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UK PRIVATISATION AND HOUSEHOLD WELFARE

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Introduction

In the last twenty years, privatisation of public utilities in UK has been associated with significant price movements. As reported by Kay (2000), in the period 1979-1999, prices increased by 507 per cent for water, by 308 per cent for railways, by 275 per cent for buses, by 157 per cent for gas, by 119 per cent for electricity and by 94 per cent for telecommunications. In the same period, the retail price index for all goods and services increased by 225 per cent. Real prices have therefore followed opposite paths in different utilities and across different periods (typically before and after privatisation).

Has this apparently significant realignment of prices damaged consumers? And how much of the welfare change may be imputed to the privatisation process *per se*?

These questions may be particularly well addressed in the case of UK, as the privatisation process of many utilities has enough a long history. British Telecom was privatised in 1984; the gas sector in 1985; local public transport started to be privatised in 1986; the electricity sector followed in 1989; water and rail followed in 1989 and 1996, respectively. This gives the opportunity to capture both short and long run effect of the privatisation process, to understand whether gains to consumers take time to emerge from such a reform and to isolate the relative merit of privatisation in the overall price evolution. As it is briefly described in Section 1, there are very few studies adequately coping with these issues.

To answer these questions, this paper will apply the methodology developed by Newbery (1995) to investigate Hungarian and UK distributional effects of price changes, and Liberati (2001), for the case of indirect tax changes in Italy. This methodology will be explained in Section 2.

The paper will first investigate real relative price changes at consumer level. This is done in Section 3, where the evolution of prices is related to the timing of privatisation, and in Section 4, where corresponding welfare changes are calculated for various degree of inequality aversion and with various years of Family Expenditure Survey (FES). A set of six utilities is here considered: electricity, gas, water, bus, telecommunications and railways from 1979 to 2002.

The role of privatisation is instead investigated in Section 5, where, according to some assumptions, the evolution of exogenous input costs is taken into consideration. To this purpose, real relative price changes from 1984 to 2002 are calculated for a restricted set of four privatised utilities: electricity, gas, telecommunications and bus. This means losing a significant part of the public ownership period. Water is very imperfectly recorded from 1984 to 1987 for both consumer prices and water delivered unit costs. Furthermore, reliable water delivered unit costs is only available from OFWAT since

1992. For railways, it has not been possible to build a consistent set of measures back to 1984.

Depending on the availability of data, three sub-periods will be distinguished: before privatisation; five years after privatisation and the remaining period. Since the analysis has a marginal nature, in order to take into account the variability of consumption patterns across households in such a long period and to limit errors due to the wrong choice of data, Family Expenditure Surveys (FES) for three years are used: 1986, 1991 and 2000.

The main result of the paper is that while the welfare gain is rather marked when considering the evolution of consumer prices, the role of privatisation *per se* in total welfare change seems much more limited. Furthermore, while the privatisation in the telecommunication sector contributes highly to the welfare change measured by the evolution of consumer prices, its contribution is much lower when alternative hypotheses on the role of technology and on the measure of exogenous input costs are considered.

1. Privatisation, redistribution and welfare

In spite of the potential significance of price changes in the sector of public utilities, there have been very few empirical studies available for the UK where price changes are converted into either a social welfare or a distributional analysis. Even less those that have tried to disentangle the contribution of privatisation *per se* on the evolution of consumer prices.

Much of the attention, as surveyed by Pollitt (2000), has indeed been paid to efficiency issues. For example, Martin and Parker (1997) devote only few pages to the issue of the effects of British privatisation on income distribution. Beesley (1997) gives only scattered reference to income distribution and welfare issues. Meek (1998) provides for some aggregate information on price behaviour in the gas, telecommunications, electricity and water markets, without going into the details of a distributional or welfare analysis. Markou and Waddams Price (1999) also give only summary evidence of the distribution of gains and losses among consumers while assessing past reform and current proposals of UK utilities. Ernst (1994), one of the first considering the role of privatisation for consumers, suggests that the outcomes for consumers have been mixed and that low-income consumers have been affected more adversely than the generality of consumers. Saunders (1995), instead, claims that consumers have generally benefited from lower prices and better services, giving spotted evidence on telecommunications, electricity, gas and water markets.

Two notable exceptions to the scarcity of welfare/distributional studies are Waddams Price and Hancock (1998) and Newbery and Pollitt (1997). The first paper addresses the issue in a rather comprehensive way, investigating the distributional impact of liberalising electricity, gas and telecommunication sector. The main result is that all groups have gained on aggregate through lower prices in these utilities since privatisation. However, the authors argue, these gains are not necessarily directly attributable to privatisation itself (p.304), as already evidenced by Newbery and Pollitt (1997) for the gas sector and by enormous technological changes in the telecommunication sector. In a counterfactual exercise isolating the effects of re-balancing prices, they found that the distribution of gains among consumers is uneven, with the lowest and the two highest quintiles gaining and the second and third quintiles losing from price liberalisation. However, this distributional impact is not converted into a social welfare analysis, i.e. gains and losses are not aggregated in order to measure social welfare changes.

