors on the productivity of the average business unit	
Capital and employment	
A 10% increase in employment	6.6%
A 10% increase in capital	2.9%
A 10% increase in the ratio of full-time to part-time employment	6.8%
A 10% increase in the & of the local workforce with NVQ4+	1.2%
A 10% increase in the % of the local workforce with NVQ 2-3	1.6%
Population density and travel time	
A 100% increase in the population density of the local area	1.1%
A 10% increase in the average travel time to London & 4 next largest urban areas	-0.6%
Difference compared to non-US, non-UK multinational	
UK multi-site business	8%
US multinational	25%
UK single-site business	-4%
Ownership and 'innovation'	
Private-sector business unit relative to public-sector	36%
No web-site available to public compared to web-site available	-4%
Difference compared to 'other' sector	
Manufacturing	(+4%)
Power	+54%
Construction	+56%
Wholesale and retail	+38%
Catering	-35%
Transport	+18%
Finance and real estate	+36%
Social work	0%
Community	6%

Sub-regional productivity differentials

This section looks at patterns of productivity within the South West, looking at differences between different parts of the region. This section of the analysis focuses only on single-site business units. This is because of the much greater likelihood at a sub-regional level of multi-site businesses being located in more than one sub-region. Given the nature of the ONS data-base this would make it more difficult to ascribe business unit characteristics to a specific sub-region.

The number of business units within the South West is obviously much smaller than nationally and reduces still further at a sub-regional level. This means that fewer of the results of the analysis are likely to be significant in a statistical sense.

Table 2 presents the full results of the sub-regional analysis of productivity differentials. This follows a similar format to the analysis of regional differentials, starting from headline differentials and progressively adding in explanatory variables. Initial productivity differentials are expressed relative to the City of Bristol. Headline productivity differentials between the sub-regions of the South West and Bristol are set out in Box 7.

Box 7: Sub-regional productivity differentials in the South West	
Cornwall	-28%
Devon	-25%
Somerset	-18%
Dorset	-13%
Wiltshire	(0%)
Gloucestershire CC	(-6%)
South Gloucestershire	(-3%)
Bath & NE Somerset	-20%
Bristol	Benchmark

Businesses located in Cornwall are on average 28% less productive than in Gloucestershire, those in Devon 25% less productive, in Somerset, 18% and in Dorset 13% less productive. Businesses in Bath and NE Somerset are 20% less productive, probably reflecting the economic performance of NE Somerset more than Bath itself. The figures for Wiltshire, Gloucestershire and South Gloucestershire are not significantly different from that for Bristol in a statistical sense but the relative scale of the differences are plausible given what we know from aggregate data.

Inclusion of additional explanatory variables progressively reduces productivity differentials at a sub-regional level. The gaps between Cornwall and Devon, and Bristol City which were considerable and statistically significant, drop to a level that is insignificant in a statistical sense.

Box 8: explaining the productivity gap between the sub-regions of the South West relative to Bristol City		
	Cornwall	**Devon**
Headline gap in GVA per employee	28%	25%
Capital stock	25%	21%
Full:part-time employment	19%	19%
Industrial structure	13%	13%
Qualifications	(12%)	(11%)
Population density, travel time, private/public, no web	(1%)	(1%)

As with the regional level analysis, we can again largely explain productivity differentials at a sub-regional level within the South West in terms of the same relatively limited set of straightforward and essentially plausible factors. The same model and set of explanatory variables appear to be relevant at a sub-regional as well as inter-regional level. It should be noted, however, that few of the variables are statistically significant. This is likely to reflect the smaller sample size at a regional and sub-regional scale. The detailed results look plausible but they should be taken as indicative only.

We can again look at the more detailed impact of progressively adding in additional variables (Box 8). In the case of Cornwall, for example, adding in capital stock reduces the productivity gap relative to Bristol City from 28% to 25%.

Adding in the ratio of full-time to part-time workers reduces sub-regional differentials considerably again, in the case of Cornwall from 25% to 19%. Adding in industrial structure reduces the gap further, to 13%. Adding qualifications reduces the gap from 13% to 12% (although the difference is now statistically marginally insignificant). Finally, adding population density, the travel time variables, ownership and web access reduces the gap to a statistically insignificant 1%.[11]

It did not prove possible to separate out the independent effects of individual factors at a sub-regional level due to the interaction between the different factors and the effects on the apparent importance of different factors of the order in which they are added in to the analysis. The final model (column 6 of table 2) gives an indication of the effect of the different factors, statistically speaking, on productivity levels. Few of the variables, however, have a statistically significant effect. Further analysis is necessary at a sub-regional level in order to tease out more in the way of meaningful results at a sub-regional scale.

Policy issues

It is clear that the South West lags well behind London and the South East in terms of productivity, based on ONS business-level data. There is a significant although not major gap relative to Scotland and the East of England and the South West is well ahead of Wales. It is also important to remember that whilst the *relative* position of the region may be an issue, in common with other regions, productivity in the South West has been rising in *absolute* terms over recent years – see chart A3.

There are, however, major variations in productivity across the South West as a whole. Businesses in Cornwall are, on average, 28% less productive than those in Bristol and in Devon, 25% less productive.

This raises the immediate policy issue of whether to attempt to raise productivity in those parts of the country where it is particularly low – whether to raise productivity at an aggregate national level or on grounds of equity – or whether this is best achieved by concentrating on those parts of the region that clearly have a degree of competitive advantage and where the returns on investment and policy effort might be greatest.

We can go on to look in turn at the various factors that might impact on productivity and the policy issues that these raise. Clearly these should not be interpreted in a mechanical sense, suggesting that a given increase in capital stock or skills for example, if it could be achieved, would automatically result in a given change in productivity. The possibility of policy leverage and impact clearly varies with different factors. The analysis does, however, point to those factors which, in combination, provide the conditions for higher or lower levels of productivity.

Business investment

It is known that level of business investment have a major impact on productivity at a national level. Businesses in the South West have a particularly low ratio of capital stock to labour relative to other countries and regions of Great Britain and there are strong contrasts

the region as a whole. The analysis indicates that differences in capital stock account for a significant part of the productivity gap between the South West and other regions and that there is a strong relationship between productivity and capital stock – a 10% increase in capital stock is associated with a 3% increase in productivity. It also accounts for a significant part of the difference in productivity at a sub-regional level.

There would appear, however, that little is possible in the way of policy leverage over levels of investment in capital stock as a whole. Any shift in capital to labour ratios is likely to come about through a combination of other factors including shifts in industrial structure or ownership towards more capital intensive businesses. It may be possible to encourage investment including IT, by businesses in under-capitalised sectors such as hotels and catering. This would include small businesses in the tourism sector for example, and might focus on quality rather than quantity of provision.

Skills

There is wide-ranging evidence that skills and human capital are important drivers of productivity, both directly and through their impact on innovation and the growth of the knowledge economy. The analysis indicates that higher levels of both medium-level and higher level skills are associated with higher levels of productivity. This suggests that policy should focus on both.

Those with higher level technical and professional skills in particular are, however, particularly mobile geographically. Simply increasing the supply of more highly skilled labour *may* serve to make an area more attractive to business investment. But unless suitable job opportunities are available, more skilled labour may be lost to other job markets.

This emphasises the need to create the sort of job opportunities that will attract and retain more highly skilled, more productive labour alongside measures to increase the supply of skilled labour or graduate retention programmes.

It also suggest the need to enhance the image and attractiveness of – and the availability of housing and appropriate facilities in - the sorts of places where more mobile professional and technical workers with higher skill levels want to live and work. This includes core urban areas – and reinforces the importance of recent regeneration in Bristol and Plymouth for example. It also includes the sort of attractive, more rural localities accessible to the main urban areas favoured by older professional, technical and managerial workers.

