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# *Distributional Effects of Liberalising UK Residential Utility Markets*

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***Abstract***

Competition is being extended into residential utility markets world-wide; the European directives on telecoms, electricity and gas will extend choice throughout the European Union by the turn of the century. In the UK, the Privatisation Acts not only changed the ownership of utilities, but imposed a duty on the regulators to encourage competition. It is the introduction of competition, actual and potential, that has been the main force behind changing the *relative* prices charged to different consumers, particularly in the residential market. We use household-level data to identify the distributional impact, particularly on vulnerable households and those for whom regulators have special responsibilities. We find a mixed outcome, with some vulnerable households, especially pensioners, adversely affected; we suggest potential compensation mechanisms that could improve welfare by enabling the benefits of competition in these industries supplying essential services to be gained without harming the most vulnerable households.

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## I. INTRODUCTION

Recent reform of UK utilities has included both a change from public to private ownership and the introduction of competition. In residential markets, liberalisation followed some time after flotation, and we distinguish the effects of changing the ownership of the industries while they still retained monopoly power from the impact of allowing entry to the markets they served. This process has implications for utilities world-wide that are 'deregulating' markets to introduce competition across a wide spectrum of consumers, both as part of the European Union initiative for competition and in the United States. Similar patterns have been seen somewhat earlier in industrial markets, but we concentrate here on the residential sector.

The utility industries provide essential services for households, and the natural monopoly inherent in their delivery requires control through public ownership or regulation of private companies. Expenditure on utilities increases with income, but less than proportionally, so that the proportion of household income devoted to these services declines with increasing income. In Great Britain, regulation is entrusted to industry-specific regulators with responsibilities that include introducing competition where feasible and protecting the interests of consumers where it is not. Consumer protection includes a secondary duty to take account of the interests of those of pensionable age, consumers with disabilities or chronic illness and (for water and electricity) those in rural areas; regulators have no specific responsibilities for income distribution or social policies.

In telecoms, the incumbent — British Telecom (BT) — was threatened with increased likelihood of entry from the date of flotation in 1984, but suffered only minor inroads into its markets until the mid-1990s; statutory monopoly remained in most of the residential markets for gas, supplied by British Gas (BG), and electricity, supplied by 14 regional electricity companies, until 1998. Consumers in markets with monopoly power were protected by caps imposed on an average of prices charged for monopoly services, and the companies were free to rebalance their tariffs within this aggregate, subject to some limitations. In markets without serious threat of entry, companies generally conformed to the constraints by changing the constituent prices within the cap in line with each other, maintaining the relative relationships between them.[1]

Regulators have recently concentrated their efforts on introducing competition wherever feasible, i.e. enabling competitive supply through access to the natural monopoly elements (pipes, wires and local switches) which constitute an essential facility for competitors to deliver services to consumers. As such competition threatens, incumbents have started to change prices

[1]We detect no consistent rebalancing by water companies, whose monopoly supply of the residential market is secure.

differentially to different consumers, rebalancing prices within the aggregate constraints imposed by the regulator. Such price-rebalancing by incumbents in response to entry (and by entrants in targeting consumers) has a differential impact on different households because of variations in their consumption of these commodities and the way in which they pay for them. We examine the changes in tariffs that competition engenders, the efficiency of these changes and their impact on different household groups, and distributional effects. Some studies (for example, Drakeford (1996)) have identified qualitatively the effects of changes on some households. Others have focused on particular industries (Hancock and Waddams Price, 1995; Burns, Crawford and Dilnot, 1995; Gómez-Lobo, 1996; Wolak, 1996). We discuss the cumulative effect of increasing competition across the residential utility sector using household-level data from the Family Expenditure Survey. We find regressive effects from rebalancing, with particularly adverse effects on pensioner households, and identify the need for some intervention which might be determined by the current government review of regulation in the UK. The paper is organised as follows. The next section describes the price changes that have occurred, Section III the data and methodology and Section IV the impact of price-rebalancing at household level. Section V discusses future changes and suggests some remedies.

## II. CHANGES IN RELATIVE PRICES

The privatised energy utilities inherited from their nationalised predecessors a pattern of uniform pricing in the residential sector that largely ignored cost differences of geographic location, payment method and 'peakiness' of demand. In both telecoms and energy, prices for remaining attached to the system (line rentals and standing charges) were generally below costs, with the difference recovered through higher usage rates (Burns, Crawford and Dilnot, 1995). Such uniform prices were implicitly regarded as a form of welfare in which some consumers subsidised others, a policy common in nationalised industries but not generally practised in the private sector. The change in objectives and constraints would be expected to lead to some rebalancing when the industries are privatised and reregulated (see, for example, Bradley and Price (1988) and Armstrong, Cowan and Vickers (1994)). BT increased its line rental by as much as the regulator permitted; however, gas and electricity companies did not rebalance their prices to increase cost-reflectiveness immediately after privatisation.

The maintenance of cross-subsidies could be explained by political motivation to avoid bad publicity, particularly at a time when the industries were heavily criticised for large payments to senior executives. Or they could have been retained for strategic political reasons, to oppose the introduction of competition in the future. If liberalising the markets could be blamed for erosion of cross-subsidies — a process that would hurt a significant number of vulnerable consumers — then politicians might be less willing to introduce

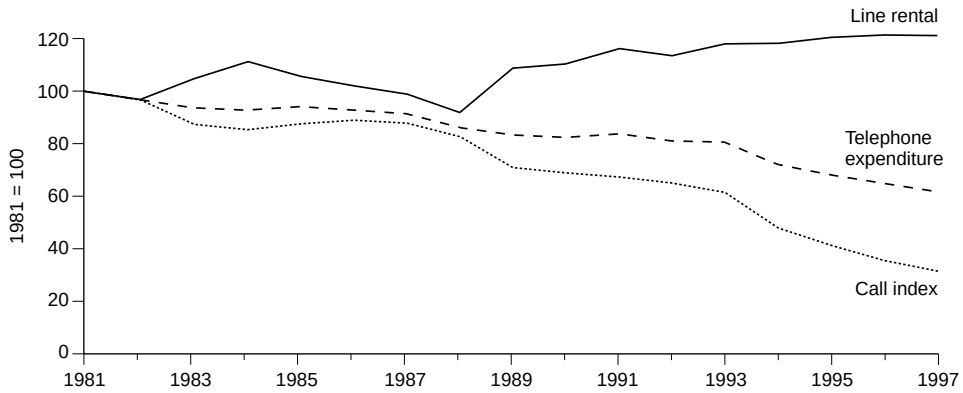
competition, as suggested by Laffont and Tirole (1993). However, once the political argument is lost and the market is opened to new entrants, they will find most attractive the markets with the highest mark-ups, in this case the low-cost consumers. Incumbents seek to rebalance prices, decreasing them to markets where new entry has occurred or is threatened, and increasing them elsewhere to maintain revenue.