Newbery and Pollitt (1997), instead, focused on the electricity market, in particular on a social cost-benefit analysis of the Central Electricity Generating Board (CEGB). According to some forecasts of profits and future prices, the authors find that social welfare may increase if prices converge to forecast prices in year 2000, while it may decrease if those prices converge in year 2010. Different discount rates of future streams of profits and consumers' gains and losses may also alter the sign of the social

welfare change (p.295). The social welfare analysis carried out by Newbery and Pollitt (1997), however, is confined to the electricity market and based on a simulation strategy where the public ownership of the CEGB is predicted in years 1989-96 as a counterfactual. On the other hand, unlike the present paper, Newbery and Pollitt (1997) go through a social cost-benefit analysis of the CEGB privatisation, considering its impact on efficiency, investments and fuel choices.

More recently, Brau and Florio (2001) tried to fill the gap on the welfare side of the analysis, by considering privatisation as a price reform. This attempt, however, is limited in scope as only the aggregate consumer price change in the period 1979-1999 is considered and the use of British microdata is given up for simplicity, by relying on an imperfect matching with distributional characteristics as calculated by Newbery (1995). Furthermore, as far as it is understood, there is no attempt to disentangle the role of the privatisation process *per se*.

This paper adds to the existing literature in two directions. First of all, it considers real relative price changes for a sufficiently large time span to capture both short and long run effects of privatisation. Privatised utilities may take some years to adequate to private standards, especially in those sectors where market competition did not follow privatisation immediately. Second, it attempts to give information to the contribution of privatisation to the welfare change. To this purpose, it compares real relative price changes at consumer level with real relative price changes at cost level. In order to disentangle the effects of privatisation, however, a counterfactual hypothesis is needed. This hypothesis must take into account first that some price reduction at consumer level might have been driven by analogous reductions of exogenous input costs and second that the way price have increased during that period may be affected by price-cap regulation applied to all sectors.

2. Theory

Theory used to convert relative price movements into welfare changes draws on Newbery (1995). In order to isolate the welfare effects of price movements on British households, we calculate real relative price changes over the analysed period.[1] Real relative price changes, in our case, is a series of changes measured by the ratio of prices of privatised utilities to the general price index in one year and the year immediately before.

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[1] See Newbery (1995) for an application to Hungary and UK and Liberati (2001) for an application to indirect taxes in Italy.

If we assume that households' money income varies proportionally to the general price index, i.e., real income is kept constant, the indirect utility function of each household can be expressed by:

[1] $$v^h\left(C^h, \pi\right)$$

where $C^h = c^h / P$ is real expenditures, $\pi_i = p_i / P$ is the real relative price of good i at the base period and $P = \sum_i \omega_i p_i$ is the general price index measured at the base period budget share ω_i.[2]

If we normalise to one all consumer prices at the base period, $P = 1$ and $\pi_i = 1$, $\forall i$. The change in real relative prices can therefore be expressed as follows:

[2] $$\Delta\pi_i = \pi_i^* - \pi_i = \pi_i^* - 1$$

where $\pi_i^* = p_i^* / P^*$, p_i^* is the new consumer price and $P^* = \sum_i \omega_i p_i^*$ is the new general price index, with fixed weights referring to the base period. The property of this approach is that with proportional increases of all prices, all p_i^* and P would grow at the same rate, which implies $\Delta\pi_i = 0$, $\forall i$.

Another advantage of this approach is that the social welfare function may be directly expressed as a function of real relative price changes rather than as a function of nominal price changes. In particular, let us define the distributional characteristic d of good i as follows[3]:

[3] $$d_i = \frac{\sum_h \beta^h x_i^h}{\overline{\beta} X_i}$$

β^h is the welfare weight attached to household h, $\overline{\beta}$ is the average social welfare weight, x_i^h is consumption of good i by household h, and X_i is aggregate consumption of good i. Also in [3], $\beta^h = \left(E^h\right)^{-e}$, where E is equivalised households' total expenditures (by OECD equivalence scale) and e is the parameter of inequality aversion.

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[2] This way of defining the indirect utility function is assured by homogeneity of degree zero in nominal prices and money income.

[3] See Feldstein (1972).

It is known that the first-order change in social welfare due to a nominal price change can compactly be expressed by:

[4]
$$\frac{\partial W}{\partial p_i} = -\overline{\beta} d_i X_i$$

Generalising expression [4] to the case of real relative price changes and multiple goods, one can write the first-order total change in social welfare as:

[5]
$$\Delta W = -\overline{\beta} \sum_i d_i X_i \Delta \pi_i$$

Expression [5] gives the welfare change of a tax reform caused by movements of real relative prices only. As already observed, a proportional increase of all prices would leave welfare unaffected. Should real relative prices move differently, welfare gains or losses may occur.