Increasing levels of skills and qualifications should also focus on the existing workforce of local businesses who are typically less mobile and where improved skill levels may increase the return on capital already invested by businesses. Training and skills development should be tailored to the particular needs of local businesses and might promote part-time and distance learning, foundation degrees and progression from the FE to the HE sector.

Ownership

The analysis demonstrates clear differences in productivity between multinational and non-multinational businesses. US-owned multinationals are also found to be considerably more productive than both other foreign-owned multinationals. There is evidence from other sources that this may reflect differences in management style and quality together with differences in levels of investment and innovation. This may impact on other businesses locally as well. It may also reflect that fact that less productive elements of foreign multi-

nationals are located elsewhere, or the way in which profits are declared on a territorial basis.

The South West benefited to some extent in the past from inwards investment by overseas multinationals albeit less so than Wales and Scotland for example. The potential flow of inwards investment is now, however, much more restricted and the capacity to boost productivity via this route is very limited. If management style and quality, however, has been among the factors distinguishing multinationals this may point towards this as a factor to be addressed more generally.

Industrial structure

The analysis of business level data indicates that there are considerable differences in productivity between different industrial sectors. This might suggest the benefits of increasing the proportion of businesses with high levels of productivity and vice versa.

As with ownership, however, the possibility of influencing the overall mix of industries is limited, however desirable this might in principle appear to be. Growth in financial and business services and high value manufacturing would tend to increase levels of productivity. Further growth in low-end hotels and catering would tend, as suggested earlier, to increase the volume of low productivity businesses.

The construction sector is also characterised by businesses with, on average, relatively high levels of productivity. Investment in regeneration and new residential development, both public and private sector, is likely therefore to support relatively high value-added businesses.

It should also be noted that although levels of productivity do differ quite considerably between different sectors, industrial structure only accounts for a limited proportion of the productivity gap at a regional or sub-regional scale.

Innovation

Innovation is widely seen as a key driver of productivity at a national level. At a regional scale, the evidence from this and other studies is more mixed. Earlier analysis of the ONS business-level data found not relationship between levels of R&D expenditure and productivity for businesses as a whole. It may be that any significant effects for some businesses and sectors were swamped when all businesses were included.

The rather crude analysis of the relationship between productivity and the level of high tech patents registered did find some relationship between the two – but this could be misleading given that no other factors are included in the analysis.

There is evidence from other studies that the dissemination, adoption and adaptation of innovation in terms of products, process and technology are more important to productivity growth than the generation and adoption of leading-edge innovation. Policy, by implication, should focus on the former.

In policy terms a focus on initiatives which might have a generic impact across a wide range of business types is likely to prove more beneficial than attempts to promote narrower product innovation in particular sectors. This might include, for example, the adoption and effective application of ICT, web-based activities and broadband.

Travel time and population density

The analysis also shows that travel time to London and other major urban areas is associated to a significant degree with productivity levels. So too is local population density. This is emphasised by the fact that adding in to the analysis travel time and population density accounts for a considerable part of the productivity gap between the South West and London having already taken into account differences in capital stock, industrial structure and qualification levels.

The very marked north-east to south-west contrasts in productivity levels within the region point towards the strong impact of peripherality on economic performance.

The possible policy implications are not however straightforward. As indicated earlier, the direct time and monetary penalties of travel time faced by businesses in more remote locations may be part of the explanation. To this extent, improvements in transport infrastructure may have an impact.

The impact of travel time and of population density in particular are probably, picking up to a greater extent the positive impacts on productivity of proximity to large centres of population, employment and economic activities and the negative impacts, therefore, of peripherality. It is the remoteness of Cornwall in particular from the economic centre of gravity of Great Britain in this much more complex sense which is the issue.

This suggests from a policy perspective the benefits of a continued emphasis on the development and expansion of the major urban centres within the region. It may also, however suggest the possible benefits of trying to reproduce by other means the benefits of urban agglomeration and scale, through strengthening networks, access to markets and information, specialist suppliers and opportunities for collaboration.

Table 1: Regional output differentials

	1	2	3	4	5
n	42592	41320	41320	29767	29767
Employment	1.067 (0.004)* *	0.663 (0.006)**	0.654 (0.006)**	0.668 (0.006)**	0.669 (0.006)**
Capital		0.322 (0.004)**	0.350 (0.005)**	0.289 (0.005)**	0.288 (0.005)
Full Time Ratio				0.320 (0.010)**	0.340 (0.010)**
No Qualifications	*Control Variable*				
Medium qualifications				0.111 (0.063)	0.162 (0.063)**
High qualifications				0.147 (0.015)**	0.120 (0.016)**
Population density				0.022 (0.005)**	0.013 (0.005)**
UK MNC				0.089 (0.013)**	0.090 (0.013)**
USA MNC				0.245 (0.027)**	0.244 (0.027)**
UK non-MNC				-0.024 (0.014)	-0.022 (0.014)
MFD				0.025 (0.024)	0.087 (0.028)**
Index				-.0001	-.0001
Average Time					-0.070 (0.013)**
Average Min Time					-0.002 (0.010)
North West	-0.360 (0.025)**	-0.252 (0.020)**	-0.222 (0.020)**	-0.127 (0.024)**	-0.019 (0.035)
Yorkshire & Humberside	-0.374 (0.026)**	-0.268 (0.021)**	-0.239 (0.020)**	-0.111 (0.025)**	-0.014 (0.033)
North East	-0.401 (0.037)**	-0.291 (0.030)**	-0.243 (0.029)**	-0.121 (0.033)**	0.001 (0.040)
West Midlands	-0.352 (0.027)**	-0.270 (0.022)**	-0.252 (0.021)**	-0.131 (0.026)**	-0.056 (0.033)
Wales	-0.542 (0.024)**	-0.403 (0.020)**	-0.280 (0.019)**	-0.177 (0.025)**	-0.079 (0.031)**
Scotland	-0.310 (0.024)**	-0.217 (0.020)**	-0.163 (0.019)**	0.011 (0.061)	0.126 (0.066)
South West	-0.402 (0.026)**	-0.281 (0.021)**	-0.216 (0.020)**	-0.107 (0.026)**	-0.026 (0.030)
East Midlands	-0.391 (0.028)**	-0.263 (0.023)**	-0.244 (0.022)**	-0.103 (0.026)**	-0.038 (0.030)
East	-0.325 (0.034)**	-0.263 (0.028)**	-0.239 (0.027)**	-0.093 (0.033)**	-0.045 (0.035)
South East	-0.242 (0.022)**	-0.131 (0.018)**	-0.113 (0.017)**	-0.030 (0.024)	-0.008 (0.024)
London	*Control Variable*				
Manufacturing			0.333 (0.030)**	0.206 (0.030)**	0.206 (0.030)**
Power			0.718 (0.180)**	0.611 (0.174)**	0.610 (0.174)**
Construction			0.785 (0.033)**	0.590 (0.034)**	0.587 (0.034)**
Wholesale & retail			0.583 (0.030)**	0.483 (0.030)**	0.480 (0.030)**
Catering			-0.403 (0.033)**	-0.293 (0.034)**	-0.293 (0.034)**
Transport			0.431 (0.034)**	0.317 (0.034)**	0.312 (0.034)**
Real estate			0.577 (0.031)**	0.475 (0.030)**	0.470 (0.030)**
Social work			0.088 (0.034)**	0.094 (0.034)**	0.096 (0.034)**
Community			0.203 (0.035)**	0.145 (0.035)**	0.142 (0.035)**
Other sectors	*Control Variable*				
Llunit	-0.116 (0.007)**	-0.040 (0.006)**	-0.063 (0.006)**	-0.033 (0.007)**	-0.030 (0.007)**
F test	94.13***	543.99***	544.48***	441.85***	416.19***
R^2	0.775	0.842	0.855	0.875	0.877

