ELECTRICITY ASSOCIATION
FUEL POVERTY TASK FORCE

FUEL USAGE AND CONSUMPTION PATTERNS OF LOW INCOME CUSTOMERS AND COMPANY ATTITUDES TO SOCIAL ACTION

Additional analysis on

Comparing Consumption Data provided by Consumers and Companies

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Comparing Consumption Data
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In November 1999 the Electricity Association Fuel Poverty Task Force commissioned the Centre for Management under Regulation at the University of Warwick to undertake research into disconnection patterns and other characteristics of low income consumers. The project was completed at the Centre for Competition and Regulation at the University of East Anglia, and a final report on the analysis submitted to the Task Force in March 2001, with publication on March 26th.

Consumers interviewed for the EA project were asked to give their permission for the research team to approach their energy suppliers for information about their consumption. Where such permission was granted, the relevant company was asked to provide this information. Unfortunately the information was received too late and in too heterogeneous a form to be included in the original report to the EA task force. However since companies had provided data, the University of East Anglia undertook to analyse it after the end of the project at no additional cost to the project itself. This annexe reports analysis of the company provided data and explores the implications for that part of the analysis in the main report which relied on consumer estimates of demand.

Consumers were asked about their own consumption in various ways according to their payment method. Prepayment meter users (two thirds of the sample were electricity prepayers because of the way in which it was chosen) were asked, *inter alia*, about their average consumption in summer and winter; these figures were used to estimate an annual consumption for prepayment meter users. Those paying by monthly direct debit were asked the amount of their monthly payment, and this was multiplied by twelve to obtain an annual figure. Other credit users were asked the amount, timing and period which their last credit bill covered. For gas this figure was seasonally adjusted and used to estimate an annual credit consumption; the company data for gas were also seasonally adjusted. No seasonal adjustment was made for electricity since this is less seasonally variable. Some consumers were unable to give us an estimate of their own consumption.

Not all consumers gave consent for their companies to be approached. Even when they did so, companies were not always able to match the name and address supplied with their own records. Where a match was possible, company data came in a variety of forms, measuring units sometimes in kWh and sometimes in therms and reporting bills over different periods. Most companies provided one or two readings and the period to which these referred, and these had to be similarly converted to an annual estimate of consumption, and then to expenditure using appropriate tariffs for each company.

The following tables show the distribution of consumption estimates and comparisons between consumer and supplier estimates of consumption.

Tables 1 to 4 show the overall distributions of payment methods reported by the consumers, and recorded by the companies.

Table 1: Payment method for electricity as recorded by consumers in the survey

		Frequency	Percent
	PPM	2091	61
	Monthly Direct Debit	378	11
	Standard Credit	937	27
	Other	11	0
	Total	3417	100

Table 2: Payment method for electricity as recorded by companies

		Frequency	% of reported
	PPM	1147	60
	Credit*	778	40
	Total	1925	100
Missing	System	1492	
Total		3417	

***** includes monthly direct debit and standard credit. The company data did not generally distinguish between these.

Table 3: Payment method for gas as recorded in the survey

		Frequency	% of reported
	PPM	982	34
	Monthly Direct Debit	479	16
	Standard Credit	1428	49
	Other	37	1
	Total	2926	100
Missing	System	494	
Total		3417	

Table 4: Payment method for gas consumption as recorded by companies

		Frequency	% of reported
	PPM	732	45
	Credit*	892	55
	Total	1624	100
Missing	System	1796	
Total		3420	

***** includes monthly direct debit and standard credit. The company data did not generally distinguish between these.

For both fuels we see that companies were able to trace only about half of the consumers and identify their payment method. In electricity we see a good match between the distribution of payment methods reported by the consumers and the companies. In gas the match is less good, with companies reporting records on a lower proportion of households paying by credit than were represented in the survey.

Tables 5-8 compare the frequency distributions of consumption as calculated from the estimates provided by companies and individuals, for prepayment and credit electricity and gas consumption.

