

Name

Institution

Date



Part One

Descriptive statistics

December 2000		December 2009	
Mean	10528.89	Mean	14569.52
Standard Error	148.67	Standard Error	208.87
Median	10133.00	Median	14148.00
Mode	9447.00	Mode	15010.00
Standard Deviation	1714.56	Standard Deviation	2408.85
Range	14109.00	Range	21467.00
Minimum	7842.00	Minimum	10602.00
Maximum	21951.00	Maximum	32069.00
Sum	1400342.00	Sum	1937746.00
Count	133.00	Count	133.00

The best measure of location of GDHIP is the median. This is because it lies in the middle of the other two measures in the year 2000 and year 2009 hence it has got high chance of being equal to the true value.

The mean of UK disposable household income per head (GDHIP) in the year 2009 was 14569.52. This was an increase from year 2000 where the income per head was 10528.89. The mode which is the most occurring GDHIP is 9447 in the year 2000 and 15010.00 in the year 2009. This is an indicator of an increased GDHIP. The year 2009 GDHIP median of 14148.00 is greater than the year 2000's GDHIP of 10133.00 which is as well an indicator of an increase. These three measures of location show an increase in GDHIP in the UK from year 2000 to 2009. This is further evidenced by the sum of total income of the sampled group of 133 persons which is 1400342 in the year 2000 while in 2009 it calculates to 1937746.

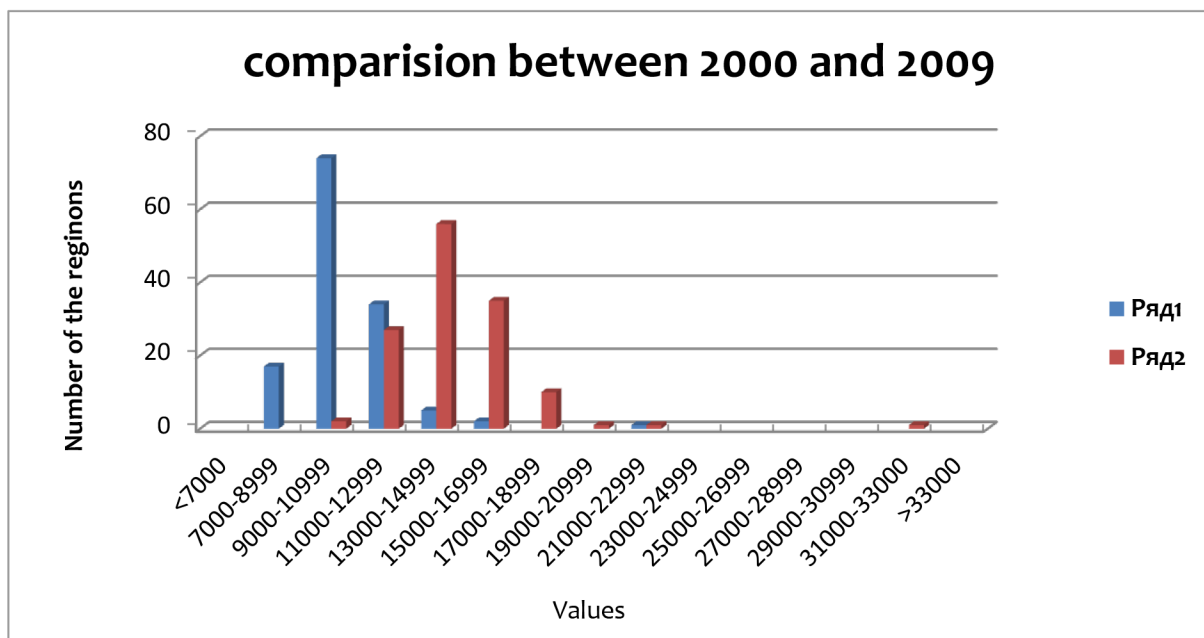
Standard error of mean in the year 2009 (208.87) is greater than it was 9 years ago in the year 2000 (148.67). This is an indicator that the spread of income among individuals is greater in 2009 than in year 2000. This same pattern is depicted by standard deviation measure with the year 2000 calculating to 1746.56 while the year 2009 calculates to 2408.85. The range of GDHIP in the year 2009 (14109) is greater than the range of the year 2000 (21467). The mini-

minimum and the maximum GDHIP in UK for the year 2000 are 7842 and 21951. These are less than their counterparts in the year 2009 which calculates to 10602 as minimum value and 32069 as the maximum value.