Notes: Equations estimated by OLS, with standard errors corrected for heteroskedasticity using White's methodology. Standard errors are in parentheses and * and ** denote the variable is significant at the 5% and 1% levels respectively. The dependent variable in each regression is GVAC. All coefficients are expressed in natural logarithms. Constant terms omitted. Source: ONS

Table 2: Productivity Differentials within the South West

	1	2	3	4	5	6
n	3134	3063	2548	2548	2548	2548
Employment	1.030 (0.101)***	0.721 (0.721)***	0.715 (0.020)***	0.693 (0.019)***	0.693 (0.019***)	0.696 (0.019***)
Capital		0.264 (0.014)***	0.211 (0.211)***	0.253 (0.014)***	0.253 (0.014)***	0.253 (0.014)***
Full Time Ratio			0.928 (0.056)***	0.654 (0.060)***	0.653 (0.060)***	0.641 (0.061)***
No Qualifications	*Control Variable*					
Medium qualifications					0.002 (0.583)	-0.201 (0.687)
High qualifications					0.023 (0.107)	0.022 (0.117)
Population density						0.008 (0.018)
Average Time						0.119 (0.146)
Average Min Time						-0.123 (0.635)
Average Miles						0.027 (0.191)
Average Min Miles						-0.107 (0.567)
Private						0.193 (0.079**)
No Web						0.003 (0.033)
Cornwall	-0.335 (0.080)***	-0.282 (0.074)***	-0.213 (0.074)***	-0.142 (0.073)*	-0.132 (0.088)	-0.012 (0.172)
Devon	-0.282 (0.074)***	-0.236 (0.068)***	-0.186 (0.067)***	-0.121 (0.065)*	-0.114 (0.080)	-0.024 (0.138)
Somerset	-0.200 (0.080)**	-0.216 (0.074)***	-0.095 (0.072)***	-0.080 (0.069)	-0.072 (0.081)	-0.005 (0.121)
Dorset	-0.137 (0.081)*	-0.117 (0.073)	-0.052 (0.071)	-0.021 (0.069)	-0.014 (0.082)	0.143 (0.141)
Wiltshire	0.001 (0.078)	-0.029 (0.071)	-0.009 (0.070)	0.035 (0.067)	0.041 (0.089)	0.124 (0.129)
Gloucestershire	-0.061 (0.078)	-0.076 (0.072)	-0.018 (0.071)	0.030 (0.067)	0.034 (0.076)	-0.040 (0.118)
South Gloucestershire	-0.029 (0.127)	-0.014 (0.115)	0.033 (0.123)	0.010 (0.116)	0.016 (0.137)	0.018 (0.156)
Bath & NE Somerset	-0.223 (0.093)**	-0.247 (0.086)**	-0.138 (0.084)	-0.120 (0.081)	-0.118 (0.096)	-0.060 (0.120)
Bristol	Control Variable					
Manufacturing				0.256 (0.079)***	0.256 (0.079)***	0.159 (0.090)*
Power				0.786 (0.556)	0.786 (0.556)	0.680 (0.554)
Construction				0.448 (0.093)***	0.448 (0.093)***	0.370 (0.099)***
Wholesale and retail				0.416 (0.078)***	0.416 (0.078)***	0.324 (0.089)***
Catering				-0.348 (0.092)***	-0.348 (0.092)***	-0.434 (0.100)***
Transport				0.240 (0.105)**	0.241 (0.105)**	0.152 (0.112)
Real estate				0.350 (0.080)***	0.350 (0.080)***	0.261 (0.089)***
Social Work				-0.062 (0.091)	-0.062 (0.091)	-0.132 (0.099)
Community				-0.029 (0.099)	-0.029 (0.099)	-0.080 (0.103)
Other sectors	*Control Variable*					
Llunits	-0.125 (0.125)***	-0.069 (0.031)**	-0.017 (0.028)	-0.046 (0.028)*	-0.046 (0.026)*	-0.040 (0.028)*
F test	1144.98***	1294.00***	1037.59***	704.99***	643.03***	507.21***
R^2	0.787	0.821	0.843	0.857	0.857	0.857

Notes: Equations estimated by OLS, with standard errors corrected for heteroskedasticity using White's methodology. Standard errors are in parentheses and *, ** and *** denote the variable is significant at the 10%, 5% and 1% levels respectively. Constant terms omitted. Source: ONS

Table 3: Regional productivity differentials

	1	2	3	4	5	6	7	8	9	10
n	42311	41217	35119	35119	35119	31725	31725	31725	31725	31725
Employment	1.033 (0.003)* *	0.653 (0.006)**	0.676 (0.005)**	0.658 (0.005)**	0.659 (0.005)**	0.661 (0.006)**	0.661 (0.006)**	0.653 (0.006)**	0.659 (0.006)**	0.658 (0.006)**
Capital		0.321 (0.004)**	0.251 (0.004)**	0.295 (0.004)**	0.294 (0.004)**	0.296 (0.004)**	0.295 (0.004)**	0.290 (0.004)**	0.290 (0.004)**	0.290 (0.004)**
Full Time Ratio			0.981 (0.017)**	0.732 (0.018)**	0.729 (0.018)**	0.717 (0.019)**	0.716 (0.019)**	0.703 (0.019)**	0.682 (0.019)**	0.684 (0.019)**
High qualifications					0.145 (0.015)**	0.146 (0.015)**	0.119 (0.016)**	0.113 (0.016)**	0.114 (0.016)**	0.115 (0.016)**
Medium qualifications					0.072 (0.056)	0.136 (0.061)	0.181 (0.060)**	0.172 (0.060)**	0.158 (0.060)**	0.155 (0.060)**
No Qualifications	Benchmark variable									
Population density						0.018 (0.004)**	0.010 (0.004)*	0.009 (0.004)*	0.010 (0.004)*	0.011 (0.004)*
Average Time							-0.063 (0.027)*	-0.061 (0.027)*	-0.060 (0.027)*	-0.060 (0.027)*
Average Min Time							-0.025 (0.032)	-0.025 (0.032)	-0.023 (0.032)	-0.022 (0.032)
Average Miles							-0.003 (0.023)	-0.004 (0.023)	-0.004 (0.022)	-0.003 (0.022)
Average Min Miles							0.039 (0.039)	0.040 (0.038)	0.038 (0.038)	0.037 (0.038)
UK MNC								0.095 (0.013)**	0.078 (0.013)**	0.079 (0.013)**
USA MNC								0.245 (0.027)**	0.225 (0.027)**	0.221 (0.027)**
UK non-MNC								-0.031 (0.013)*	-0.038 (0.013)**	-0.038 (0.013)**
Private									0.306 (0.025)**	0.304 (0.025)**
No Web										-0.038 (0.009)**
North West	-0.338 (0.026)**	-0.244 (0.022)**	-0.242 (0.022)**	-0.221 (0.021)**	-0.142 (0.023)**	-0.130 (0.023)**	-0.013 (0.035)	-0.011 (0.035)	-0.004 (0.034)	-0.004 (0.034)
Yorkshire and Humberside	-0.350 (0.026)**	-0.261 (0.022)**	-0.250 (0.022)**	-0.232 (0.021)**	-0.145 (0.023)**	-0.121 (0.024)**	-0.015 (0.034)	-0.013 (0.034)	-0.009 (0.034)	-0.009 (0.034)
North East	-0.379 (0.036)**	-0.286 (0.031)**	-0.285 (0.030)**	-0.254 (0.029)**	-0.154 (0.031)**	-0.134 (0.031)**	-0.018 (0.039)	-0.016 (0.039)	-0.002 (0.039)	-0.002 (0.039)