Normalising $\overline{\beta} = 1$ and standardising welfare changes on the initial level of welfare W, one can get the following expression:

[6]
$$\frac{\Delta W}{W} = -\frac{\sum_i d_i X_i \Delta \pi_i}{\sum_i d_i X_i}$$

Dividing both the numerator and the denominator by aggregate expenditures X, one can get the equivalent expression:

[7]
$$\frac{\Delta W}{W} = -\frac{\sum_i d_i \omega_i \Delta \pi_i}{\sum_i d_i \omega_i}$$

Performing this analysis has some shortcomings and one should be aware of these limitations. First, and most important, is the fact that the analysis is only considering the first-order impact of price changes on social welfare. A more sensible way to deal with the issue would be that of considering second-order effects, which means including in the analysis consumers' responses to price changes on the consumption side. Our approach, as in the case of Waddams Price and Hancock (1998), is that consumption of utilities is unresponsive to changes in both their own price and the

price of other goods.[4] However, unlike the case of Waddams Price and Hancock (1998) and in order to take into account consumption variability in a simple form, the analysis is here performed using three different expenditure surveys (and therefore three different weights) that should embody consumption changes across years. In particular, the analysis is carried out on three years: 1986, 1991 and 2000. To this purpose, table 1 shows the percentage distribution of expenditures on utilities on the three years by quintiles of equivalent income. As can be easily seen, the path of consumption across quintiles does not show striking differences over years, with the possible exception of water (becoming more equally distributed in 2000) and rail in 1991 (compared with the same distribution in 1986 and 2000).

Second, quality issues are not included in real relative price changes. Quality adjusted prices would have been a more correct measure of welfare. Consumers may indeed gain from privatisation in two ways: first, because prices fall; second, because the quality of the service improves. If either of the two does not occur, the sign of consumers' welfare may be ambiguous. It might be the case that lower prices reflect lower quality, which is one of the main arguments of opponents to privatisation processes. This would mean that consumers were not paying less for the same service, rather that they were paying less for a different service. In this case, welfare gains measured on relative prices may conceal a welfare loss due to quality reduction. Because of lack of meaningful data on quality, this paper does not address this issue.

3. Real consumer price changes and the timing of privatisation

Before proceeding with the welfare analysis, it is worth relating real relative price changes to the most significant stages of the privatisation process of each utility. First of all, it is worth recalling that regulation of utilities, in UK, is mainly based on price caps. Furthermore, from 1997, individual price caps have been introduced in gas and electricity markets, replacing the average price cap allowing re-balancing within those utilities. Also in the telecommunication market, the basket of controlled prices was reduced from 1997, one of the major elements being the removal of constraints on the line rental. A price cap method, corrected by a factor K, is also in place for water companies in order to allow them to recover capital costs. For Railtrack (the railway infrastructure company floated in the stock market in 1996), a price cap is also applied for access charges for service. In the bus sector, instead, deregulation has been the key issues, with tendering for routes applying to London buses only.

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[4] Waddams Price and Hancock (1998; 301) also justify their welfare measure by saying that demand responses may be small because price changes themselves are relatively small.

Figure 1 illustrates the evolution of real prices of utilities since 1980. By this way, one can appreciate what happened before privatisation started, immediately after and in a medium-term perspective.[5]

Let us start with electricity. The path of real prices reveals that significant reductions started well before the time of privatisation, occurred in 1990. Starting of privatisation, therefore, does not seem to cause a structural break in price behaviour.[6] This may be due to the replacement of the public monopolist with private monopolists. This happened in the supply stage of the process, where the public monopolist was replaced with a private monopolist supplying electricity at regional level through 14 regional companies (RECs) until 1998. This also happened at the generation level, where the public monopolist (the Central Electricity Generating Board – CEGB) was replaced by three companies having market power (National Power, PowerGen and British Energy).[7] To identify a sharp and continuous decline in prices, indeed, one has to wait until 1995. At that time, the majority of electric companies, possibly in response to the introduction of competition in the gas market (see below), have started to re-balance their tariffs, producing reductions until 2002. It is also worth noting that in the period immediately after privatisation, real prices have increased. From a regulatory point of view, it is worth recalling that each REC has its own X, which ranges from 0 to 2.5.

In the case of gas market, there is similar evidence. Real prices started to decrease some years before privatisation, following a period of real increases from 1980 to 1983 under public ownership. However, this is mainly due to an analogous change in the cost of natural gas at delivery points. After privatisation, real prices behaved as expected, showing a continuous fall, with the possible exception of the last year. On the regulation side, it is worth recalling that with the price review of 1991, the factor X in the price cap formula was increased from two to five after a rise in companies' profits of about 45 per cent. With one possible exception of 1994, this decline was reinforced at the time when competition in the gas market was announced (November 1994) and immediately after. It is worth recalling that the regulator, at that time, decreased X from five to four. In 1997, X was set equal to two. Corry (1995) already gave evidence that between 1986/87 and 1995 British Gas non-tariff prices fell by over 35 per cent in real terms, while regulated tariffs fell by 20 per cent. However, Ernst (1994) estimated that not all cost savings (especially from gas purchase) were passed on to consumers. If they had been a further 3 per cent reduction was feasible. This would mean a divergence between prices and costs. We will back to this issue below.

In the case of telecommunications, privatisation occurred in 1984. Again, it is worth noting that some increases occurred under public ownership between 1980 and 1982.

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[5] Below, where the production side will be added, we will be forced to focus on the period 1984 to 2002 for all utilities (excluding water and rail), losing the information on public ownership, because of lack of homogeneous data.

[6] See, for example, Giulietti and Otero (2002).

[7] See also Waddams Price and Hancock (1998).