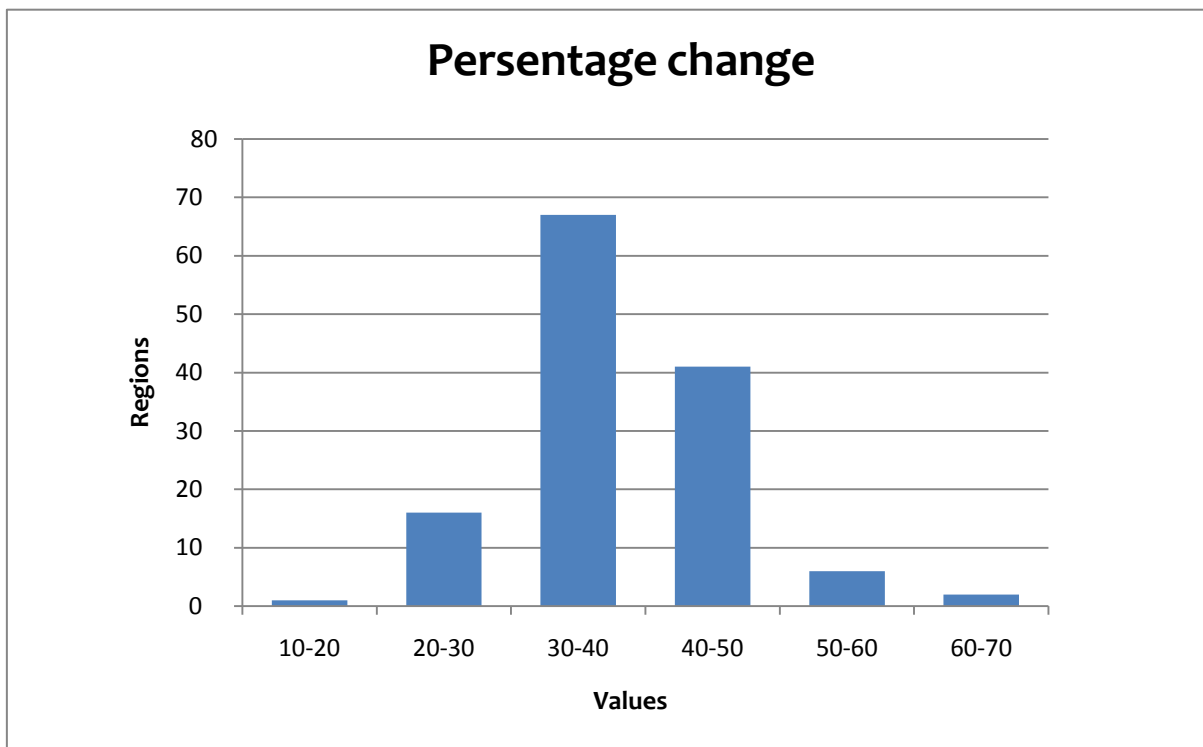
Generally the GDHIP in UK has become more varied in the year 2009 than in the year 2000 as indicated by these measures of spread.

The spread of GDHIP in UK is not uniform. Some of the regions' score is lower than the mean scores in both years 2000 and 2009. A good example is South Teesside, Sunderland, Liverpool among others. Sunderland GDHIP of 8 773 and 12 196 for the years' 2000 and 2009 is less than the mean score of 10528.89 and 14569.52 for the same years' respectively. However, some regions like East Cumbria scores' higher GDHIP than the average score of all the regions in both years i.e the scores are 10 995 and 15 301 in years' 200 and 2009 respectively which are greater than the mean scores of 10528.89 and 14569.52 respectively.