… continued

	1	2	3	4	5	6	7	8	9	10
West Midlands	-0.317 (0.027)**	-0.249 (0.023)**	-0.261 (0.022)**	-0.248 (0.022)**	-0.155 (0.024)**	-0.138 (0.024)**	-0.051 (0.033)	-0.050 (0.033)	-0.046 (0.033)	-0.046 (0.033)
Wales	-0.517 (0.025)**	-0.387 (0.022)**	-0.368 (0.020)**	-0.289 (0.020)**	-0.209 (0.021)**	-0.170 (0.024)**	-0.079 (0.030)**	-0.073 (0.030)*	-0.072 (0.030)*	-0.072 (0.030)*
Scotland	-0.296 (0.024)**	-0.205 (0.021)**	-0.213 (0.020)**	-0.179 (0.020)**	-0.124 (0.023)**	-0.026 (0.062)	-0.084 (0.067)	-0.081 (0.066)	-0.088 (0.065)	-0.087 (0.065)
South West	-0.378 (0.025)**	-0.263 (0.022)**	-0.214 (0.022)**	-0.181 (0.021)**	-0.121 (0.024)**	-0.094 (0.025)**	-0.020 (0.031)	-0.019 (0.031)	-0.015 (0.030)	-0.014 (0.030)
East Midlands	-0.364 (0.028)**	-0.249 (0.024)**	-0.237 (0.023)**	-0.221 (0.022)**	-0.135 (0.024)**	-0.105 (0.025)**	-0.035 (0.031)	-0.034 (0.031)	-0.030 (0.031)	-0.030 (0.030)
East	-0.326 (0.034)**	-0.254 (0.029)**	-0.209 (0.028)**	-0.206 (0.027)**	-0.132 (0.029)**	-0.094 (0.030)**	-0.052 (0.033)	-0.051 (0.033)	-0.045 (0.033)	-0.044 (0.032)
South East	-0.200 (0.023)**	-0.113 (0.019)**	-0.095 (0.019)**	-0.090 (0.019)**	-0.042 (0.022)	-0.023 (0.022)	-0.003 (0.025)	-0.003 (0.025)	-0.003 (0.025)	-0.005 (0.025)
London	Benchmark region									
Manufacturing				0.191 (0.028)**	0.213 (0.028)**	0.226 (0.030)**	0.227 (0.030)**	0.190 (0.030)**	0.042 (0.032)	0.039 (0.032)
Power				0.630 (0.193)**	0.645 (0.192)**	0.598 (0.176)**	0.598 (0.175)**	0.587 (0.174)**	0.433 (0.174)*	0.430 (0.174)*
Construction				0.559 (0.031)**	0.574 (0.031)**	0.589 (0.033)**	0.587 (0.033)**	0.569 (0.033)**	0.447 (0.034)**	0.447 (0.034)**
Wholesale and retail				0.475 (0.028)**	0.485 (0.028)**	0.504 (0.030)**	0.502 (0.030)**	0.474 (0.030)**	0.327 (0.032)**	0.324 (0.032)**
Catering				-0.289 (0.031)**	-0.285 (0.031)**	-0.276 (0.033)**	-0.276 (0.033)**	-0.285 (0.033)**	-0.424 (0.034)**	-0.428 (0.034)**
Transport				0.306 (0.032)**	0.320 (0.032)**	0.326 (0.034)**	0.323 (0.034)**	0.304 (0.034)**	0.166 (0.035)**	0.162 (0.035)**
Real estate				0.466 (0.029)**	0.466 (0.029)**	0.471 (0.030)**	0.467 (0.030)**	0.446 (0.030)**	0.307 (0.032)**	0.307 (0.032)**
Social work				0.100 (0.032)**	0.107 (0.032)**	0.117 (0.033)**	0.117 (0.033)**	0.114 (0.033)**	-0.003 (0.034)	-0.003 (0.034)
Community				0.134 (0.033)**	0.139 (0.033)**	0.160 (0.034)**	0.157 (0.034)**	0.140 (0.035)**	0.062 (0.035)	0.060 (0.035)
Other sectors	Benchmark sector									
Llunit	-0.127 (0.008)**	-0.043 (0.007)**	0.022 (0.006)**	-0.013 (0.006)*	-0.012 (0.006)	-0.016 (0.007)*	-0.013 (0.007)	-0.014 (0.007)*	-0.013 (0.007)	-0.013 (0.007)
Multi-firm Dummy	0.151 (0.026)**	0.051 (0.022)*	-0.021 (0.022)*	-0.025 (0.021)	0.033 (0.023)	0.040 (0.024)	0.104 (0.029)**	0.090 (0.029)**	0.077 (0.028)**	0.076 (0.028)**
F test	13223.16**	16571.01**	13853.85**	9656.74**	8958.41**	7900.44**	6889.31**	6361.23**	6259.09**	6100.81**
R^2	0.811	0.856	0.873	0.882	0.882	0.884	0.884	0.884	0.885	0.885

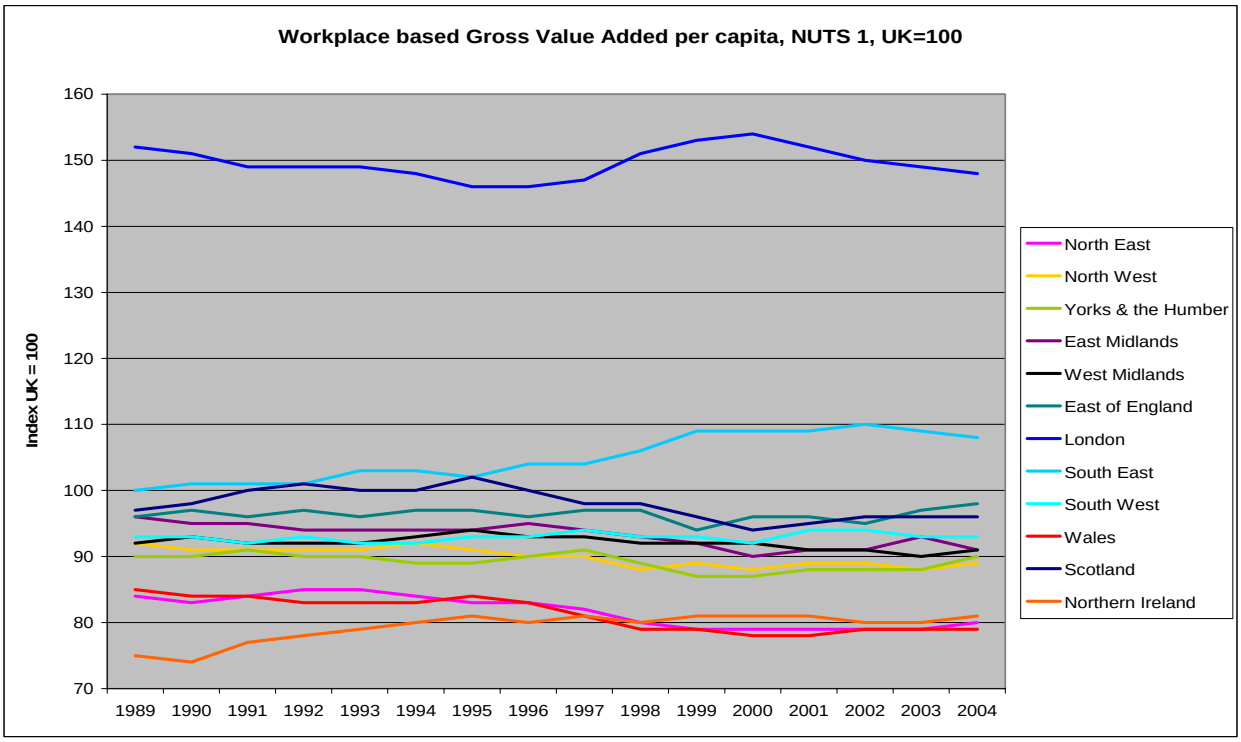
Notes: Equations estimated by OLS, with standard errors corrected for heteroskedasticity using White's methodology. Standard errors are in parentheses and * and ** denote the variable is significant at the 5% and 1% levels respectively. The dependent variable in each regression is the log of labour productivity. All coefficients are expressed in natural logarithms. Constant terms omitted. Source: ONS

Annex 1: analysis of aggregate ONS data

This section of the report updates elements of the analysis presented in the previous study that were based on ONS data aggregated to a regional and sub-regional level. As discussed in the report on that study, this data set suffers from problems of estimation, consistency and interpretation, particularly at a finer, sub-regional scale. It can, however, usefully provide an indication of trends and relationships.