The timing of price changes supports our contention that it is competition rather than privatisation that has triggered price-rebalancing. BT has consistently rebalanced between line rental and call charges to the maximum extent permitted under its price constraint; the only exception was when price changes were avoided altogether for other reasons (Bradley and Price, 1987). In the first 12 years after privatisation, throughout which it faced increasing competitive pressure, BT increased its line rentals by 7 per cent in real terms and reduced the average cost of calls by 40 per cent. In the 15 months since the Office of Telecommunications (Oftel) removed the specific constraint on line rentals, these have already risen in real terms. The full pattern of price changes for BT since privatisation is shown in Figure 1, where 'call index' is the price index for calls only and 'telephone expenditure' is a price index for total telephone expenditure including the line rental.

British Gas has demonstrated most clearly the relation between competition and price-rebalancing. It announced major innovations in tariff structures within 24 hours of the Queen's Speech which confirmed that legislation would enable competition in residential gas markets. Unlike with BT, these changes did not alter the balance between the fixed standing charge levied on each consumer and

FIGURE 1

**Index of Real Household Telephone Expenses**




Source: BT publications and index of expenditure on telephones in *Monthly Digest of Statistics*.

TABLE 1

**Index of Real Residential Gas Tariffs, by Payment Method**

*1984 = 100*

| | Standing charge (£ p.a.) | | | Running rate (p/kWh) | | |
|---|---|---|---|---|---|---|
| | *Quarterly credit* | *Direct debit* | *Prepayment* | *Quarterly credit* | *Direct debit* | *Prepayment* |
| Dec. 1994 | 62 | 62 | 67 | 77 | 77 | 76 |
| Jan. 1998 | 75 | 39 | 63 | 67 | 61 | 66 |

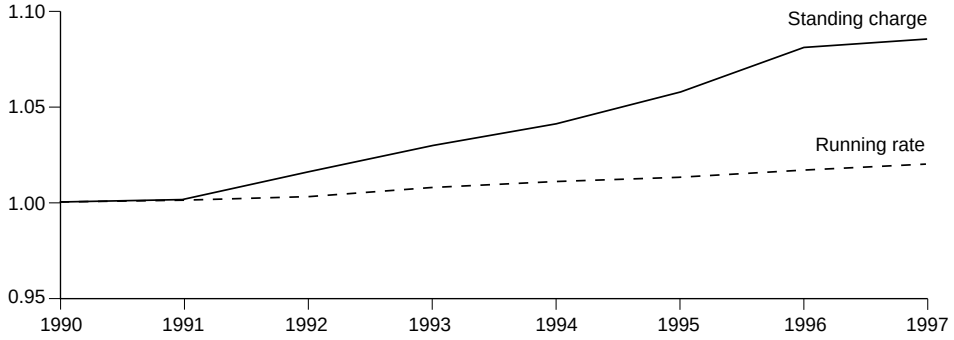
Source: British Gas Annual Accounts and British Gas Trading.

the price paid for units of energy consumed, but altered the balance between charges for payment by different means. BG introduced a substantial discount for those paying by direct debit, which has since increased. Table 1 shows rebalancing in British Gas since 1984 and its acceleration after 1995 when competition in residential markets was confirmed.

In electricity, the 15 separate public electricity suppliers (PESs), which presently supply the residential market as regional monopolies, make straightforward comparisons more difficult. Unlike with gas, there was no particular moment when the introduction of competition to the market was determined: it was foreshadowed in the 1989 Electricity Act, though the efforts of the electricity regulator to ensure that it occurs smoothly in 1998 have concentrated suppliers' minds as the date approaches. Rebalancing has, as with gas, been mainly in the form of discounts for direct debit payers relative to those paying through prepayment meters or the quarterly credit tariff, as Figure 2 shows for the credit tariff.

FIGURE 2

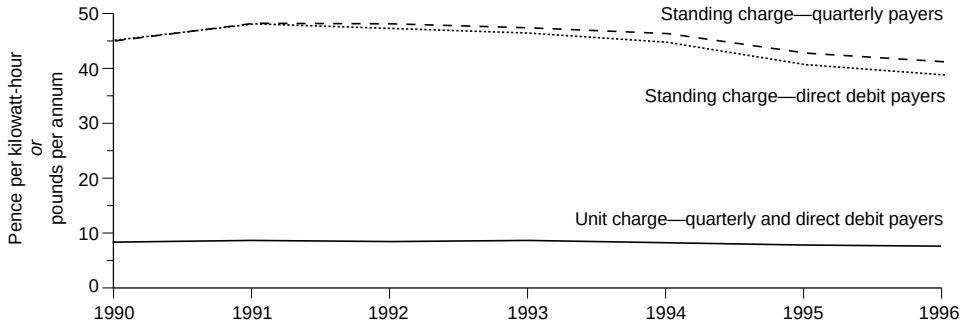
**Ratio of Quarterly Standard Tariff to Direct Debit Tariff: Average for all Public Electricity Suppliers in Great Britain**




Source: Electricity Association.

FIGURE 3

**Changes in Levels of Average Electricity Tariffs (1996 prices)**




Source: Electricity Association.

Figure 2 shows how the ratio between quarterly credit and direct debit tariffs has increased for both the fixed standing charge and the running rate per unit of fuel consumed, at each year since privatisation, averaged over all the PESs in England, Wales and Scotland. The relative increase in quarterly credit charges is small in the period covered (about 9 per cent on average on the standing charge by 1997) but there is a clear acceleration in rebalancing as the opening of the residential market in 1998 approaches.[2] The changes identified are likely to accelerate sharply as competition develops towards the end of the decade, particularly in energy where the process is only just beginning. Figure 3 shows the movements in the averages of real standing charge and running rates for the quarterly credit and direct debit tariffs.

## III. DISTRIBUTIONAL EFFECTS OF PRICE CHANGES: METHODOLOGY AND DATA

We use data from the 1991, 1992 and 1993 Family Expenditure Surveys (FESs) to explore the distributional impact of residential tariff changes in telecoms, gas and electricity. The FES is a representative survey of UK households which interviews around 7,000 households a year, collecting detailed information on the incomes, expenditure and personal characteristics of household members. Combining data for three years yields larger sample sizes and permits more detailed analyses than would otherwise be the case. We have checked for differences between the years and find little consistent pattern to indicate that we should not aggregate them, except for the increase in use of prepayment meters for gas and electricity which is discussed below. Details of our methodology are

[2]The slowing-down of the rate of rebalancing in 1997 is likely to reflect uncertainties about pressure from the regulator and an anticipated change of government.

contained in Appendix A. We calculate consumption levels from expenditure and prevailing prices. Some approximation is involved here since we cannot be certain which prices were applicable to the latest payment (see Hancock and Waddams Price (1995)) but we make as much use of the relevant information as we can to minimise any resulting error.