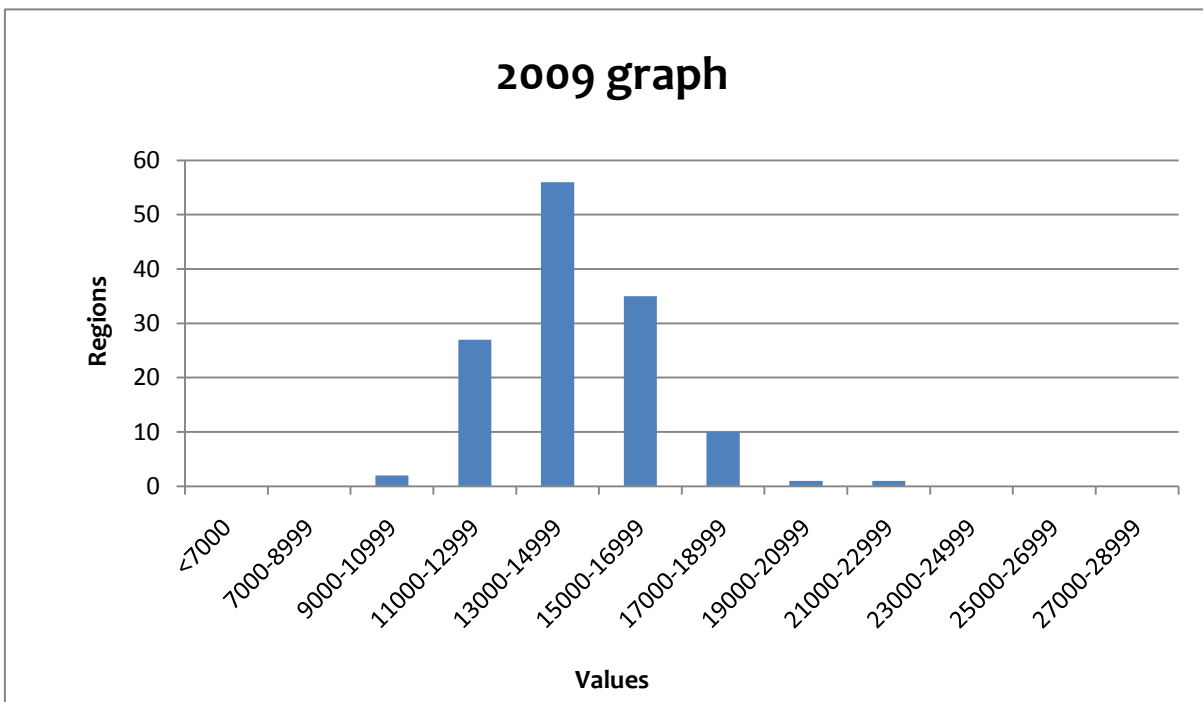
The three most common percentage change lie between 50% and 70 % these shows high rate of change of GDHI in these three percentages. The least common percentage change lie in the category between 10% and 20 %. This is a low value and indicates that GDHIP these regions have changed very little.