Table 5: Comparison of frequency distribution of annual prepayment electricity expenditure as recorded by companies and individuals

	PPM annual electricity expenditure in £ as recorded by companies	PPM annual electricity expenditure as recorded by individuals
Valid	**869**	**2091**
Mean	**361**	**425**
Minimum	**21**	**0**
Maximum	**2683**	**16800**
Percentiles		
5	**80**	**180**
10	**135**	**220**
20	**194**	**240**
30	**230**	**288**
40	**271**	**336**
50	**315**	**360**
60	**352**	**408**
70	**413**	**480**
80	**486**	**528**
90	**654**	**680**
95	**806**	**840**

Table 6: Comparison of frequency distribution of annual credit electricity expenditure as recorded by companies and individuals

	Credit annual electricity expenditure in £ as recorded by companies	Credit annual electricity expenditure as recorded by individuals
Valid	625	720
Mean	311	300
Minimum	0	31
Maximum	3588	1574
Percentiles		
5	98	111
10	128	139
20	160	171
30	200	196
40	229	221
50	262	250
60	290	281
70	336	321
80	400	394
90	538	514
95	680	723

Table 7: Comparison of frequency distribution of annual gas prepayment expenditure as recorded by companies and individuals

	PPM annual gas expenditure in £ as recorded by the companies	PPM annual gas expenditure as recorded by the individual
Valid	600	982
Mean	370	417
Minimum	2	0
Maximum	2224	2400
Percentiles		
5	48	145
10	102	192
20	190	260
30	244	312
40	280	360
50	328	360
60	386	432
70	435	480
80	516	552
90	679	660
95	783	791

Table 8: Comparison of frequency distribution of annual gas credit expenditure as recorded by companies and individuals

	Credit annual gas expenditure in £ as recorded by the companies	Credit annual gas expenditure as recorded by the individual
Valid	**251**	**905**
Mean	**516.35**	**360.06**
Minimum	**8.80**	**3.56**
Maximum	**3326.94**	**3296.67**
Percentiles		
5	**49.81**	**73.82**
10	**95.43**	**116.67**
20	**184.17**	**166.67**
30	**247.76**	**208.43**
40	**309.03**	**248.89**
50	**385.65**	**284.44**
60	**461.61**	**340.44**
70	**581.58**	**401.20**
80	**777.68**	**487.57**
90	**1055.91**	**685.81**
95	**1256.86**	**896.67**

For the groups as a whole we see that companies record both prepayment electricity and gas as lower than consumers do. For credit, companies' average estimates are higher for both fuels. The closest correspondence in mean estimates is for credit electricity, with the greatest divergence for credit gas. But these reflect the distributions of estimates which do not necessarily refer to the same individuals (for example, company estimates are available for many fewer households than consumer estimates are).

When estimates for individual households were matched, there were considerably fewer cases in which comparisons could be made, because many consumers were unable to estimate their own expenditure. The breakdown of 'matching' consumers by payment method and by supply company is shown in table 9. The table shows the difference between the consumer estimates of their expenditure, and the estimates which we were able to make from the company data.

Table 9: Comparison between consumer and company estimates of annual electricity/gas expenditure

	PPM difference consumer/ company electricity	Credit difference consumer/ company electricity	PPM difference consumer/ company gas	Credit difference consumer/ company gas
Valid	**841**	**165**	**451**	**251**
Mean	**32.58**	**7.62**	**5.37**	**-114.83**
Std. deviation	**443.94**	**260.00**	**359.40**	**550.93**
Minimum	**-10199.46**	**-1334.08**	**-4117.69**	**-3197.10**
Maximum	**800.02**	**1165.13**	**868.71**	**1769.73**
Percentiles				
5	**-303.15**	**-431.14**	**-344.54**	**-929.08**
10	**-171.67**	**-209.46**	**-211.55**	**-694.48**
20	**-66.08**	**-97.21**	**-117.18**	**-350.65**
30	**-23.80**	**-43.85**	**-66.40**	**-194.86**
40	**12.95**	**-8.07**	**-26.76**	**-109.77**
50	**40.32**	**14.80**	**15.15**	**-45.56**
60	**82.65**	**43.66**	**59.19**	**18.92**
70	**124.39**	**86.64**	**16.79**	**96.03**
80	**190.48**	**1127.16**	**79.74**	**201.41**
90	**298.60**	**1218.78**	**98.10**	**329.66**
95	**402.51**	**2303.89**	**368.70**	**519.43**

For each consumer for whom a match can be made, we calculate the consumer's estimate of annual expenditure, less that of the company. If the estimates matched perfectly we would see a zero difference in every entry. Instead we see considerable differences. Here the best average match is for prepayment gas, with credit electricity the next best match at the mean. Most consumers overestimate (relative to company estimates) expenditure for electricity and for prepayment gas, but underestimate it for credit gas.