After privatisation started, with possibly few exceptions, real prices of telecommunications followed a decreasing trend. After some stasis in the first two years after privatisation, caused by rebalancing between domestic and business tariffs, the introduction of competition, by allowing Mercury entry on the bcal market, and significant technological changes, especially on long-distance calls, have allowed real decreases over the whole period.[8] The regulator may have played its role by setting an initial X at 3 per cent at privatisation and increasing it at 4.5 for 1989/91, 6.25 for 1991/93 and 7.5 for 1993/97, in response to the evidence that the company was making large profits.[9] X was back to 4.5 for 1997/2001. Significant price reductions concentrated in long-distance call charges, leading to a 40 per cent reduction in real terms for all regulated tariffs, is also reported by Markou and Waddams Price (1999).

In the case of local bus transport, whose privatisation at urban level started in 1986, things do not seem to have worked in the same direction as in the case of other utilities. Irregular patterns of price changes emerge before privatisation, while after privatisation there is a striking increase of real prices over the whole period. With the 1980 Transport Act, interurban bases were deregulated first. Local bus services (except London buses) were instead deregulated with the 1985 Transport Act. At the same time, the National Bus Company was privatised. This process was in fact completed in 1988 and followed in 1992 by the privatisation of the Scottish Bus Group included in the 1989 Transport Scotland Act. The full effect of deregulating local bus services outside London, therefore, took place in 1987.[10] London buses, instead, were first subdivided in 11 operating subsidiaries in 1989 and then sold to private operators mostly in 1994. Privatisation, in the case of London buses, operated mainly through tendering of either individual or groups of routes, rather than through deregulation by itself. As a result of this process, prices for interurban buses fell since privatisation, those for urban (including London) and rural buses went up. One explanation why privatisation did not push prices down, as argued by Hibbs (2000), is that bus fares have for far too long been too low to permit a higher standard of the quality of the product. An alternative one is that the bus service is relatively more labour intensive than other utilities.

Privatisation of the water sector was carried out in 1989. Compared with other utilities, the process of privatisation has a clear upward impact on prices. Privatisation, indeed, did not lead to actual competition in the market, as water companies are still local monopolists in the corresponding geographical region. Some calculation made by Waddams Price and Hancock (1988; 304) estimated an increase in the water bill by about £ 70 in the 1989-96 period. As the authors argue, this may cast some doubts on the effects of privatisation *per se* on price movements. Indeed, other privatised utilities

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[8] On this, see again Giulietti and Otero (2002).
[9] This might lead to the conclusion that OFTEL was in fact regulating profits and not prices. In any case, this denotes an aggressive behaviour of the regulator in passing efficiency gains to consumers as soon as possible.
[10] See, on this, Parr (2000).

have also benefited from gains external to the privatisation process, as lower gas costs due to the falling of North Sea gas costs and lower oil and coal prices to generate electricity.[11] As reported by OFWAT (1999; 76) final determination on future water and sewerage charges, the water industry was instead suffering from under-investment.[12] The initial value of K was indeed positive for all companies, ranging from 3 to 7, a fact that led to sharp price increases in the next years, justified by a more stringent environmental and quality regulation (imposed by the EU). Water companies have been required to undertake extensive programmes of work to meet higher standards of water quality and sewage treatments. This may explain, to some extent, why real price increases emerged before privatisation started and continues ten years later. As a result of increased efficiency of water companies and of falling capital costs, real prices for customers have been instead cut by the 1999 OFWAT price review. Furthermore, the level of K for 1995/2000 has ranged between –2 and 4, less, on average, than the initial cost pass-through companies benefited from. This may explain, to some extent, the significant fall around year 2000 reported in figure 1. However, as also reported by OFWAT (1999; 79), the average household bill is expected to slightly increase from 2000 to 2004, a trend which is partially captured by the index in 2001 and 2002.

Finally, rail privatisation split British Rail (the state-owned company) into more than 100 private-owned companies. It started in 1996, when the network infrastructure was taken over by Railtrack. On the service delivery side, Railtrack agreed contracts with 25 train operating companies (TOCs), while for maintenance the involvement of about 2,000 firms is estimated.[13] Being perhaps the most controversial privatisation, real price changes are, more than in other cases, only part of the story. In any case, there are actually few years to observe after privatisation of such a complex utility (six in total). Looking at the evolution of real prices, however, reveals quite an adverse behaviour for consumers, but it seems independent of the ownership. On the regulatory side, X was set at eight in 1995/96 and then at two for 1997/2001. Eventually, Railtrack went bankrupt and it has been replaced by Network Rail, a public/private firm.

The outcome of privatisation depicted by Figure 1 is therefore rather clear. If one looks only at the end-user prices, electricity, gas and telecommunications provided for significant reductions in real prices; rail, bus and water followed quite an opposite path. This means that the welfare effects of these utilities needs to be carefully investigated in order to get the net effect of those contradictory behaviours.

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[11] See Newbery and Pollitt (1997).
[12] See also Saunders (1995).
[13] See Martin (2002).

4. Households' welfare: a focus on consumer prices

4.1. The period 1979-2002

In this section we will focus on consumer prices. Regardless of the reasons why prices have changed as illustrated in figure 1, the first aim is to answer the question whether these changes have had adverse distributional effects on households. To this purpose, we applied the methodology illustrated in Section 2.