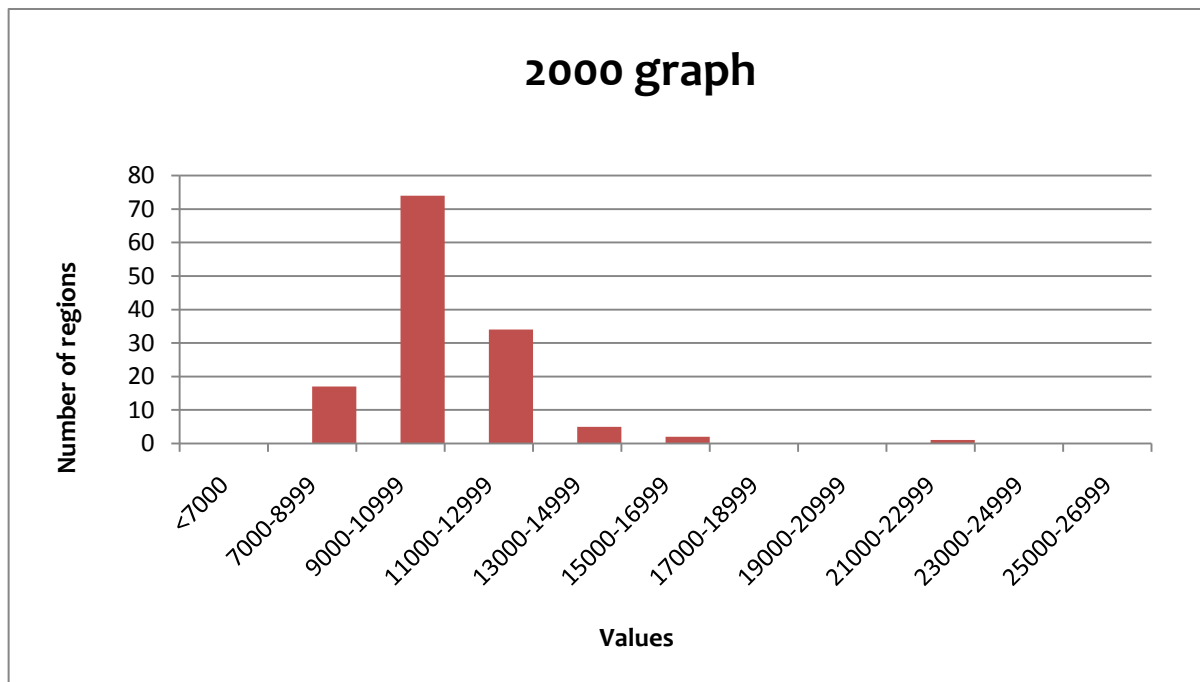
Generally the GDHIP is much lower for the year 2000 than in 2009. It can be noted the high frequency of regions have a high frequency in 9000-10999 category while GDHIP of 2009 is high in 13000-14999 category.



Most of the regions have a percentage change of 30%-40%.



In the year 2009 most of the regions had a GDHIP value category of 13000-14999.



In the year 2000 most of the regions had a GDHIP value category of 9000-10999.

Skewness

The graph of number of regions against income in year 2000 is positively skewed. Hence the earnings are not symmetrical to the number of regions.

The same case is replicated in the graph of income against values in the year 2009 which is also positively skewed. Hence the earnings are not symmetrical to the number of regions.

Part 2

Data on Visits and Expenditure by UK residents abroad' from 2005Q1 to 2011Q4 was used. It was formatted (appendix 1), and a scatter drawn (appendix 2). The correlation coefficient was calculated and an equation of regression generated. The coefficient of determination was retrieved from the equation. The following was then obtained from the appendices.

The source of the data and the reasons why the variables might be related.

This data was obtained from the Office of National Statistics (ONS) and was downloaded from their website <http://www.ons.gov.uk>. The variables in this data are related. The total amount of expenditure that UK residents use depends on how many people made the visits and how many times those who made these visits make them. In this case, the amount of expenditure will depend on the number of visits made. If no visits are made, there will be no expenditure.

An interpretation of the value of the correlation coefficient in the context of the data.

The correlation coefficient, denoted as r , shows how closely related or not related variables are. When r is a negative number, the variables are negatively related and an increase in one leads to a decrease in the other. Positive r value shows that an increase of one variable leads to the increase of the other. In our data, y-axis represents the number of visits while x-axis represents the amount of expenditure. The r -value is 0.8340807. This shows that the two variables are highly correlated and an increase in visits leads to an increase in expenditure.

State the equation of the regression line in the context of the meaning of the data (write the equation of the regression line)

The equation is $y=2.444x-4476$. It means that any value of y , which is the expenditure, is two times the number of visits, represented by x , less 4476 million pounds

An interpretation of the intercept and the gradient

The gradient of a graph shows the strength of the trend between the two variables being investigated. A steep gradient shows a strong trend while a slightly slant gradient shows a weak trend. A negative gradient represents a decreasing trend. In our data, the equation $y=2.444x-4476$ shows that the gradient is 2.444 which is positive. It shows that the number of visits at any given point is 2.444 times the expenditure, less 4476, which is the intercept. We can therefore, from this, be able to estimate the number of visits that we need in order to obtain a certain target in expenditure and vice versa. The negative intercept means that if there is no expenditure, the number of visits is negative, which could mean that there are foreign visitors coming into the UK.