In order to allow comparison with the firm level analysis, GVA is used here as the measure of productivity. ONS typically present productivity in terms of GVA per head of the resident population of an area to give GVA per capita. This represents the value added generated by enterprises in an area per resident of that area. 'Workplace based GVA' allocates the value added of commuters to the area in which they work. Thus it overstates the productivity of centres of employment and in-commuting and understates the productivity of areas from which a significant proportion of the employed population commutes out.

Chart A1

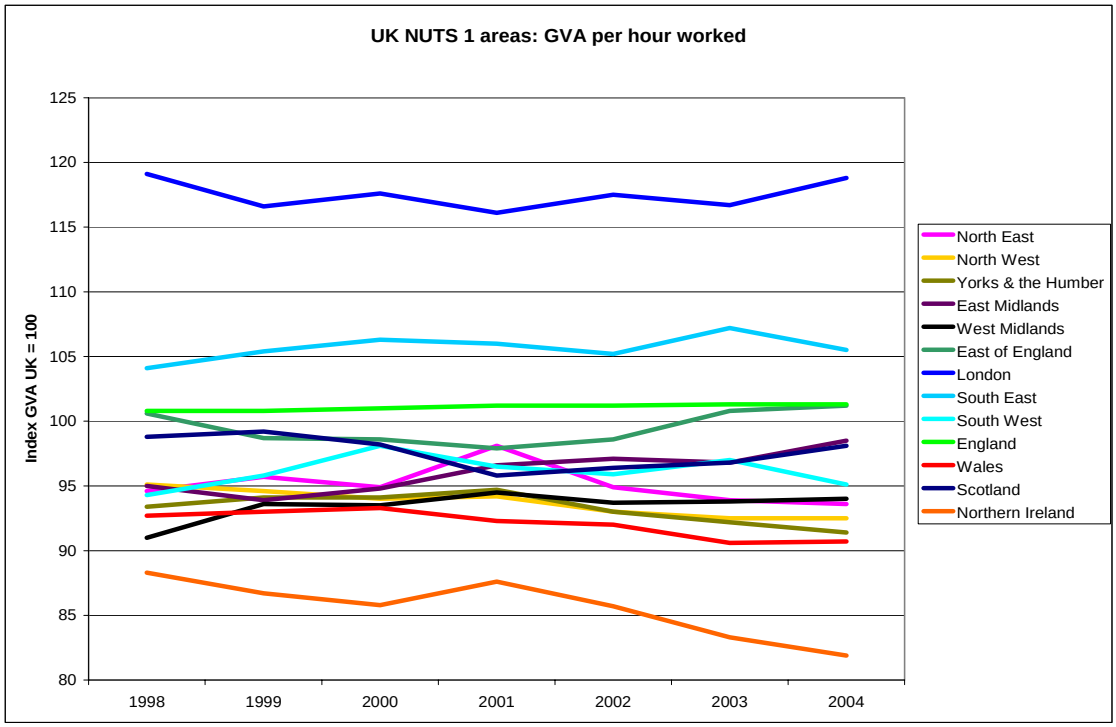


Source : ONS

Chart A1 above compares the GVA per head, workplace based, at current prices across the regions and countries of the UK from 1989 to 2004. Productivity is expressed as an index based on UK = 100, giving a picture of the relative performance of regions and countries over time. On this basis, the South West has moved ahead of the East Midlands and kept up with the improvements in the UK as a whole, maintaining productivity at around 93% of the UK average.

Chart A2 compares all the UK regions and countries on the basis of GVA per hour worked, again indexed on the basis of UK = 100.

Chart A2



Source: ONS

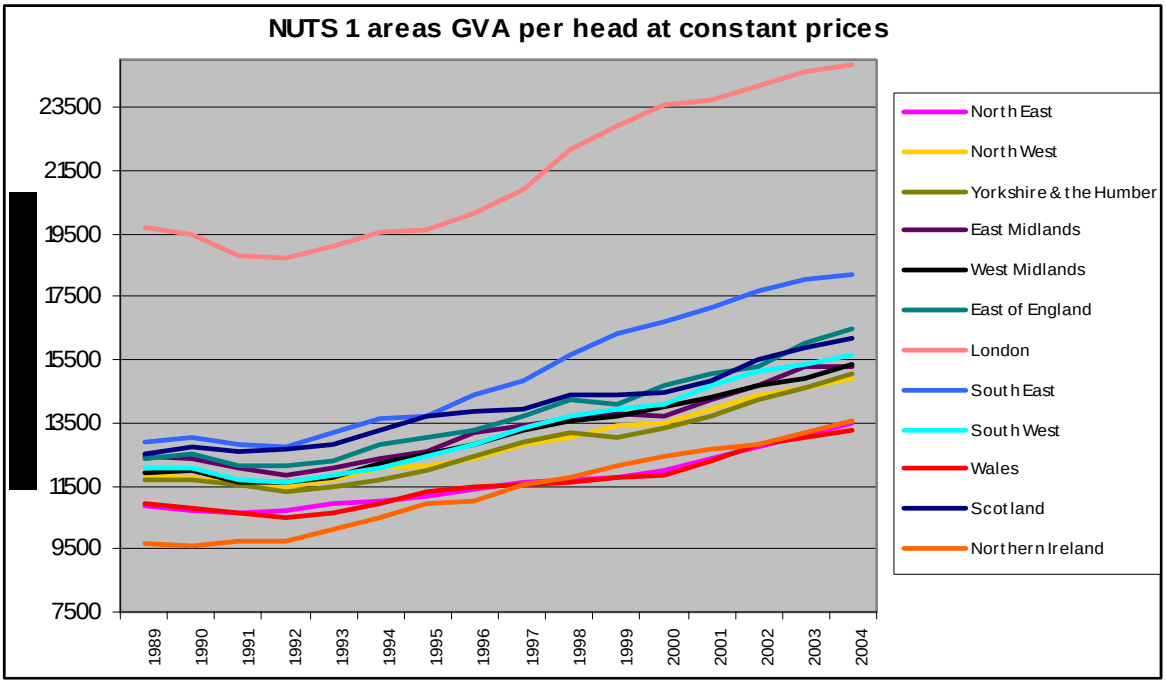
Compared with chart A1, the South West is closer to the UK average and improved by one index point over the period. However, the region was overtaken by the East Midlands from 2001. The similarity between the two measures of productivity suggests that commuting distortions are not significant for the South West compared with other regions.

Chart A3 below expresses productivity in real terms at constant prices - rather than index numbers. This gives a clearer picture of the extent to which the value of output has changed in real terms, providing a possible basis for an increase in the potential wellbeing of those within a given region.

This shows that although the gap between the South West and the leading regions has not narrowed significantly in recent years, the value of output per head has nevertheless expanded considerably in real terms. Gross value added per resident is expressed at 2004 prices, eliminating the distortions of inflation. On this basis, the buying power of aggregate earnings and profits available to distribute has increased, nationally, by over 25% during the 15 year period.

This also shows that the South West has shared in this overall increase in the value of output per head over this period of time. London and the South East have pulled ahead to some extent from the mid-1990s but output growth in the South West generally kept pace with the other regions of the UK.