Although table 9 shows substantial differences between estimates, there is no evidence of consistent over- or under-estimation which would lead us to review any of the analysis in the original EA report which involved expenditure for electricity or for prepayment gas. In these cases the variance of the difference between estimates is so large that the mean difference is not significantly different from zero and so it is not appropriate to adjust the findings of the main report.

However for credit gas, consumers' estimates are significantly different from those of companies, on average underestimating their annual gas expenditure by £115. The only table in the report for which this difference might be relevant is table 4.8, which refers to the number of switchers in each expenditure category. Re-presenting table 4.8 using company rather than consumer estimates for expenditure yields the following result.

Table 4.8 : Distribution of bill size of gas switchers and non switchers based on company estimates of expenditure

	All		**Switchers**		**Non switchers**	
Gas bill size (month av.)	number	Cumul%	number	Cumul %	number	Cumul%
≤10	152	11	73	24	79	7
10.1 -15.0	84	17	24	31	60	13
15.1 - 20.0	143	27	47	46	96	22
20.1 - 25.0	167	39	52	63	115	32
25.1 - 30.0	166	51	33	74	133	44
30.1 - 35.0	131	60	18	79	113	55
35.1 - 40.0	122	69	15	84	107	65
40.1 - 50.0	169	81	14	89	155	79
50.1 - 100.0	214	96	30	98	184	96
≥100	52	100	5	100	47	100
	1400		311		1089	
Mean bill (£s per month)			**25**		**40**	

The difference in the average size of switchers' and non switchers' bills is substantial, using these figures, and is statistically significant at 1%. It is surprising to see that switchers had much lower bills in general than non switchers, since those with large consumption can achieve greater potential savings and therefore have more incentive to switch suppliers. Some of the difference in the results may be because we have seasonally adjusted the consumption data in this paper (for both consumer and company estimates of gas expenditure), while there was not time to do this in the initial report. Although the lack of statistical difference between consumer and company estimates for electricity did not indicate the need to recalculate any of the tables in the main report, we did reproduce the equivalent of the above table for electricity (table 4.3 in the main report). This is shown below.

Table 4.3 : Distribution of bill size of electricity switchers and non switchers based on company estimates of expenditure

	All		**Switchers**		**Non switchers**	
Electricity bill size month av	number	Cumul%	number	Cumul%	number	Cumul%
≤10	118	7	22	8	96	7
10.1 - 15.0	203	20	42	24	161	20
15.1 - 20.0	304	39	60	46	244	38
20.1 - 25.0	250	55	41	61	209	54
25.1 - 30.0	214	68	32	73	182	68
30.1 - 35.0	121	76	18	79	103	75
35.1 - 40.0	110	83	16	85	94	83
40.1 - 50.1	108	90	20	93	88	89
50.1 - 100.0	147	99	16	99	131	99
≥100	16	100	4	100	12	100
	1591		271		1320	
Mean bill (£s per month)			**29**		**29**	

Here, as expected, there is no detectable difference in the average expenditure of those who have and have not switched suppliers, confirming the results of table 4.3 in the main report.

We explored whether there were statistically significant differences between the consumer and company estimates for different categories of consumers. This showed that the general result of no statistically significant average difference for electricity and prepayment gas consumers was reflected in all the subgroups. Among credit gas consumers, the differences found for this group as a whole were reflected in some but not all of the subgroups. The results for the subgroups by fuel and payment method are shown in the following tables. In these tables, *** indicates a mean difference between estimates which is significantly different from zero at 0.5%, and * indicates that the difference is significantly different from zero at 10%.