An interpretation of the value of the coefficient of determination (R^2)

R^2 is used to test the goodness of fit of the model. The higher the value, the better the model and the more reliable it can be used to predict the future. An R^2 value of 1 shows a perfect model while a value of zero shows that the data cannot be adequately used to forecast the outcome. Experts advise that an R^2 value of 0.39 or less should not be used in statistical analysis since it is unreliable. In our data, R^2 value is 0.6956906 which gives the data and graph credibility. It can be used for future forecasts or planning purposes in the tourism department in the UK.

Show how your regression equation can be used to make predictions. Comment on the accuracy of these predictions. (Use the regression equation and predict two values then comment how accurate the values are).

The regression equation can be used to make predictions. This is because R^2 is high enough to be reliable at 0.6956906. To predict the future, the government can use equation by putting a ceiling on the amount that they wish to spend in foreign visits. This will help determine the number of visits needed to obtain that figure. For instance, if the government wishes to have a total expenditure of 10000 million, the equation will be applied as

$$y = 2.444x - 4476$$

$$y \text{ therefore} = 19964000 \text{ visits}$$

If there are 15 million expected foreign visits, $y = 15000$ and x can be calculated as

$$15000 = 2.444x - 4476$$

$$X = (15000 + 4476) / 2.444$$

$$X = 7968.9 \text{ million pounds}$$

$$y = 2.4443x - 4476.9$$

UK visits abroad: expenditure £million = $2.4443 \times \text{UK visits abroad: all visits} - 4476.9$

$$\begin{array}{l} \text{UK visits abroad: expenditure £million} = \\ \text{interpolation } 2.4443 \times 16957 - 4476.9 = 36971.1 \end{array}$$

$$\begin{array}{l} \text{UK visits abroad: expenditure £million} = \\ \text{interpolation } 2.4443 \times 12000 - 4476.9 = 24854.7 \end{array}$$

Part 3

The source of your data and describe exactly what is being measured.

Data was obtained from the UK Household Final Consumption Expenditure on Transport Services from 2004Q1 to 2011Q3 and accessed from <http://www.ons.gov.uk>. The data was formatted (appendix) a trendline drawn and an equation from the line generated (appendix)

A description of any regular seasonality found in the data set

There has been a trend that is experienced in every year in the department. At the start of the first quarter, transport is at its lowest and rises with time. In all the years, peak starts at the end of the second quarter, which is the start of the third quarter while the lowest is always at the start of the year, the fourth quarter. The year always starts with a lowest and ends at the lowest.

The data set of household final consumption expenditures depicts various

Trends in various quarters. Quarter one always depicts a positive trend showing that the household final consumption expenditure on transport is rising with time. The same pattern is being repeated in the second quarter where it reaches the peak. At quarter three the trend goes down to a negative value indicating reducing household final consumption expenditure on transport is rising with time. This negative trend continues to quarter four to a trough.

The equation of the trend line in the context of the data and interpret the value of the average quarterly increase

The equation is $Y=63.72x+6539$. The average quarterly trend is positive thus the positive gradient of the trendline, 63.72. This indicates the overall trend rises every year. This gradient shows that there is a progressive increase in the amount of money households spend on transport with respect to time. The spending has progressively risen from 2004 to 2011 by an average of 63.72.

Appendices

UK Gross Disposable Household Income per head (£) in December 2000 and 2009

	UK Regions	2000	2009	%
1	Hartlepool and Stockton-on-Tees	9 229	13 213	43.17
2	South Teesside	8 890	12 316	38.54
3	Darlington	9 498	13 647	43.68
4	Durham CC	9 579	12 875	34.41
5	Northumberland	10 493	15 216	45.01
6	Tyneside	9 373	12 676	35.24
7	Sunderland	8 773	12 196	39.02
8	West Cumbria	9 631	13 786	43.14
9	East Cumbria	10 995	15 301	39.16
10	Halton and Warrington	10 594	14 728	39.02
11	Cheshire CC	11 731	16 622	41.69
12	Greater Manchester South	10 202	13 357	30.93
13	Greater Manchester North	9 936	13 210	32.95
14	Blackburn with Darwen	8 425	11 234	33.34
15	Blackpool	9 652	12 199	26.39
16	Lancashire CC	9 944	13 697	37.74
17	East Merseyside	8 777	12 562	43.12
18	Liverpool	8 956	12 456	39.08
19	Sefton	11 184	14 517	29.80
20	Wirral	10 774	15 018	39.39
21	Kingston upon Hull, City of	8 458	10 783	27.49
22	East Riding of Yorkshire	11 008	14 759	34.08
23	North and North East Lincolnshire	9 547	13 186	38.12
24	York	11 250	14 044	24.84
25	North Yorkshire CC	11 658	16 228	39.20
26	Barnsley, Doncaster and Rotherham	9 439	12 797	35.58
27	Sheffield	9 892	12 591	27.28
28	Bradford	9 649	12 104	25.44
29	Leeds	10 635	13 179	23.92