Focusing only on consumer prices allows us to consider a long period, from 1979 to 2002 (taking as a base 1979) so including the effects of public ownership, and to consider the widest range of utilities (six in total). To this purpose, three sub-periods are distinguished: from 1979 to the date of privatisation of each utility; five years after privatisation; the remaining period.

Table 2 reports the results of the analysis. The three panels illustrates the outcome obtained by using three Family Expenditure Surveys, 1986, 1991 and 2000, respectively from left to right.[14] Each panel is further divided in five sets of results. The first is the cumulative welfare effect obtained by considering all six utilities. The other sets illustrates the welfare effects split by sub-groups of utilities (telecoms + gas; previous + bus; previous + electricity; previous + water. Adding rail gives the total). Finally, each set of results is divided by sub-periods: before privatisation; five years after it; the remaining period up to 2002. Distributional characteristics and budget shares are reported in table B.1 in Appendix B.

Let us start from the first set of results considering the aggregate welfare change due to all six utilities. Using FES 2000 as a benchmark (the far right-hand panel) it is worth noting that welfare changes are negative before privatisation and in the order of 2.4 to 3.0 per cent of total welfare (as measured by [7]) for all degrees of inequality aversion. This suggests that during public management, at least with regard to the limited focus of the analysis, consumer price changes were not strongly consumer-oriented. Quite interestingly, welfare changes are also negative within five years after privatisation, even though much smaller in size. This might mean that privatisation has produced some beneficial effects to consumer, reducing their welfare loss. This interpretation finds support by considering the "remaining period", where the welfare change is positive and between 3.9 and 5.4 per cent of total welfare, increasing in the degree of inequality aversion. It is worth noting that this welfare gain is to be distributed over a weighted average length of privatisation (after five years) of about 11 years for the six utilities considered, which means a gain ranging from 0.35 to 0.49 per cent per year.

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[14] Data from the Family Expenditure Survey (FES) are Crown Copyright. They have been made available by UK Data Archive (UKDA). Data Archive does not bear any responsibility for the analysis or interpretation of the data reported here.

Things do not change significantly when switching from FES 2000 to FES 1986 and FES 1991. The main difference is that these two latter FES record lower welfare losses in the five years after privatisation, which may suggest that privatisation has been almost welfare neutral during this period, and a lower welfare gain in the remaining period. The effects of privatisation on prices might be a long run effect, a fact finding support from the stable sign and size of welfare gains in the remaining period regardless of the FES used and of the degree of inequality aversion.

Did all five utilities work in a welfare improving directions? The following four sets of results, aggregating welfare changes by utilities, tell us that this is not the case. Aggregating welfare changes is here carried out by date of privatisation, i.e. starting first from telecommunications and gas, then adding bus, electricity and water. Rail privatisation comes last.

Let us consider the second set of results, that including telecommunications and gas and let us take again FES 2000 as a benchmark. Considering only these two utilities has the effect of reducing the loss from public ownership and the gain of the remaining period, while at the same time increasing the gain to five years after privatisation. Welfare losses before privatisation are indeed lower than those coming out from all six utilities together for all degrees of inequality aversion. This means that these two sectors were contributing in a relatively positive way before privatisation started. On the other hand, welfare gains seem to have rapidly originated from privatisation, a feature already suggested by the pattern of real prices shown in figure 1.

The pattern of these results does not change dramatically when switching to FES 1986 or FES 1991, but it is worth saying that FES 2000 has the effect of slightly overestimating both welfare losses before privatisation and welfare gains in the remaining period. In this latter case, welfare gains by FES 1986 are about 75 per cent of those by FES 2000.

In the third set of results, the effects of bus privatisation are included. Looking again at the case of FES 2000, it is easily seen that bus privatisation adversely contribute to the welfare change, as welfare losses before privatisation slightly increase, while welfare gains both five years after it and in the remaining period are reduced, even though they remain significant in size. The same impact is again shown by alternative use of FES 1986 and FES 1991, with the former again showing much lower welfare gains from the privatisation of these three utilities (for e=2, the welfare gain is about 67 per cent of that estimated with FES 2000).

The fourth set of results embodies electricity privatisation. This inclusion does not give a significant contribution to the welfare gains five years after privatisation (where we observed some increases in real prices), while it gives it in the remaining period, with gains ranging from 2.7 to 5.2 per cent depending on the specific FES used.

The fifth set includes water privatisation. It again adversely contributes to households' welfare, especially after privatisation took place. In the case of FES 2000, the welfare gains of the remaining period are reduced, while those of five years after privatisation are almost neutralised. Again, no significant difference is shown by alternative use of FES data.

Finally, the effects of rail privatisation may be indirectly appreciated by the difference between the total and the fifth set of results. Railways negatively contribute to the welfare loss before privatisation and they are almost neutral with regard to the privatisation period as a whole.

4.2. The period 1984-2002.

In this section, the analysis on the consumer side is reduced to four utilities and to the period 1984-2000. This is to prepare for homogeneous comparisons with data at the production level, where some data are lacking, especially in the period of public ownership for all utilities, and for water also for some years after privatisation took place. Considering electricity, gas, telecommunications and local transport, however, we are dealing with a very important part of the privatisation process. Results may therefore give useful insights to the role of privatisation *per se* in the dynamic of prices.