We measure the impact on individual households of price changes in the early years of competition and its threat by, so far as possible, pricing households' recorded consumption of each commodity at 1996 and pre-privatisation price structures, measuring the 'gain' as the difference between the former and the latter. This is not an exact measure of welfare gain. Our approach is as if consumption of gas, electricity and telecoms were completely unresponsive to changes in their own prices and their prices relative to each other; the implied utility function involves zero substitutability among these and other goods. This is clearly a restrictive assumption. However, to the extent that such demand responses may be small, especially where the price changes themselves are relatively small, we believe our results are informative about the *distribution* of gains. Moreover, the actual price changes that we analyse are small relative to the large hypothetical changes envisaged by Gómez-Lobo (1996) and Wolak (1996), and price elasticities are generally estimated to be low (see, for example, Gómez-Lobo (1996, p. 58)). Banks, Blundell and Lewbel (1996) suggest that, for small price changes and low elasticities, ignoring changes in consumption causes only a slight error in estimating welfare changes.[3]

We indicate in Appendix B how our measure of welfare is calculated and its relation to other commonly used measures of welfare change. Our measure is a good approximation to consumer surplus, but may overestimate gains for gas and telecoms and underestimate them for electricity. We have proceeded to average this welfare measure over a number of consumers, initially within each income and household group. This represents the average change in cost per household of purchasing the same quantity of services at the two prices.

Since our emphasis is on the distributional impact, it is only if there are substantial differences in the scope for substitution between lower- and higher-income households that our overall conclusions will be wrong. Although we have quoted studies above that show that low-income consumers are in general more price-responsive than higher-income groups, we do not believe that this property affects the estimates significantly. Moreover, the simultaneous price changes across utilities, particularly within the energy sector, are likely to reduce the responsiveness of demand to changes in own price.

We have ignored the effects of changes in payment methods over the period of the study, despite the increasing use of prepayment meters; because the FES is not a longitudinal survey, we are unable to identify how different households are

[3]We extend this approximation to cross-elasticities between goods.

affected. But we note that an increasing proportion of households supplied through prepayment meters are in the lowest income quintile (Appendix C). Since supply by this means is generally more expensive than through the credit tariff, including the effect of switching to prepayment meters would exacerbate the regressive effects that we identify.

## IV. RESULTS: GAINS AND LOSSES OF HOUSEHOLDS FROM PRICE-REBALANCING SINCE PRIVATISATION

Tables 2 and 3 show how use of utilities, the amount consumed and payment method are related to income.

TABLE 2

**Use of Telecoms, Gas and Electricity**

| | Telecoms | | Gas | | Electricity |
|---|---|---|---|---|---|
| | *(1) Use (%)* | *(2) Call-related element (£ p.a.)* | *(3) Use (%)* | *(4) Average consumption (kWh p.a.)* | *(5) Average consumption (kWh p.a.)* |
| All | 87 | 135 | 78 | 20,300 | 3,018 |
| Pensioner households | 90 | 89 | 73 | 16,400 | 2,977 |
| On disability benefit | 87 | 130 | 76 | 20,300 | 4,062 |
| On income support | 66 | 140 | 74 | 18,800 | 3,604 |
| *Income quintile* | | | | | |
| Lowest | 71 | 137 | 74 | 18,800 | 3,437 |
| 2nd | 83 | 112 | 75 | 17,900 | 3,400 |
| 3rd | 91 | 127 | 78 | 20,200 | 3,928 |
| 4th | 94 | 133 | 80 | 20,800 | 3,909 |
| Highest | 95 | 163 | 81 | 28,300 | 4,171 |
| *Household numbers* | *17,621* | | *16,155* | | *6,717*[a] |

[a]We were able to identify the electricity suppliers of a smaller number of electricity consumers because the standard FES regions do not often coincide with the boundaries of electricity suppliers. This limitation has also introduced some bias to our sample, as we discuss below, and limited the scope for regional analysis. Our sample had a lower consumption level than average because of this restriction, which causes most of Scotland and the North-West — areas of high electricity consumption — and the whole of southern England — where incomes and expenditure would be higher — to be omitted. This bias is demonstrated in Appendix D.

Columns 1 and 3 of Table 2 show that connection to the telephone and gas systems increases with income;[4] there is a major difference in that all households have access to telephones (at the same charge) whereas gas supply is geographically limited. Column 2 — the call-related element — indicates that, though pensioners are more likely to have a telephone, they use it much less than average. Amongst the lowest income quintile, telephone ownership is lower than average but telephone use for those who do have a phone is about average. Ownership then rises steadily, but use declines and then rises again with income. Call expenditure at higher income levels may be an underestimate because the FES reports the latest bill, which represents only part of the expenditure for those using the services of both the incumbent and a new entrant. This is more likely among high-income groups since the FES data pre-date significant penetration by cable companies, which have captured a more representative cross-section of households than did early entrants in both fixed and mobile

TABLE 3

**Payment Method for Gas and Electricity:**
**Percentage in Each Household Category Paying by Each Method**

| | Gas | | | Electricity | | |
|---|---|---|---|---|---|---|
| | *(1) Prepayment* | *(2) Quarterly credit* | *(3) Direct debit* | *(4) Prepayment* | *(5) Quarterly credit* | *(6) Direct debit* |
| All | 4 | 59 | 38 | 11 | 62 | 27 |
| Pensioner households | 3 | 70 | 27 | 3 | 79 | 18 |
| On disability benefit | 7 | 55 | 38 | 16 | 60 | 24 |
| On income support | 12 | 54 | 34 | 29 | 49 | 22 |
| *Income quintile* | | | | | | |
| Lowest[a] | 9 | 58 | 33 | 26 | 54 | 20 |
| 2nd | 6 | 60 | 34 | 11 | 66 | 23 |
| 3rd | 3 | 57 | 40 | 7 | 62 | 31 |
| 4th | 2 | 57 | 41 | 5 | 64 | 31 |
| Highest | 1 | 61 | 38 | 2 | 68 | 31 |

[a]The numbers of low-income customers paying by direct debit for gas are higher than reported in Hancock and Waddams Price (1995), who used 1991 data. However, they are consistent with a survey of the gas market in South-West England in November 1997 which reported 37 per cent of low-income consumers paying for gas by direct debit (Waddams Price, 1998) and analysis of the most recent Family Expenditure Survey, for 1995–96, which shows 30 per cent of the lowest income quintile pay for gas and 17 per cent pay for electricity by this means.