	UK Regions	2000	2009	%
30	Calderdale, Kirklees and Wakefield	9 823	13 259	34.98
31	Derby	9 442	12 399	31.32
32	East Derbyshire	9 380	13 172	40.43
33	South and West Derbyshire	9 966	14 735	47.85
34	Nottingham	8 898	10 602	19.15
35	North Nottinghamshire	9 706	13 765	41.82
36	South Nottinghamshire	11 291	15 845	40.33
37	Leicester	8 653	11 163	29.01
38	Leicestershire CC and Rutland	11 123	15 010	34.95
39	Northamptonshire	10 923	15 247	39.59
40	Lincolnshire	10 179	14 148	38.99
41	Herefordshire, County of	10 133	14 894	46.99
42	Worcestershire	11 145	15 547	39.50
43	Warwickshire	11 891	16 218	36.39
44	Telford and Wrekin	9 793	13 151	34.29
45	Shropshire CC	10 694	15 584	45.73
46	Stoke-on-Trent	8 660	12 097	39.69
47	Staffordshire CC	10 684	14 640	37.03
48	Birmingham	9 291	12 010	29.26
49	Solihull	12 463	16 804	34.83
50	Coventry	9 447	12 260	29.78
51	Dudley and Sandwell	9 287	12 106	30.35
52	Walsall and Wolverhampton	9 323	12 041	29.15
53	Peterborough	11 133	14 235	27.86
54	Cambridgeshire CC	12 254	16 491	34.58
55	Norfolk	10 304	13 779	33.72
56	Suffolk	10 649	14 913	40.04
57	Luton	9 362	12 332	31.72
58	Bedfordshire CC	12 193	15 908	30.47
59	Hertfordshire	14 066	18 704	32.97
60	Southend-on-Sea	11 543	15 446	33.81
61	Thurrock	10 131	14 093	39.11

	UK Regions	2000	2009	%
62	Essex CC	12 478	16 359	31.10
63	Inner London - West	21 951	32 069	46.09
64	Inner London - East	11 713	17 684	50.98
65	Outer London - East and North East	11 603	15 854	36.64
66	Outer London - South	13 382	18 079	35.10
67	Outer London - West and North West	13 564	18 639	37.42
68	Berkshire	13 574	17 881	31.73
69	Milton Keynes	11 440	15 591	36.28
70	Buckinghamshire CC	15 079	20 471	35.76
71	Oxfordshire	13 264	17 493	31.88
72	Brighton and Hove	11 875	16 320	37.43
73	East Sussex CC	11 694	16 358	39.88
74	Surrey	16 057	21 419	33.39
75	West Sussex	12 828	17 012	32.62
76	Portsmouth	9 656	11 693	21.10
77	Southampton	9 447	12 231	29.47
78	Hampshire CC	12 633	17 234	36.42
79	Isle of Wight	9 691	13 463	38.92
80	Medway	10 697	14 691	37.34
81	Kent CC	11 735	15 995	36.30
82	Bristol, City of	10 630	13 582	27.77
83	Bath and North East Somerset, North Somerset and South Gloucestershire	12 072	15 527	28.62
84	Gloucestershire	11 722	16 084	37.21
85	Swindon	11 585	15 351	32.51
86	Wiltshire CC	11 921	16 400	37.57
87	Bournemouth and Poole	11 392	16 239	42.55
88	Dorset CC	11 436	16 397	43.38
89	Somerset	11 015	15 272	38.65
90	Cornwall and Isles of Scilly	9 710	13 767	41.78
91	Plymouth	9 645	12 769	32.39
92	Torbay	9 765	13 457	37.81