To this purpose, table 3 reports the same results as in the first panel of table 2 for all FES. The decomposition is the same as before, yet, from 1984 onwards, one loses some years of public ownership. To this purpose, some points are worth remarking. First, excluding water and rail makes the contribution of the remaining utilities positive already in the first five years after privatisation. It means that those two utilities adversely contributed in that period (in fact they actually did over the whole period). Second, the sign of the public ownership welfare change also turns to be positive. This may due to the combination of the exclusion of rail and water and of the exclusion of some years for other utilities that might have shown negative impact on welfare. In any case, it gives a warn that a judgement on public ownership, in fact as the judgement on the private one, must be taken on as many years as possible. Wrongly selecting years may lead to distorted results. Third, changing the base (from 1979 to 1984) does not change the profile of the welfare change in the remaining period. This also means that in the long run water and rail have not added so much (possibly they have subtracted) to the total welfare change. Results do not change significantly with FES 1991 and FES 1986.

It is also worth noting (figure 2) that most of the contribution to the total welfare change after privatisation as a whole comes from the telecommunication sector.

5. The role of privatisation

5.1. Preliminary issues

An interesting question to ask is now: how much of the welfare change is due to the privatisation process *per se*? In other words, how much of the evolution of consumer prices is due to analogous changes of exogenous input costs in the privatised sector?

In order to answer these questions we would need a counterfactual scenario where public and private ownership over the whole period is simulated and compared. However, building such a counterfactual is a difficult task, as it almost requires simulating the behaviour of the economy with and without the public sector. For example, public and private firms are likely to use different technologies to supply utilities. Usually, a private firm will always attempt to pre-empt competitors by adding capacity as soon as it expects this behaviour to be profitable. The public sector, instead, may react more slowly to technological changes. Furthermore, one might still question whether public and private ownership would have shared the same incentive to take opportunity of the beneficial action of external factors. Even under the positive contribution of external factors, there is no guarantee that changes in relative prices would have been the same under public or private ownership. Our aim, however, is not to compare the relative merit of public and private ownership; rather it is that of isolating, within the period of private ownership, what may be due to privatisation and what may not. In order to give useful insights of the role of privatisation in welfare changes, we therefore rely on a simplified counterfactual, where real relative price changes for consumers *due to privatisation* are built by combining real relative price changes at consumer level (*RRPC*) and real relative price changes of input costs (*RRPI*) in the privatised sectors.

The matrix in table 4 explains the hypotheses made for the counterfactual scenario. Let us start from the elements outside the main diagonal. In both cases, *RRPC* is imputed in the counterfactual scenario. The line of reasoning is as follows. If *RRPC* is negative and *RRPI* is positive, the *RRPC* change is considered a beneficial effect of privatisation, as, in this case, the firm would have increased prices following an increase in costs and it has not. If *RRPC* is positive and *RRPI* is negative, the *RRPC* change is considered an adverse effect of privatisation. In this case, the firm has succeeded in increasing prices, despite a cost reduction and despite competition and privatisation.

With regard to the elements of the main diagonal, if both *RRPC* and *RRPI* have a positive sign, two cases must be distinguished:
a) if *RRPC* is greater than *RRPI*, this is counted as an adverse effect of privatisation, as firms succeeded to increase prices more than the costs. However, costs have increased, so the adverse effect is only the difference between *RRPC* and *RRPI*;

b) if *RRPC* is lower than *RRPI*, this is counted as a beneficial effect of privatisation, even though prices have increased. This is so because even though *RRPI* increases, for reasons due to the market structure and regulation, firms have increased prices for less. The benefit is again quantified by the difference between *RRPC* and *RRPI* (this difference becomes now negative, to underline the fact that it is counted as a benefit).

Finally, if both *RRPC* and *RRPI* have a negative sign, again two cases must be distinguished:

a) if $|RRPC| > |RRPI|$, this is counted as a beneficial effect of privatisation, as prices have reduced more than the costs. Since costs have decreased, the benefit is quantified by the difference between *RRPC* and *RRPI*;

b) if $|RRPC| < |RRPI|$, this is counted as a zero benefit, as the reduction of consumer prices is less than the reduction of costs. Therefore, there is no benefit of privatisation. [15]

Obviously, the matrix of Table 4 is a simplified strategy to analyse the effects of privatisation. Nevertheless, and with some caution in interpretation, we think that this procedure may shed some light to the potential size of the contribution of privatisation process in total welfare changes from 1984 to 2002. Results, quite obviously, cannot pretend to provide for "the right number", yet they may give some realistic picture of the share of the privatisation process in the evolution of consumer prices. This also attempts to address one of the most relevant critiques to the privatisation process, that external factors have played a role in reducing prices of utilities (Waddams Price and Hancock, 1998).

To get a flavour of the results, figure 3 shows the pattern of real prices and costs in the four utilities, according to the available data.

In the case of electricity, real consumer prices are compared with the real prices of the main electricity generation sources, namely heavy fuel oil, coal and natural gas. [16] According to their shares in electricity production, weighted costs (the bold line) have been built. The comparison between prices and weighted costs makes evident that the margin between the two is increased immediately after privatisation to stay almost constant from 1997 onwards. This may suggest that the declining pattern of consumer prices may have been driven, to some extent, by a declining profile of exogenous input costs.