[4]This is based on a positive expenditure reported in the FES. This may underestimate telephone ownership in the years concerned (1991–93). Access to a telephone was reported at 91 per cent amongst households in 1994–95 (Oftel, 1995).

telephony.[5] Gas use increases with income (column 4), except for lower use by pensioners, who dominate the second income quintile, but electricity has a somewhat flatter consumption profile.

The main influence of income in the residential energy sector is on payment method, as Table 3 shows. Columns 1 and 4 show how much higher than average are the proportions of low-income households using prepayment meters, and columns 3 and 6 show how the percentages paying by direct debit increase with income for both gas and electricity.

To assess the effect of these variations on household groups, we first measure the total gains for different households since privatisation, from the price reductions reported in Section II. Table 4 shows the results. The first column indicates the different household categories as before. The next six columns show the financial gains for each of the three utilities. For each utility and household type, the two columns show the average gain or loss per year in expenditure on that utility and the average proportion of income that this represents for the group. These are then aggregated over the three utilities in the penultimate column, and the difference between the gain made by each group and the average gain is shown in the last column. This involves some approximation, since the sample of households is different for each utility, but it provides an indication of average changes for each group.[6]

We see that all groups have gained on aggregate through lower prices in these utilities since privatisation, though these gains are not necessarily directly attributable to privatisation itself. For example, about three-quarters of the lower gas costs are attributable to falling North Sea gas costs, and lower oil and coal prices have reduced the costs of electricity production (Newbery and Pollitt, 1997). In telecoms, the period since privatisation has coincided with enormous technological change which has reduced costs. Those seeking to establish the effect of privatisation *per se* should recall that average water bills *increased* by about £70 in the 1989–96 period. We show the combined effect for all four utilities, including water, in an earlier paper (Waddams Price and Hancock, 1996). We are not seeking to establish whether prices would have fallen by as much (or more) if the industries had remained in public ownership, but to examine how prices have moved differentially for different groups because of the introduction of competition.

To separate the effect of higher consumption levels on welfare gain, we posed a different counterfactual. This identifies the effect on each household group of rebalancing between prices, rather than changes in their overall level. It

[5]One advantage of using data from the early 1990s is that new entrants had made little penetration in the market, so minimising the problem of underestimation of telephone use.

[6]It is not appropriate to aggregate the gains for payment methods, since these represent different households for each payment method in each industry.

TABLE 4

**Real Gains and Losses for Telecoms, Gas and Electricity since Privatisation**

*1996 prices*

| | Telecoms | | Gas | | Electricity | | Aggregate | |
|---|---|---|---|---|---|---|---|---|
| | *Gain (£ p.a.)* | *Percentage of income (%)* | *Gain (£ p.a.)* | *Percentage of income (%)* | *Gain (£ p.a.)* | *Percentage of income (%)* | *Gain (£ p.a.)* | *Difference from average* |
| All | 73 | 0.32 | 124 | 1.61 | 43 | 0.66 | 240 | 0 |
| Pensioner households | 44 | 0.75 | 102 | 1.82 | 34 | 0.68 | 180 | –60 |
| On disability benefit | 70 | 0.84 | 122 | 1.60 | 45 | 0.59 | 237 | –3 |
| On income support | 77 | 1.56 | 111 | 2.44 | 42 | 0.94 | 230 | –10 |
| *Income quintile* | | | | | | | | |
| Lowest | 75 | 2.67 | 112 | 4.03 | 42 | 1.59 | 229 | –11 |
| 2nd | 58 | 0.91 | 110 | 1.78 | 39 | 0.66 | 207 | –33 |
| 3rd | 66 | 0.64 | 123 | 1.18 | 45 | 0.44 | 234 | –5 |
| 4th | 72 | 0.50 | 129 | 0.89 | 46 | 0.32 | 247 | 7 |
| Highest | 92 | 0.41 | 142 | 0.64 | 47 | 0.22 | 281 | 41 |
| Prepayment | | | 75 | 1.28 | 43 | 0.77 | | |
| Quarterly credit | | | 105 | 1.47 | 38 | 0.58 | | |
| Direct debit | | | 159 | 1.88 | 55 | 0.78 | | |
| *Household numbers* | *17,621* | | *16,155* | | *6,717* | | | |

Note: The table includes only users of gas and telecoms for these industries, and for electricity only those households for which we can identify electricity suppliers; so the samples for each utility vary.

compares the bills of households under the 1996 price structures with the bills they would have paid had the *relative* prices been as they were at privatisation and the *level* of revenue for the supplier the same as in 1996. We have thus abstracted from the effects of privatisation and regulation *per se*, which we argue affect the average level of prices through changed incentives and price caps, and examine merely the effect of changes in structure that are motivated by actual or anticipated introduction of competition.

The remaining tables in this section show the results of analysing the gains and losses due solely to rebalancing, keeping the level of prices constant at their (lower) 1996 levels. In Table 5, columns 1, 2 and 3 present results for each industry, using the same household categories as in previous tables. These are aggregated to an 'indicative total' for each household group in column 4.

Table 5 shows that pensioner households lose from rebalancing across all three industries. This is particularly marked in telecoms, where the increase in line rentals in absolute terms and relative to usage charges has had an adverse effect, even allowing for low-user rebates. In gas and electricity, the loss arises mainly from pensioners' higher use of the quarterly credit rather than direct debit payment method. We see that quarterly credit customers are losing most, and

TABLE 5

**Mean Gains from Price-Rebalancing, Separately for Each Industry since Privatisation (Consumers Only)**

*Pounds per annum, 1996 prices*

| | *(1) Telecoms* | *(2) Gas* | *(3) Electricity* | *(4) 'Indicative total'* |
|---|---|---|---|---|
| All | 0.0 | 0.0 | 0.0 | 0.0 |
| | | | | |
| Pensioner households | –10.5 | –1.7 | –1.2 | –13.4 |
| On disability benefit | –1.3 | 0.0 | –1.6 | –2.9 |
| On income support | 1.9 | –0.1 | 0.0 | 1.8 |
| *Income quintile* | | | | |
| Lowest | 1.6 | –0.7 | 1.1 | 2.0 |
| 2nd | –5.0 | –0.4 | –0.9 | –6.3 |
| 3rd | –2.5 | 0.4 | –0.3 | –2.4 |
| 4th | –1.2 | 0.7 | 0.6 | 0.1 |
| Highest | 6.8 | –0.2 | –0.7 | 5.9 |
| Prepayment | n/a | –3.1 | –0.1 | |
| Quarterly credit | n/a | –8.9 | –1.7 | |
| Direct debit | n/a | 14.2 | 4.1 | |
| | | | | |
| *Household numbers* | *17,621* | *15,906* | *6,717* | |

direct debit payers gaining most, from rebalancing in the energy sector. Overall, pensioner households are paying about £13.40 more per year as the result of rebalancing in these three utilities (together representing about one-third of one per cent of average income for these households, and just over 0.4 per cent for those on a basic pension). The other group for which regulators have special responsibility — disabled people — is also losing, but a much smaller amount — about £2.90 a year.