Chart A3

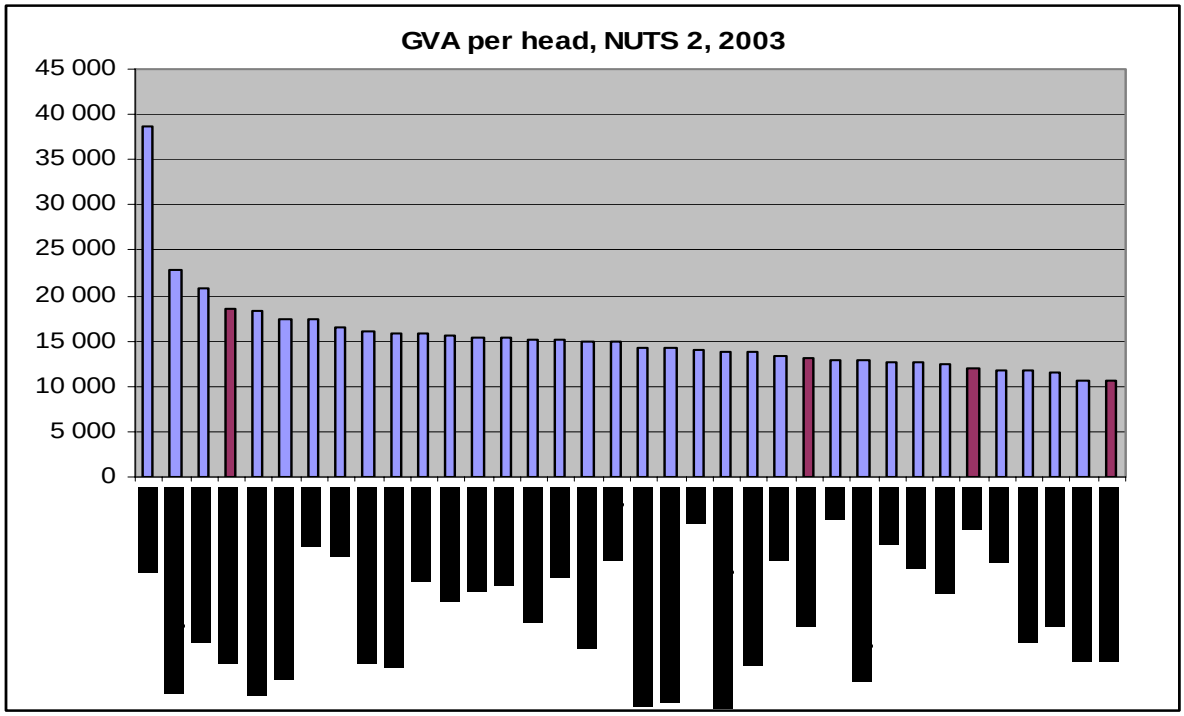


Source: ONS

Table A1 at the end of this section places the South West in the context of EU 15 nations, regions and sub regions down to the NUTS 2 level, where data is available. GDP per head is used for this comparison as fuller data is available than for productivity. This gives a fair approximation to GVA per head at national level and regional level, although there will be more significant differences between the two measures at sub regional level. The region is ranked 66 out of 191.

Chart A4 shows productivity in 2003 in the sub regional NUTS 2 areas of the UK. This shows the relative position of the region and its major sub-regions in a national context. It also indicates the significant differences that exist at a sub-regional scale.

Chart A4

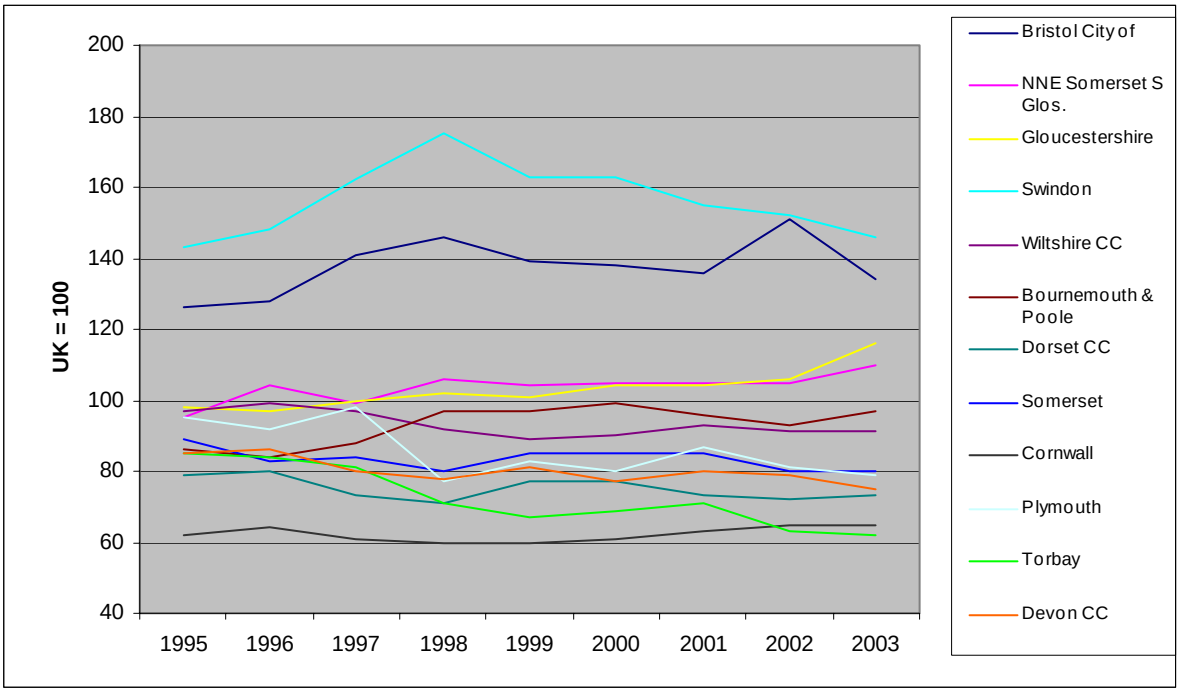


Source: ONS

Cornwall, and West Wales and the Valleys have the lowest workplace productivity of any NUTS 2 area in the UK. On the other hand, Gloucestershire/Wiltshire/North Somerset has the fourth highest productivity.

Chart A5 shows these sub-regional differences in more detail at NUTS 3 level.