Table 10: Difference between consumer and company annual fuel expenditure estimates for high and low income earners

	Annual household income	N	Mean	Std. Error Mean
PPM electricity difference	Above £12,000 pa	376	15.89	29.27
	Below £12,000 pa	465	46.08	14.37
Credit electricity difference	Above £12,000 pa	90	3.01	33.86
	Below £12,000 pa	75	13.16	18.51
PPM gas difference	Above £12,000 pa	189	-4.12	29.28
	Below £12,000 pa	262	12.21	20.10
Credit gas difference	Above £12,000 pa	134	-58.54	41.46
	Below £12,000 pa	117	-179.30***	57.16

Table 11: Difference between consumer and company annual fuel expenditure estimates by location

	Area	N	Mean	Std. Error Mean
PPM electricity difference	Metropolitan	778	36.56	15.71
	Rural	63	-16.55	64.23
Credit electricity difference	Metropolitan	40	7.13	25.80
	Rural	5	-155.73	350.97
PPM gas difference	Metropolitan	439	5.43	17.33
	Rural	12	3.02	52.94
Credit gas difference	Metropolitan	82	-77.22	58.75
	Rural	9	-517.30	339.48

Table 12: Difference between consumer and company annual fuel expenditure estimates by whether households included children under 16

	Children in household?	N	Mean	Std. Error Mean
PPM electricity difference	no children	397	42.66	13.32
	Children	444	23.57	26.45
Credit electricity difference	no children	122	-5.15	15.59
	Children	43	43.86	64.11
PPM gas difference	no children	175	10.54	30.83
	Children	276	2.09	19.61
Credit gas difference	no children	158	-154.99***	42.76
	Children	93	-46.61	59.05

Table 13: Difference between consumer and company annual fuel expenditure estimates by whether the household contained an unemployed member

	Unemployed member in household?	N	Mean	Std. Error Mean
PPM electricity difference	No	668	22.79	18.86
	Yes	173	70.38	15.09
Credit electricity difference	No	154	5.43	21.49
	Yes	11	38.40	41.80
PPM gas difference	No	342	10.42	18.30
	Yes	109	-10.47	40.22
Credit gas difference	No	220	-94.97***	33.47
	Yes	31	-255.79	151.01

Table 14: Difference between consumer and company annual fuel expenditure estimates by whether the household contained a disabled member

	Disability benefit received?	N	Mean	Std. Error Mean
PPM electricity difference	No	756	33.83	16.61
	Yes	85	21.45	33.78
Credit electricity difference	No	150	9.12	21.75
	Yes	15	-7.34	49.37
PPM gas difference	No	418	1.45	17.87
	Yes	33	55.04	47.72
Credit gas difference	No	223	-104.49***	35.70
	Yes	28	-197.24	128.89

Table 15: Difference between consumer and company annual fuel expenditure estimates by receipt of a state pension

	State pension received?	N	Mean	Std. Error Mean
PPM electricity difference	No	748	33.19	17.05
	Yes	93	27.68	19.18
Credit electricity difference	No	100	-4.24	30.81
	Yes	65	25.88	19.95
PPM gas difference	No	419	5.50	17.87
	Yes	32	3.69	47.39
Credit gas difference	No	178	-126.13***	44.17
	Yes	73	-87.28*	52.20

The difference in estimates for credit gas expenditure identified for the group as a whole is significant in only some of these subgroups. The variation between company and consumer estimates for credit gas consumers is significantly different from zero at 0.5% or lower for households earning less than £12,500 p.a., households with no children, no unemployed members, not in receipt of disability benefits, and those with no pension. In all cases the consumers' estimates of consumption were lower than the figures implied by company figures. The difference was also significant at 10% for households including members receiving state benefit, but in no other cases was the difference in estimates of credit gas expenditure significantly different from zero. No subgroups showed significant differences in customer and company estimates of expenditure for prepayment gas or electricity or credit electricity. It is not surprising that prepayment consumers' estimates match company records more closely than those for credit consumers. The discrepancy for credit gas may reflect the greater seasonal element in this fuel than for electricity, making it more difficult for consumers to estimate annual consumption accurately.