Consumers in the lowest income quintile (mainly families on low incomes or unemployed) have gained marginally from rebalancing, because of their greater use of the telephone and electricity and through using monthly direct debit schemes rather than quarterly credit. However, the second income quintile, containing many of the pensioner households, has lost from rebalancing; above these quintiles, the aggregate loss decreases and becomes a gain in successively higher income groups for telecoms, with a similar pattern in energy.

Including non-consumers would reduce the average gain or loss in each category by adding in households with zero change. This would have the effect of reducing the average changes most for telecoms and gas in the lowest income groups, particularly reducing the average gain for telecoms. Some of this effect is shown in Table D.1 in Appendix D.

Table 6 shows the proportion of each group that is amongst the lowest and highest quartile of gains. This can be interpreted as the probability that such a household would be in the group of 'lowest gainers' (in fact, these households lose from rebalancing in all industries) or 'highest gainers'. If the gains were distributed neutrally, the probability would be 25 per cent for each group and category as well as for the sample as a whole. The boundaries for the upper and lower quartiles and deciles of gains in each industry are shown in the bottom part of the table.

TABLE 6

**Percentage of Each Household Category in Lowest and Highest Quartiles of Gains (Consumers Only)**

| | Lowest quartile | | | Highest quartile | | |
|---|---|---|---|---|---|---|
| | *Telecoms* | *Gas* | *Electricity* | *Telecoms* | *Gas* | *Electricity* |
| All | 25 | 25 | 25 | 25 | 25 | 25 |
| Pensioner households | 39 | 24 | 26 | 11 | 15 | 17 |
| On disability benefit | 26 | 25 | 28 | 24 | 25 | 27 |
| *Boundaries* | | | | | | |
| Lowest quartile | –£24.05 | –£8.78 | –£1.64 | | | |
| Highest quartile | | | | £9.03 | £12.02 | £6.20 |
| Lowest decile | –£28.11 | –£14.73 | –£21.50 | | | |
| Highest decile | | | | £34.58 | £16.68 | £17.26 |

We see that pensioner households have a probability of nearly 40 per cent of being in the lowest quartile for telecoms gains (i.e. of losing more than £24 a year) but only a 11 per cent chance of gaining more than £9 a year. Their chances of being amongst the highest gainers for gas and electricity (gaining more than £12 and £6.20 a year, respectively) are also lower than average (15 per cent and 17 per cent). For other households, these proportions are not markedly different from the 25 per cent average. Moreover, the losses and gains for those in the bottom and top deciles of gains are considerable: households falling into the lowest or highest deciles for all three utilities are losing or gaining more than £60 a year.

The regional impact of price-rebalancing for gas and telecoms (our electricity sample is too regionally restricted to give useful results) is shown in Table 7, which presents the mean gain and the probability of being in the lower and upper quartiles for each industry. Again, the analysis is restricted to consumers only.

The regional figures for telecoms and gas show significant differences in gains and their distribution between different regions of Great Britain (Northern Ireland was excluded because energy is supplied there under different arrangements). Only Greater London and the rest of the South-East have positive gains from telephone price-rebalancing, with the greatest average losses in the

TABLE 7

**Regional Impact of Price-Rebalancing in Telecoms and Gas (Consumers Only)**

| | Mean gain (£ p.a.) | | Percentage of group in lowest quartile of gains | | Percentage of group in highest quartile of gains | |
|---|---|---|---|---|---|---|
| | *Telecoms* | *Gas* | *Telecoms* | *Gas* | *Telecoms* | *Gas* |
| All | 0.0 | 0.0 | 25 | 25 | 25 | 25 |
| North | –6.1 | 0.2 | 31 | 26 | 18 | 24 |
| Yorkshire and Humberside | –6.0 | –1.5 | 34 | 30 | 20 | 19 |
| North-West | –2.2 | –1.3 | 27 | 28 | 22 | 20 |
| East Midlands | –4.6 | –3.5 | 29 | 41 | 21 | 11 |
| West Midlands | –2.8 | –4.9 | 30 | 44 | 21 | 8 |
| East Anglia | –1.8 | –0.5 | 28 | 23 | 23 | 23 |
| Greater London | 13.4 | 0.1 | 21 | 20 | 36 | 24 |
| Rest of South-East | 3.1 | 2.5 | 24 | 17 | 27 | 35 |
| South-West | –2.0 | 2.3 | 26 | 14 | 23 | 32 |
| Wales | –3.3 | 1.6 | 25 | 19 | 23 | 32 |
| Scotland | –0.3 | 4.2 | 23 | 17 | 21 | 31 |
| *Numbers* | *17,901* | *15,906* | | | | |
| *Boundary* | | | *–£24.05* | *–£8.78* | *£9.03* | *£12.02* |

North and Yorkshire and Humberside. In these areas, over 30 per cent of households lose more than £24 a year and only 20 per cent gain more than £9. For gas, the pattern is rather different, with the South-East, the South-West, Wales and Scotland gaining at the expense of the rest of the country (our analysis is based on the situation before any differential price reductions in South-West England). The losses for the East Midlands and the West Midlands are particularly striking: an average of £3.50 and £4.90 a year, respectively, with more than 40 per cent of households losing more than £8.78 and less than 10 per cent gaining more than £12.

Analysis by type of area (metropolitan areas, high, medium and low density) did not reveal very different gains and losses for these groups as a whole. Only the electricity and water regulators have a duty to take account of the needs of those in rural areas, and analysis of changes in the water industry suggests that those in rural areas have seen higher price rises than others. However, this is due not to competition but to different conditions of water supply. It is unfortunate that our electricity sample is too geographically skewed to yield useful comparisons of rural and urban households.

## V. FUTURE CHANGES IN PRICES, COMPENSATION SCHEMES AND CONCLUSION

Price-rebalancing removes the cross-subsidies sustained by monopoly. Our analysis shows differences in the gains for various household groups. So far, these have been small, but we have argued that much greater changes are likely to follow. Political sensitivity and fear of regulators' attentions (both the gas and electricity regulators and the Energy Minister have commented on charges to prepayment consumers) may have limited rebalancing, but such constraints will inevitably be eroded by competitive forces from 1998 as all energy markets are opened. As deregulation proceeds over the next two years, we can expect substantially larger changes. The effect of competition will be accentuated by the requirement for the monopoly elements to make their charges more cost-reflective. In the summer of 1997, British Gas sought to increase both its charges to suppliers per residential consumer served and the charges for prepayment meters. These changes have not yet been implemented, but if they are, they will further exacerbate the regressive distributional effects, since low-income households generally consume less gas and are more likely to use prepayment.