Chart A5



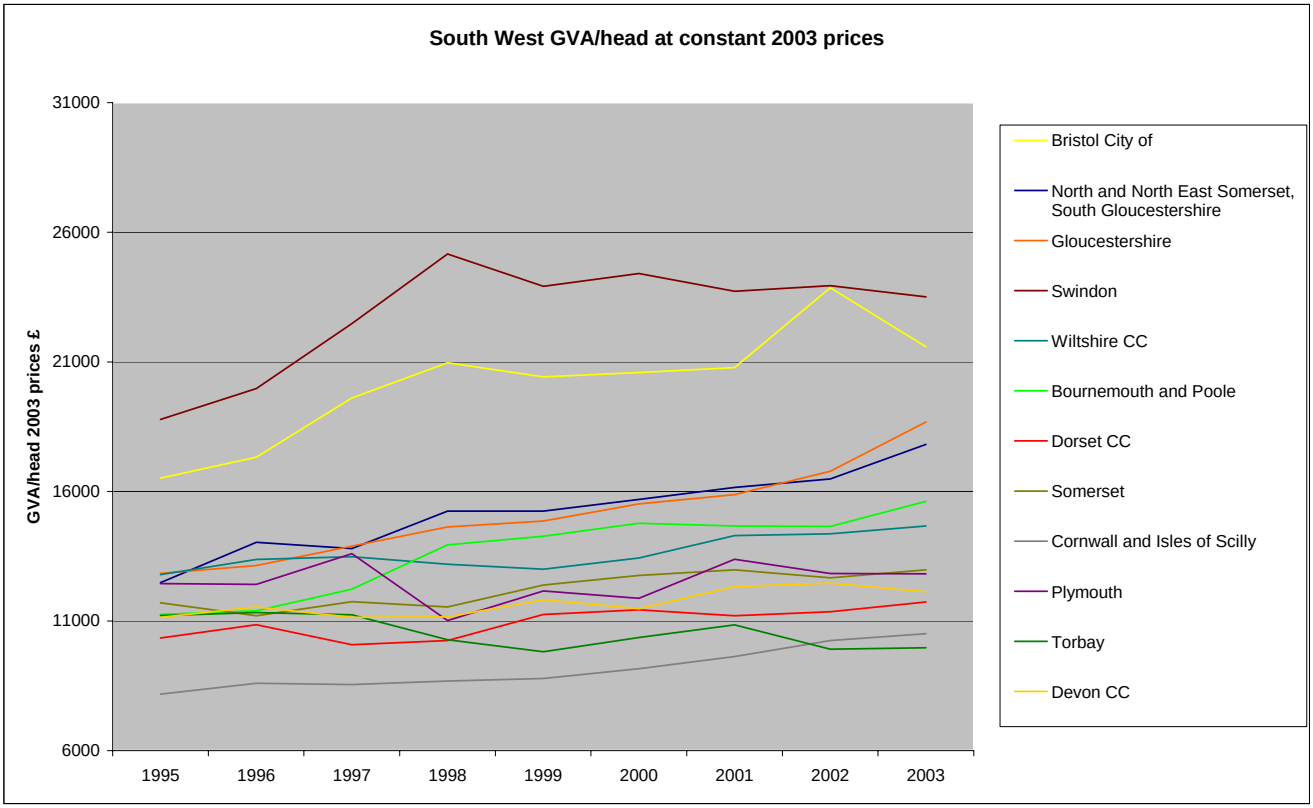
Source: ONS

Sub-regions which grew relative to the UK as a whole over the period 1996-2003 include Bristol, North and NE Somerset and S Gloucestershire, Gloucestershire and Bournemouth and Poole. Sub-regions which declined relative to the UK over this period include Dorset, Somerset, Wiltshire, Plymouth and Torbay.

Swindon had the highest level of productivity throughout the period but has seen a continuous decline since the highpoint of 1998. Torbay has seen productivity decline throughout most of the period and now has the lowest level among all the sub-regions of the South West. Productivity in the City of Bristol apparently rose sharply in 2002 and fell back in 2003 – suggesting that there is a problem with the underlying data.

Chart A6 shows output per head at constant prices. As with the earlier regional figures, this gives a clearer picture of the extent to which the value of output has changed in real terms, providing a possible basis for an increase in the potential wellbeing of those within a given sub-region. The caveat again here is that output per head will be exaggerated in areas on in-commuting and vice versa. The figures show that most sub-regions have experienced an increase in output per head in real terms over recent years. The exceptions are Swindon (still the leading sub-region in 2003) and Torbay (the lowest sub-region) where productivity apparently declined in real terms

Chart A6



Source: ONS

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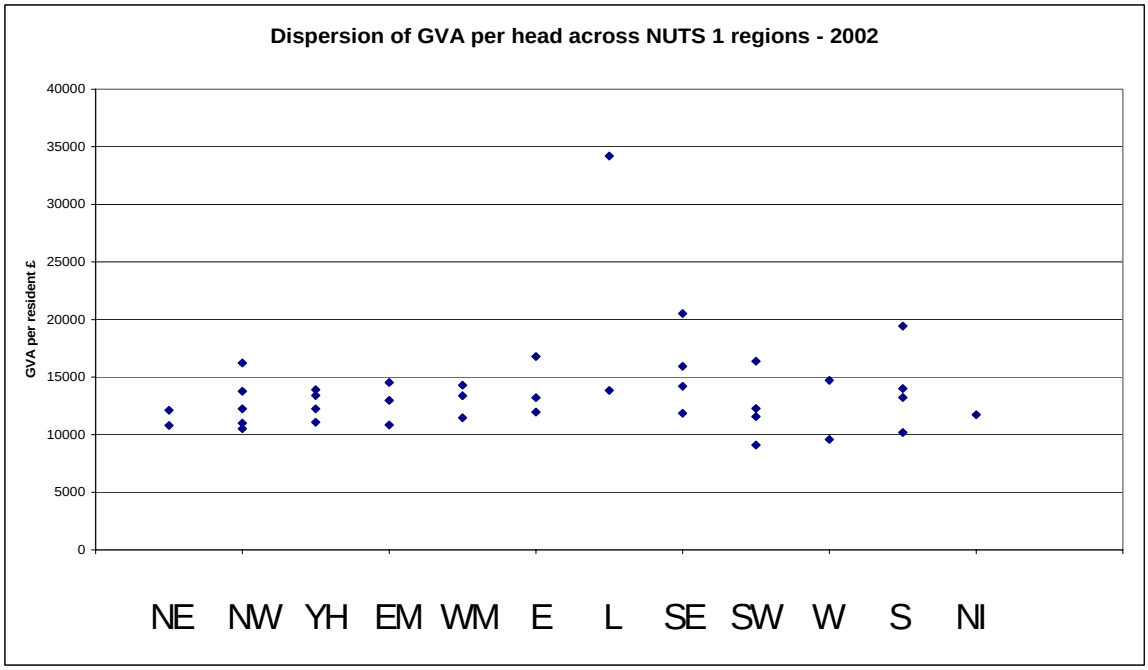
Chart A7 below shows that the disparity of NUTS 2 sub regions in terms of productivity is relatively marked in the South West. The points represent the productivity values of each of the sub regions in each of the regions of the UK. It is clear that the region has the third highest degree of disparity in productivity, at least at the NUTS 2 sub regional level.

Chart A7



Source: ONS

The disparity in productivity becomes much more pronounced at the NUTS3 level. The areas of South West are shown in Table A.1 below.

Table A1 South West region NUTS 3 areas percentrank by GVA per head

Percentrank	1995	1996	1997	1998	1999	2000	2001	2002	2003
Swindon	0.98	0.99	0.99	0.99	0.99	0.98	0.97	0.97	0.96
Bristol, City of	0.94	0.94	0.95	0.96	0.95	0.95	0.94	0.96	0.92
Gloucestershire	0.65	0.65	0.65	0.68	0.72	0.74	0.73	0.77	0.84
Wiltshire CC	0.65	0.65	0.68	0.65	0.62	0.64	0.65	0.65	0.63
N&NE Somerset S Gloucestershire	0.59	0.78	0.67	0.72	0.75	0.75	0.76	0.74	0.79
Plymouth	0.51	0.50	0.63	0.36	0.41	0.41	0.56	0.43	0.44
Somerset	0.42	0.34	0.43	0.40	0.43	0.47	0.55	0.46	0.42
Torbay	0.34	0.30	0.35	0.27	0.11	0.21	0.22	0.06	0.06
Devon CC	0.33	0.35	0.33	0.37	0.39	0.37	0.37	0.40	0.34
Bournemouth and Poole	0.32	0.39	0.50	0.68	0.67	0.68	0.68	0.68	0.68
Dorset CC	0.19	0.28	0.19	0.22	0.29	0.31	0.30	0.26	0.26
Cornwall and Isles of Scilly	0.01	0.02	0.03	0.02	0.03	0.04	0.05	0.07	0.08

Source: ONS

In order to compare the region's areas with the 120 other UK NUTS 3 areas, Table A.1 shows the percent rank. This expresses the ranking as a decimal fraction such that 1.00 is at the top of the

productivity league and 0.00 is at the bottom. For example, the value of 0.42 in 2003 shows that Somerset is in the bottom 42% of UK NUTS 3 areas. It can be seen that two areas of the South West, Cornwall and Torbay, are in the bottom 10% of UK areas but that two, Swindon and Bristol, make it into the top 10%. Gloucestershire, N&NE Somerset/S Gloucestershire and, in particular, Bournemouth/Poole have climbed up the rank order in impressive fashion. Dorset has made some progress. Plymouth has slipped down the league while Torbay has fallen into the bottom 10 NUTS 3 areas of the UK. Table A2 at the end of this section gives the full listing of all 133 UK NUTS 3 areas and their productivity.