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[15] Alternatively, it might be considered as an adverse effect of privatisation, as prices would have been reduced further. However, we maintain the neutral assumption of zero benefits. An alternative counterfactual, using *RRPI*, is also considered in Section 5.3.2.

[16] Natural gas and coal sources, in 2002, account for about 70 per cent of electricity production. Heavy fuel oil share decreased to 1.6 per cent in 2002, after having accounted for about 10 per cent in the period 1988-1992.

In the case of natural gas, prices have been compared with the cost of natural gas at UK delivery points ("at the beach"). Also in this case, real prices and costs follow a quite similar declining profile, suggesting, as in the case of electricity, that at least part of the benefit on the consumer side might be due to the evolution of input costs.

In the bus sector, lack of data on prices (expressed as pence per vehicle/km) forced us to show the pattern of the real index of both prices and operating costs (including depreciation). In this case, there is a significant divergence between the two. Real prices show a continuous increase, operating costs a continuous fall (with the possible exception of 2001 and 2002), despite the fact that the bus sector is relatively more labour intensive than other utilities.

Telecommunications have the least reliable indicator. A time series for average prices is not available and, more importantly, data on weighted operating costs for such a long period were almost impossible to find. In order to have a rough indication of the sector, on the consumer side we started from the average price of BT direct – basic contract in 2002 and we went backward by using the price index of the telecommunication sector.[17] On the production side, we scaled consumer prices by the time series of profit margins in the UK telecommunication sector as available in Dassler, Parker and Saal (2001) and reported in figure 3.[18] It is recognised that this may be an imperfect procedure, but the comfortable first best was simply unavailable. As shown in the graph, profit margins have a cyclical behaviour (which of course may depend on the way it is built). Some sensitivity analysis is conducted below.

5.2. Results

Time series at both consumer and input cost levels are used to recalculate two sets of relative price changes. Comparing the two sets according to the matrix in table 4 and, if necessary, correcting *RRPC* with the appropriate element of the matrix gives rise to the specific contribution of privatisation to the welfare change. This result is reported in table 5.

The first row, for each FES, simply recalls the results obtained by passing the overall change in consumer prices to welfare (the sum of the two rows "five years after" and "remaining period" in table 3). The second row, instead, is the welfare change when the matrix of table 4 is applied, i.e. after correction. Welfare changes are now much lower than in the previous case. The third row reveals that, once exogenous movements of input costs are taken into account, the gains from privatisation only accounts for

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[17] We implicitly rely on the fact that BT has the greater share in the telecommunication sector, and that this is even more true when one goes back in time.

[18] Last three years of the graph assume a constant profit margin.

about 18/19 per cent of the total welfare change due to the evolution of consumer prices. Things stay the same by using alternative FES.

As it stands, it is also useful to understand the contribution of the various utilities to the composition of this "corrected" welfare change. This is reported in figure 4, for all degrees of inequality aversion. In particular, it is worth noting that the contribution of telecommunications is now much lower than that observed in figure 2. Gas privatisation contributes the most, telecom and electricity share more or less the same percentage and bus negatively contributes to this composition also in this case.[19]

This may be a negative result for supporters of privatisation. To this purpose, it is fair enough to test whether alternative hypotheses may give different results.

5.3. Sensitivity

5.3.1. Different sets of utilities

Some sensitivity analysis may be useful to understand the role of privatisation according to different sets of utilities. Table 6 reports the outcome by focusing on FES 2000. The first three rows recall the results already obtained for all four utilities in table 5. In order to test for sensitivity, the exercise has been repeated by selecting subsets of three utilities. In the first case (excluding telecoms), privatisation gains are lower (in the range 1.2 / 1.9 per cent) when considering only the consumer side. They are also lower after application of the hypotheses embodied in table 4. However, the share of privatisation increases to about 32 per cent. The reason why gains are lower is because telecommunications provide benefits. However, the remaining gains are a greater share of the total welfare change on the consumer side, because this latter is much lower when telecommunications are excluded (first row of the panel).

Excluding electricity and gas has also depressing effects on the welfare change obtained by considering only the consumer side, even though this effect has not the

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[19] It is worth noting that the attempt to introduce water in the analysis (with mild assumptions) would further decrease the percentage of welfare due to privatisation. In fact, it gives rise to a regressive change for e=2, as if the whole process, when added up, worked in the wrong direction. The need to fill lacking data, however, suggests us not to show the results for this case and to leave the inclusion of water and rail for further research. However, it is worth noting that this result may agree with the findings of Waddams Price and Hancock (1998; 306), when they find that privatisation worked in a particularly wrong way with respect to the most vulnerable groups of population. Including rail, perhaps the most controversial privatisation, benefits from privatisation are expected to decrease even further. However, for the case of railways, it must be said that there are still few years to observe after privatisation. Gains may come in the long run, as the experience of other utilities may suggest.

same size as in the case of telecommunications. However, corrected welfare changes are quite similar in both cases (and also similar to the case of telecommunications). The share of privatisation is therefore lower in these two cases (from 10 to 15 per cent). This means that the role of input costs in explaining changes at consumer level is, in the case of electricity and gas, more powerful than in the case of telecommunications.