So far, rebalancing has been constrained by both explicit and informal regulatory control. In a market where potentially competitive parts are completely deregulated and prices of monopoly services are fully cost-reflective, we might expect between four and 10 times the rebalancing effects observed and analysed above. We have seen that this will have a negative impact on pensioners and low-income households. Those paying by regular credit payment for gas and electricity might lose between £40 and £100 a year, and we have

seen that there are additional pressures to increase the charges to prepayment meter users.[7] This exacerbates the financial exclusion of households without bank accounts or poor credit rating who cannot use direct debit payment methods (Hancock and Waddams Price, 1995). Households in receipt of pensions and benefits that do not consume these products at all also lose, because the retail price index (RPI), used to uprate their payments, incorporates the lower average prices paid for these utilities. We note that the lowest income groups are less likely to purchase telecoms and gas. Because the RPI reflects substantial average savings of nearly £200 a year for telecoms and gas since privatisation of these industries, benefits and pensions are correspondingly lower, although recipients themselves have not enjoyed the average level of gains.

Moreover, these are average figures for the groups as a whole. The tables show considerable dispersion in the distribution, suggesting that some households, particularly those in vulnerable groups, will be worse off as a result of future rebalancing. These effects are significantly regressive and may impose considerable hardship on the families concerned. Although comparatively small compared with other distributional changes over the past 15 years (Atkinson, 1993), they are in the same direction and further exacerbate these regressive changes.

Because our analysis centres on price changes already implemented, we have not included differential prices for different parts of the country which are expected in the gas industry. As carriage costs are reflected more accurately in gas prices, they will tend to rise in the South-West and Wales, and fall in Scotland and North-East England. This will counter some of the heaviest telecoms losses in northern England but exacerbate those in the South-West of England and Wales. In telecoms, the regulator is likely to continue to impose uniform prices. The electricity regulator may continue to encourage transmission charges to be more cost-reflective, raising prices in the South and lowering them in the North of England.

The rebalancing arises from removing cross-subsidies that have been practised over decades by the nationalised industries and their privatised monopoly successors. If deregulation results in oligopoly, it may not necessarily increase efficiency. Such a possibility makes it even more important that deregulation proceeds in such a way as to maximise the chance of robust competition. The regressive distributional effects that we have identified threaten this process because the present regulatory regime in the UK contains no appropriate policy tool to rectify the losses. The public outcry over rebalancing gas prices in the wake of the 1997 Monopolies and Mergers Commission Report (*Observer*, 27 July 1997) and the call for regulatory action demonstrate the

[7]These larger price changes may challenge some of our assumptions of non-responsiveness of demand, but we believe our analysis remains indicative of distributional effects.

pressure for regulatory intervention, which might prove inappropriate and skew the development of competition.

One way to provide some compensation for those losers who are in receipt of pensions and other social security benefits (who constitute some of the most vulnerable consumers) is through the levels of these benefits. Our analysis certainly provides a reason to revisit the question of whether annual benefit upratings should take more account of the expenditure patterns of their recipients than is implied in the use of the general RPI. Historically, there has always been resistance to regional variations in benefit levels, making it difficult to address this aspect of the distributional consequences of tariff-rebalancing through the benefit system. In the present political climate, one-off increases in benefits seem unlikely. We would not wish to rule out the possibility of reflecting the distributional consequences of rebalancing in pension and benefit payments. However, regulators have special (but unspecified) responsibilities for pensioners and disabled people; are there appropriate remedies that they could enact? We suggest two schemes.

Cross-subsidies could be enforced through the monopoly part of the industry, and each industry will retain such an element (which will engender the necessity for continued regulation). It would be possible to instruct the monopoly supplier to continue or impose cross-subsidies (for example, requiring geographic averaging of prices as in telecoms or enforcing continued cross-subsidy of prepayment by other energy consumers). A regulator might offer explicit subsidies for supplying particular groups of 'vulnerable' consumers, raising the money from a general tax on the monopoly element (i.e. other consumers). This is effectively what the gas regulator does in discouraging BG Transco's moves to reflect the higher costs of prepayment meters in its charges to suppliers, and what the Green Paper on regulation suggests in Chapter 5 (Department of Trade and Industry, 1998).

A third possibility — capping individual tariffs — is essentially a variation of such intervention, given the implicit link between prices in different markets afforded by a cap on average prices or revenue. All three regulators concerned have used such a mechanism to protect particular groups from rebalancing as competition develops. The gas and electricity regulators have done so or propose to do so (Ofgas, 1996; Offer, 1997) by caps on different elements of tariffs, particularly for those supplied through prepayment meters; the telecoms regulator has narrowed the price cap so that it encompasses only consumers who use the telephone relatively less intensively and so have less competition for their custom (Oftel, 1996). The problem with separate price caps is that they also constrain the attractiveness of the market to new entrants and so may deny other benefits of competition to these consumers. Moreover, the way in which competition develops is strongly influenced by such regulatory intervention, possibly distorting the development of the market in the longer term. However,

price caps can play an important, limited role in slowing down the speed of rebalancing while more appropriate compensation mechanisms are introduced.

Each of these regulator-imposed schemes effectively involves the regulator imposing taxes and subsidies through the monopoly supplier, which might amount to acting *ultra vires*. It would also require considerable double-guessing on the part of the regulator and might lead to some strange inconsistencies if the regulators acted independently of each other and of government. An additional policy instrument is needed to mediate the trade-off between efficiency and equity and to provide some of the welfare functions that the nationalised industries can no longer perform. We welcome the Trade and Industry Committee's suggestion that energy regulators should monitor the development of competition (Trade and Industry Committee, 1997). Without a co-ordinated compensation policy, the potential benefits of competition for consumers as a whole may be gained at the expense of those households least able to afford it, with consequent implications for social and national cohesion, or may be lost altogether because of public resistance. Both in the UK and in other countries opening up markets to competition, there needs to be central co-ordination and direction on such distributional effects.