	UK Regions	2000	2009	%
93	Devon CC	10 716	15 010	40.07
94	Isle of Anglesey	9 592	13 751	43.36
95	Gwynedd	8 801	12 900	46.57
96	Conwy and Denbighshire	10 222	14 089	37.83
97	South West Wales	8 896	13 178	48.13
98	Central Valleys	8 543	12 510	46.44
99	Gwent Valleys	9 354	12 495	33.58
100	Bridgend and Neath Port Talbot	9 962	13 500	35.51
101	Swansea	9 787	13 447	37.40
102	Monmouthshire and Newport	10 308	14 887	44.42
103	Cardiff and Vale of Glamorgan	10 070	14 065	39.67
104	Flintshire and Wrexham	10 008	13 657	36.46
105	Powys	9 188	13 623	48.27
106	Angus and Dundee City	10 170	14 316	40.77
107	Clackmannanshire and Fife	9 792	13 810	41.03
108	East Lothian and Midlothian	10 464	16 126	54.11
109	Scottish Borders	10 052	15 047	49.69
110	Edinburgh, City of	12 566	17 160	36.56
111	Falkirk	9 551	13 993	46.51
112	Perth & Kinross and Stirling	11 385	16 376	43.84
113	West Lothian	9 566	14 149	47.91
114	East Dunbartonshire, West Dunbartonshire and Helensburgh & Lomond	10 808	15 368	42.19
115	Dumfries & Galloway	9 612	13 888	44.49
116	East Ayrshire and North Ayrshire mainland	9 084	13 627	50.01
117	Glasgow City	9 761	13 571	39.03
118	Inverclyde, East Renfrewshire and Renfrewshire	11 183	15 479	38.42
119	North Lanarkshire	9 587	13 543	41.26
120	South Ayrshire	10 158	15 102	48.67
121	South Lanarkshire	10 502	14 816	41.08
122	Aberdeen City and Aberdeenshire	11 376	17 039	49.78

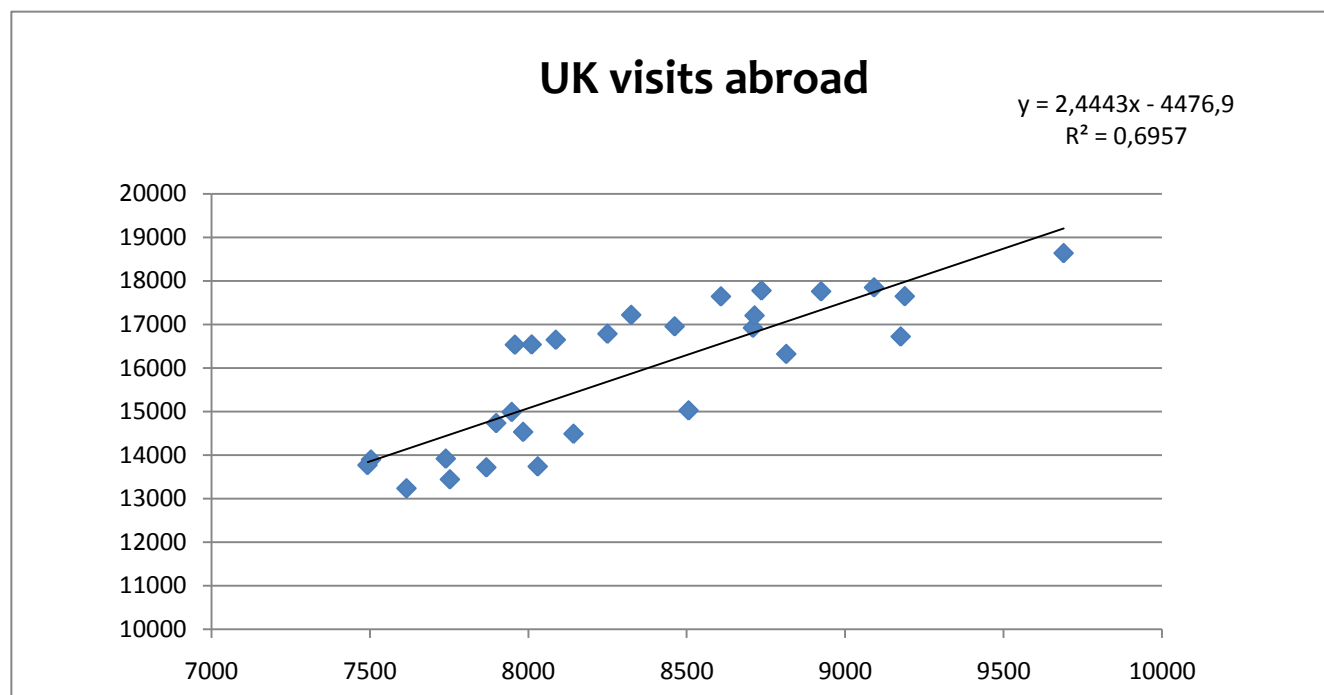
	UK Regions	2000	2009	%
123	Caithness & Sutherland and Ross & Cromarty	10 068	14 583	44.85
124	Inverness & Nairn and Moray, Badenoch & Strathspey	8 992	14 028	56.01
125	Lochaber, Skye & Lochalsh, Arran & Cumbrae and Argyll & Bute	8 526	14 012	64.34
126	Eilean Siar (Western Isles)	9 192	13 204	43.65
127	Orkney Islands	8 684	14 600	68.13
128	Shetland Islands	9 698	14 767	52.27
129	Belfast	10 587	14 383	35.86
130	Outer Belfast	10 382	14 748	42.05
131	East of Northern Ireland	9 736	13 893	42.70
132	North of Northern Ireland	7 842	12 217	55.79
133	West and South of Northern Ireland	8 315	12 313	48.08