Table A2 UK NUTS 3 areas ranked by workplace based GVA per head 2003

	NUTS 3 area	GVA	%rnk			NUTS 3 area	GVA	%rnk
1	Inner London - West	66704	1.00		67	Thurrock	13426	0.50
2	Berkshire	25950	0.98		68	Inverness/Nairn/Moray/Badenoch/Strathspey	13419	0.49
3	Edinburgh, City of	25592	0.96		69	Kent CC	13417	0.48
4	Milton Keynes	23798	0.95		70	Falkirk	13381	0.47
5	Belfast	23649	0.93		71	South Ayrshire	13375	0.46
6	Swindon	23348	0.92		72	Sunderland	13371	0.46
7	Inner London - East	22607	0.90		73	Perth & Kinross and Stirling	13340	0.45
8	Glasgow City	22574	0.89		74	Plymouth	13286	0.44
9	Surrey	21673	0.87		75	Bradford	13230	0.43
10	Nottingham	21542	0.86		76	South and West Derbyshire	12975	0.43
11	Bristol, City of	21502	0.84		77	Somerset	12924	0.42
12	Aberdeen City, Aberdeenshire & NE Moray	21151	0.83		78	East Cumbria	12790	0.41
13	Oxfordshire	20812	0.81		79	Southend-on-Sea	12759	0.40
14	Hertfordshire	20506	0.80		80	Powys	12755	0.40
15	Solihull	20153	0.78		81	Blackburn with Darwen	12704	0.39
16	Leeds	19195	0.76		82	Norfolk	12696	0.38
17	Derby	19132	0.75		83	South Lanarkshire	12653	0.37
18	Buckinghamshire CC	18977	0.73		84	Herefordshire County of	12617	0.37
19	Cardiff and Vale of Glamorgan	18957	0.72		85	North Lanarkshire	12599	0.36
20	Halton and Warrington	18801	0.70		86	Lincolnshire	12489	0.35
21	Outer London -West and North West	18781	0.69		87	Devon CC	12449	0.34
22	Gloucestershire	18585	0.67		88	Staffordshire CC	12372	0.34
23	Peterborough	18409	0.66		89	Orkney Islands	12370	0.33
24	Greater Manchester South	18402	0.64		90	North Nottinghamshire	12366	0.32
25	Portsmouth	17935	0.63		91	Shetland Islands	12346	0.31
26	Southampton	17934	0.61		92	Shropshire CC	12319	0.31
27	York	17755	0.60		93	Gwynedd	12318	0.30
28	North & NE Somerset, S Gloucestershire	17720	0.58		94	Hartlepool and Stockton-on-Tees	12194	0.29
29	Cambridgeshire CC	17710	0.56		95	East Derbyshire	12164	0.28
30	Leicester	17691	0.55		96	East of Northern Ireland	12051	0.28
31	Cheshire CC	17133	0.53		97	East Riding of Yorkshire	11716	0.27
32	Birmingham	17102	0.52		98	Dorset CC	11666	0.26
33	Luton	16999	0.50		99	South Nottinghamshire	11638	0.25
34	West Sussex	16824	0.49		100	Dumfries and Galloway	11637	0.25
35	Coventry	16787	0.47		101	West Cumbria	11593	0.24
36	Northamptonshire	16780	0.46		102	Greater Manchester North	11379	0.23
37	Brighton and Hove	15914	0.44		103	South Teesside	11370	0.22
38	Hampshire CC	15783	0.43		104	Northumberland	11249	0.21
39	Monmouthshire and Newport	15770	0.41		105	Barnsley, Doncaster and Rotherham	11200	0.21
40	Warwickshire	15769	0.40		106	Blackpool	11153	0.20
41	Darlington	15529	0.38		107	Outer London - East and North East	11107	0.19
42	Bournemouth and Poole	15507	0.36		108	East Ayrshire and North Ayrshire Mainland	11103	0.18
43	West Lothian	14952	0.35		109	Clackmannanshire and Fife	11081	0.18
44	Liverpool	14921	0.33		110	Isle of Wight	11045	0.17
45	Tyneside	14882	0.32		111	Scottish Borders	10965	0.16
46	Kingston upon Hull, City of	14877	0.30		112	East Sussex CC	10896	0.15
47	Flintshire and Wrexham	14778	0.29		113	Eilean Siar (Western Isles)	10887	0.15
48	Telford and Wrekin	14607	0.27		114	East Merseyside	10858	0.14
49	Wiltshire CC	14591	0.26		115	Bridgend and Neath Port Talbot	10857	0.13
50	North and North East Lincolnshire	14516	0.24		116	Durham CC	10703	0.12
51	Outer London - South	14489	0.23		117	Sefton	10671	0.12
52	Angus and Dundee City	14413	0.21		118	East Lothian and Midlothian	10605	0.11
53	Leicestershire CC and Rutland	14400	0.20		119	North of Northern Ireland	10599	0.10
54	North Yorkshire CC	14368	0.18		120	Medway	10592	0.09
55	Bedfordshire CC	14338	0.16		121	Outer Belfast	10545	0.09
56	Sheffield	14194	0.15		122	Cornwall and Isles of Scilly	10364	0.08
57	Swansea	13926	0.13		123	Lochaber/Skye/Lochalsh/Argyll/Islands	10327	0.07
58	Suffolk	13893	0.12		124	Torbay	10206	0.06
59	Worcestershire	13762	0.10		125	Central Valleys	10136	0.06
60	Essex CC	13760	0.09		126	West and South of Northern Ireland	10053	0.05
61	Lancashire CC	13750	0.07		127	Conwy and Denbighshire	9987	0.04
62	Inverclyde, E Renfrewshire, Renfrewshire	13720	0.06		128	EW Dunbartonshire & Helensburgh & Lomond	9947	0.03
63	Walsall and Wolverhampton	13580	0.04		129	Caithness & Sutherland and Ross & Cromarty	9796	0.03
64	Calderdale, Kirklees and Wakefield	13512	0.03		130	South West Wales	9717	0.02
65	Stoke-on-Trent	13433	0.01		131	Wirral	9600	0.01
66	Dudley and Sandwell	13426	0.00		132	Gwent Valleys	9499	0.00
					133	Isle of Anglesey	9005	0.00

Acknowledgements

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[1] The full report on this earlier work is available at http://www.southwestrda.org.uk/downloads/document.asp?lang=&documentid=714&

[2] Recent developments in the data-base implemented by the ONS will allow for year on year analysis in the future.

[3] A 'gravity model' based index derived from the size of each local authority (population total) and the inverse of the distance from each place to every other place in Britain.

[4] We can distinguish from the data, US-owned multi-national businesses, other foreign-owned businesses, businesses with a UK parent (some but not all of which will be multinational businesses) and single-site UK businesses. We cannot from this data set identify branches of UK owned multi-nationals as such.

[5] GVA at factor cost per worker employed at the business level.

[6] Results presented here are for 2003, using the ONS business-level database. The study as a whole explored a range of different variables and applied a range of different statistical models to the data.

[7] The index of economic potential did not prove to be statistically significant and did not therefore add anything to the analysis over and above the effects captured by the cruder measure of time-distance.

[8] Statistically speaking the probability that the remaining gap of 2.6% could have occurred by chance is relatively high.

[9] See note 4 above.

[10] An additional variable (MFD) was included from the start of the more detailed analysis to take account of any differences between single and multi-plant businesses. This is reflected in slight difference in the initial headline gap in GVA per employee.

[11] The effect of progressively adding in additional factors gives only an approximate idea of their impact rather than a statistically accurate picture. Adding in later factors will impact on the apparent effect of those included earlier. The coefficients in the final model – column 6 of table 2 – give the statistically valid picture. It is for this reason that several variables are added in as a group in the final step of the presentation of results.