## APPENDIX A: TECHNICAL APPENDIX — USE OF THE FES

We estimate gas consumption from recorded expenditures and tariffs prevailing at the times households were interviewed in the Family Expenditure Survey. Since interviews with households are spread throughout the year, we make a seasonal adjustment (as described in Hancock and Waddams Price (1995)). This permits us to look at the distribution of gas consumption as well as average consumption levels for subgroups of households. For those households that pay for their gas using a slot meter, we are forced to make a somewhat *ad hoc* adjustment to their implied gas consumption. Conversion of their gas expenditure to consumption using prevailing tariffs tends to overestimate their consumption, since this method of payment is frequently used as a means of collecting debt on past consumption. The average of our original estimates for the consumption of prepayment customers was about twice the corresponding British Gas figure. We therefore scale down all estimated gas consumption levels of prepayment customers by 50 per cent.[8] Having arrived at estimates of consumption levels for each FES household, and knowing which payment

[8]Note that the information collected in the FES on slot meter rebates does not help here. First, it relates to rebates in the last three months. BG aims to assess and give rebates every six months. Thus the FES is likely to identify only 50 per cent of customers who have received rebates in the last year. Second, rebates usually occur once people have paid off their debt and result from the delay in resetting the meter to normal tariffs. Thus, even if we could identify all rebates, we would still be left with an overestimate of consumption for those still paying off debt.

method each household used, we are then able to estimate expenditure under pre- and post-privatisation tariff regimes.

In the case of electricity, we need to establish which company supplied each household in order to apply an appropriate price index. This is done on the basis of the standard region in which each household lives; our analysis of electricity is therefore restricted to the six-and-a-half thousand households in Great Britain where this is possible. At least some consumers in the following regions are included in our electricity analysis: East Midlands, East Anglia, West Midlands, Wales, Yorkshire and Humberside, North and Scotland. We have to make a similar adjustment for those using prepayment meters to that for gas, by reducing consumption figures by one-third, to bring them into line with information from Offer about average consumption levels for such consumers.

For telecoms, we use a different approach because it is not possible to use recorded expenditure to infer consumption levels directly. Our approach is to construct relevant real[9] price indices, distinguishing fixed and variable elements as appropriate. These are then applied to recorded expenditure to arrive at estimates of real expenditure before and after privatisation. For telecoms, we cannot distinguish between bills paid to different telecoms providers and have ignored the possibility of non-BT provision. This results in an underestimate of telecoms expenditure for those whose last bill represents only part of their expenditure. Any bias will tend to underestimate the gains of high-income groups and those in Greater London, where penetration by BT's competitors is greatest. We are also unable to identify consumption on different kinds of telephone calls, so have not been able to capture the effect of rebalancing prices between different call categories (long-distance and local, peak and off-peak). However, we have included in our analysis the light-user tariffs for telecoms for households whose expenditure level indicates that they were eligible.

Where households are classified according to income level, this is what is left of the sum of net income of household members from all sources after the household's housing costs have been met. It is adjusted to a 'per-equivalent-adult' basis by an equivalence scale of 1.0 for the first adult in the household, 0.7 for each subsequent adult and child aged 14 or over, and 0.5 for each child under the age of 14, to allow for household composition. The income is converted to April 1996 prices according to movements in the all-items RPI. Pensioner households are those consisting exclusively of one or two persons of state pension age. Disabled households are those containing at least one person in receipt of a disability benefit. Households on income support are those where one or more people receives income support. Table A.1 shows the relation between income and other household characteristics.

[9]That is, indices that reflect price changes relative to general inflation as measured by the all-items RPI.

TABLE A.1

**Household Characteristics of Income Quintiles**

*Per cent*

| | Quintile | | | | | All |
|---|---|---|---|---|---|---|
| | *1* | *2* | *3* | *4* | *5* | |
| All | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 100 |
| One pensioner | 19.7 | 42.5 | 16.0 | 10.6 | 11.3 | 100 |
| Two pensioners | 12.5 | 28.3 | 26.0 | 17.4 | 15.9 | 100 |
| One adult + children | 46.4 | 14.8 | 11.7 | 12.2 | 14.8 | 100 |
| Other, children under five | 30.0 | 24.1 | 24.2 | 13.9 | 7.8 | 100 |
| Other, three or more children | 17.6 | 16.5 | 24.0 | 24.4 | 17.4 | 100 |
| Other | 15.6 | 12.8 | 20.3 | 24.9 | 26.4 | 100 |
| On disability benefit | 13.4 | 26.0 | 29.6 | 20.3 | 10.7 | 100 |
| On income support | 55.5 | 26.7 | 10.6 | 5.3 | 1.9 | 100 |

## APPENDIX B: MEASURING WELFARE CHANGE

Our measure of welfare change for each individual is the difference between price at privatisation and price in 1996 multiplied by our estimate of consumption from the Family Expenditure Survey data. Figure B.1 illustrates this measure and its relation to other standard measures of welfare change. ab is the uncompensated demand curve; ac represents the demand curve compensated to keep the consumer at his original (privatisation) utility level; db is the compensated demand curve at the (higher) 1996 utility level. $p_1$ and $p_2$ are the (real) prices at privatisation and in 1996, and $x_1$ and $x_2$ are the corresponding demand levels for each household. We assume that these are normal goods.

$x^*$ is the quantity that the household consumed when it was questioned for the FES. The FES provides expenditure data, and $x^*$ is estimated from knowledge of tariffs prevailing at the time of interview. This consumption level was realised between the times and the prices when a and b were observed, and therefore lies between $x_1$ and $x_2$.

Our measure of welfare change is then

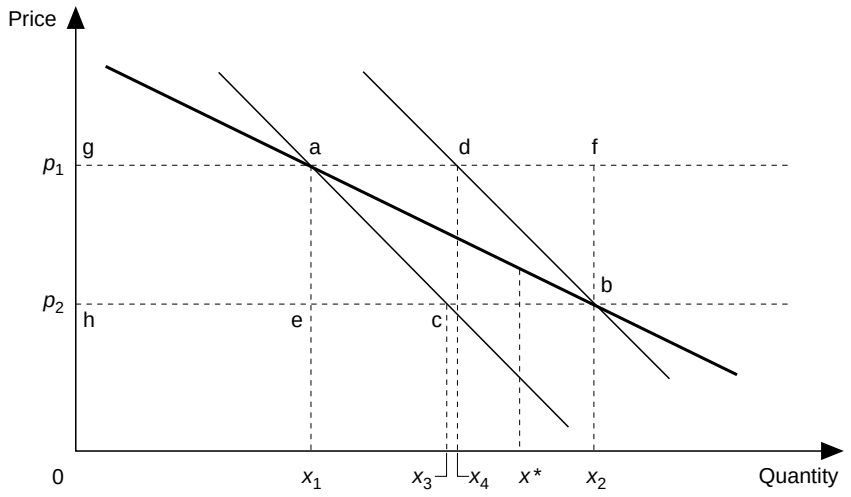
$$\Delta W = x^*(p_1 - p_2).$$

The Laspeyres measure of welfare change is

$$L = x_1(p_1 - p_2).$$

FIGURE B.1

**Measures of Welfare Change**




The Paasche measure is

$$P = x_2(p_1 - p_2).$$

Since $x_1 < x^* < x_2$, $\Delta W$ lies between the Laspeyres and Paasche indices.