2009	UK Regions
<7000	
7000-8999	
9000-10999	2
11000-12999	27
13000-14999	56
15000-16999	35
17000-18999	10
19000-20999	1
21000-22999	1
23000-24999	
25000-26999	
27000-28999	
29000-30999	
31000-33000	1
>33000	
Grand Total	133

2000	Count of UK Regions
<7000	
7000-8999	17
9000-10999	74
11000-12999	34
13000-14999	5
15000-16999	2
17000-18999	
19000-20999	
21000-22999	1
23000-24999	
25000-26999	
27000-28999	
29000-30999	
31000-33000	
>33000	
Grand Total	133

	UK visits abroad: Expenditure £million (x)	UK visits abroad: All visits 'ooo (y)
2005 Q1	8087	16650
2005 Q2	7958	16536
2005 Q3	8011	16541
2005 Q4	8250	16787
2006 Q1	8325	17221
2006 Q2	8608	17645
2006 Q3	8462	16957
2006 Q4	9091	17852
2007 Q1	8736	17780
2007 Q2	8709	16924
2007 Q3	8714	17206
2007 Q4	8924	17761
2008 Q1	9689	18639
2008 Q2	9188	17649
2008 Q3	9175	16724
2008 Q4	8814	16324
2009 Q1	8506	15027
2009 Q2	7948	14991
2009 Q3	7899	14736
2009 Q4	7504	13898
2010 Q1	7753	13444
2010 Q2	8030	13741
2010 Q3	8143	14491
2010 Q4	7616	13238
2011 Q1	7493	13772
2011 Q2	7984	14534
2011 Q3	7740	13920
2011 Q4	7868	13719

Appendix



Household Final Consumption Expenditure on Transport Services (£)

2004	Q1	5061
	Q2	6360
	Q3	8208
	Q4	6288
2005	Q1	5629
	Q2	6753
	Q3	8688
	Q4	6646
2006	Q1	5788
	Q2	7392
	Q3	9382
	Q4	7114
2007	Q1	6285
	Q2	8479
	Q3	9843
	Q4	7578

2008 Q1	6784
Q2	8067
Q3	9583
Q4	7130
2009 Q1	6354
Q2	7918
Q3	9353
Q4	6963
2010 Q1	6325
Q2	7688
Q3	9892
Q4	7164
2011 Q1	6590
Q2	8596
Q3	10440