If $x^* \approx \frac{x_1 + x_2}{2}$, then $\Delta W$ is close to the Marshallian consumer surplus, $\Delta M$, represented by gabceh.

Compensating variation, *CV*, is gaceh, and the equivalent variation, *EV*, is given by gadbceh.

If demand is linear,

$$\Delta M = x_1(p_1 - p_2) + \frac{(p_1 - p_2)}{2}(x_2 - x_1),$$

i.e. $$\Delta M = \frac{(p_1 - p_2)}{2}(x_1 + x_2).$$

Similarly,

$$CV = \frac{(p_1 - p_2)}{2}(x_1 + x_3)$$

and

$$EV = \frac{(p_1 - p_2)}{2}(x_2 + x_4).$$

Since $x_1 < x_3 < x_4 < x_2$, we have the standard result that $L < CV < \Delta M < EV < P$.

The relative value of our measure, $\Delta W$, depends on the value of $x^*$. Our measure of welfare change is close to a Paasche measure if $x^* \approx x_2$ and to a Laspeyres measure if $x^* \approx x_1$. In the former case, we are likely to have overestimated welfare changes; in the latter case, we are likely to have underestimated them. Expenditure was observed during 1991–93, a time closer to 1996 than to the dates of privatisation for BT and gas but closer to privatisation (1990) for the electricity industry. We would therefore expect our measure to overestimate gains for telecoms and gas and underestimate them for electricity.

Where we express our measure of welfare change as a proportion of income, this is unequivalised income after meeting housing costs.

TABLE C.1

**Prepayment for Gas and Electricity:**
**Percentage of Each Category Using Prepayment Meters**

| | Gas | | | Electricity | | |
|---|---|---|---|---|---|---|
| | *1991* | *1992* | *1993* | *1991* | *1992* | *1993* |
| All | 3 | 4 | 5 | 9 | 10 | 13 |
| | | | | | | |
| Pensioner households | 3 | 2 | 4 | 3 | 3 | 4 |
| On disability benefit | 6 | 6 | 8 | 14 | 13 | 20 |
| On income support | 10 | 11 | 13 | 29 | 26 | 34 |
| *Income quintile* | | | | | | |
| Lowest | 7 | 9 | 10 | 22 | 61 | 17 |
| 2nd | 5 | 5 | 8 | 9 | 9 | 14 |
| 3rd | 3 | 3 | 4 | 4 | 8 | 9 |
| 4th | 2 | 1 | 1 | 5 | 5 | 5 |
| Highest | 1 | 1 | 1 | 2 | 2 | 1 |
| | | | | | | |
| *Numbers* | *178* | *198* | *246* | *2,233* | *2,318* | *2,166* |

## APPENDIX C: PREPAYMENT FOR GAS AND ELECTRICITY

The only significant difference we detected between the years 1991, 1992 and 1993 was an increasing proportion of consumers using prepayment meters for gas and electricity. Our data show that, within this, an increasing *proportion* are in the lower income groups. The change from credit to prepayment meters is therefore itself regressive in effect, as more low-income households move onto a higher cost tariff.

In 1997, the proportion of gas users paying by prepayment meter was 5 per cent and the corresponding electricity figure was 15 per cent.

## APPENDIX D: COMBINING THE INDUSTRIES

We can examine the combined effect of the three industries on the subsample of households for which we have data consumption on all three industries including electricity. We know that this is a biased sample (in particular, with households in the highest income quintile under-represented) but it gives some idea of the general pattern. The bias emerges largely because of the limited geographical areas for which we could identify electricity suppliers and tariffs. These exclude the whole of the South of England, where incomes are highest and gains for telecoms and gas are greatest. The changes in tariffs in our subsample are similar to the average for Great Britain as a whole. If the pattern in electricity is similar to those in gas and telecoms, our subsample excludes a disproportionate number of those who have benefited from rebalancing and will have a lower range than the full sample. Moreover, if the gains and losses were constrained to zero for a more representative group, the average gain for our subsample would almost certainly be negative for electricity, as we observe for the other two industries. However, the inclusion of non-consumers corrects a bias in Table 4 which underestimates the differences between household groups because it aggregates only the gains and benefits of *consumers* in each industry, and we have already seen that those who are on lower incomes are less likely to consume both telecoms and gas. Moreover, higher-income households spend more on these services.

A similar pattern emerges to that in previous tables, with relatively high losses — here, £17.60 on average for pensioner households (about 0.4 per cent of income). We have also restricted our sample to those who are customers of all three industries, with similar results.

TABLE D.1

**Gains from Price-Rebalancing since Privatisation:**
**Combined Analysis for Telecoms, Gas and Electricity (including Non-Consumers of Telecoms and Gas) — pounds per year and as a percentage of income**

| | *Telecoms (£)* | *Gas (£)* | *Electricity (£)* | *Total gain (£)*[a] | *Total gain as a percentage of income* | *Gain with mean gain standardised to zero (£)* | *Numbers*[b] |
|---|---|---|---|---|---|---|---|
| All | –3.32 | –1.71 | 0.00 | –5.05 | –0.09 | 0 | 6,468 |
| | | | | | | | |
| Pensioner households | –13.10 | –3.30 | –1.20 | –17.60 | –0.40 | –12.55 | 1,623 |
| On disability benefit | –1.77 | –1.47 | –1.62 | –4.96 | –0.06 | 0.09 | 745 |
| On income support | –0.81 | –1.36 | 0.04 | –2.40 | –0.14 | 2.65 | 1,060 |
| *Income quintile* | | | | | | | |
| Lowest | –2.69 | –2.05 | 1.13 | –3.75 | –0.05 | 1.30 | 1,273 |
| 2nd | –7.30 | –1.55 | –0.85 | –9.78 | –0.24 | –4.73 | 1,416 |
| 3rd | –4.72 | –1.44 | –0.32 | –6.52 | –0.09 | –1.47 | 1,432 |
| 4th | –2.56 | –1.28 | 0.60 | –3.26 | –0.04 | 1.79 | 1,309 |
| Highest | 2.24 | –2.38 | –0.65 | –0.53 | –0.02 | 4.52 | 1,038 |
| | | | | | | | |
| *Numbers*[b] | *6,616* | *6,665* | *6,717* | *6,565* | *6,468* | | |

[a]This column represents the total gain from all utilities for each household, averaged over all the households in each group, and is not necessarily the same as the sum of the average gain in each group for each utility.
[b]The column ‘Numbers’ and the row ‘Numbers’ differ because for a few households there is information on expenditure but not on income.

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