Excluding buses has a peculiar effect, instead. Both plain and corrected welfare changes increase. This means that including this sector has an adverse impact already at the consumer level and what happens at the input level has not power in neutralising this impact. This also explains why, excluding the bus sector, the share of privatisation is just above 20 per cent.

Therefore, by considering different combination of welfare changes and different sets of utilities, it seems that privatisation per *se* is able to explain no more than one third of the total welfare change due to the evolution of consumer prices. Furthermore, most of the benefits of privatisation seem to derive from gas and electricity markets.

5.3.2. Exogenous factors

The results obtained are implicitly based on this simple fact. If consumer prices fall, part of this fall may be given to what happens at the cost of exogenous factors used in the production process. However, one could still ask the question: How much of these cost reductions are affected by privatisation? In other words, this would require analysing what happen at an upper stage.

So far, the analysis has been conducted under the implicit assumption that what determines costs are exogenous factors independent of the privatisation process. This may be indeed a tenable assumption for electricity and gas, where costs are determined (more or less) on a "world basis" that privatisation in UK cannot affect.[20] It still remains the question as to whether private firms are more efficient than public firms in taking opportunities at world level. However, this relates to the comparison between public and private ownership that is ruled out in the present analysis.

That same assumption, in our case, may not be tenable for the telecommunication sector, as in estimating the evolution of costs we could not disentangle the contribution of exogenous factors (i.e. input costs and technology). The assumption may also be debatable for the bus sector, but in this case the evidence that it negatively contributes to welfare change is rather marked.

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[20] For the limited aim of this paper, we cannot say whether world privatisation of these sectors may affect world prices.

This calls for alternative assumptions on the telecommunication sector. To this purpose, two alternative hypotheses have been experimented. The first is to assume that 70 per cent of the *RRPI* changes in this sector is due to exogenous factors, i.e. technology, whose development is not affected by UK privatisation *per se*; the second is to assume 30 per cent. In other words, the first assumption is minimising the role of privatisation, the second is, to some extent, pro-privatisation.

With the first assumption (table 6), the share of privatisation would be about 32 per cent, with the second (quite favourable to privatisation supporters) it would raise to nearly 60 per cent. In any case, at the best (i.e. for *e*=2), privatisation would have caused about 2.8 per cent increase in households' welfare, which means, on average, 0.25 per cent per year.

Finally, one could also ask the question? How welfare would have changed had *RRPC* be equal to *RRPI*, i.e. if consumers had faced the same relative price changes as at the input cost level? The last panel of table 6 answers this question, by showing that had *RRPC* exactly matched *RRPI*, the total welfare change would have been higher. This means not only that *RRPC* have been driven by *RRPI* but also that consumers only partially benefit from changes at the input costs level. The main issue, therefore, becomes that of translating cost reductions into price reductions, rather than that of debating about private or public ownership *per se*.

6. Conclusions

If one looks only at the evolution of consumer prices since privatisation, privatisation seems to have reduced prices compared with the pre-privatisation period, to generate aggregate welfare gains for households, especially in the long run. However, when the price of exogenous input costs in the production process is controlled for, the role of privatisation seems more limited, extending at the best to a 0.27 per cent of total welfare per year. At worst, privatisation accounts for 0.05 per cent per year (about 15 per cent of the total welfare change). Compared with the impressive debate about the role of privatisation on consumers' welfare, those figures appear rather low, supporting the view that these changes are comparatively small compared with other distributional changes occurred in UK over the past 15 years (Atkinson, 1983). Furthermore, it is worth taking into account that the analysis has been performed leaving aside water and railways, two of the most controversial processes in UK. These latter are likely to reduce the positive contribution of privatisation even more (eventually to cause a welfare loss), as in both cases real prices have marked non-negligible increases (see figure 1). This may be indirect support to the regressive figures calculated by Waddams Price and Hancock (1998), where it is shown that the more vulnerable parts of the income distribution have suffered monetary losses from price liberalisation.

This is not to say that the whole privatisation process has worked in the wrong direction. Privatisation has many dimensions. Effects on employment, total factor productivity, financial markets, quality have all been the subject of specific contributions. This paper particularly contributes to fill the gap on the distributional and welfare side of the privatisation process in UK. The results may be of some interest for those countries, like Italy, where the privatisation process is still in its infancy. In particular, two messages are particularly important: a) privatisation *per se* has played a more limited role than it was thought in the evolution of consumer prices in UK, as in most cases consumer prices only accomodated changes in exogenous input costs where privatisation has little to say. It is worth saying that this behaviour has also characterised the years before privatisation occurred for both gas and electricity; b) privatisation does not automatically mean that cost reductions are translated into price reductions, as in the case of local transports and railways. In the absence of this link, that must be proved empirically, the debate about the relative merit of private ownership over public ownership runs the risk of being an empty box.

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Table 1 – Distribution of expenditures, by quintiles of equivalent income

FES 2000 - Percentage distribution of expenditures, by quintiles of equivalent income

Quintiles	Gas	Electricity	Telecoms	Water	Bus	Rail
1	16.6	17.0	12.0	19.8	18.0	3.1
2	17.6	19.1	16.6	19.1	20.9	7.2
3	20.2	20.2	19.1	19.7	21.6	15.4
4	21.3	20.4	22.9	19.7	21.1	22.5
5	24.2	23.4	29.4	21.6	18.5	51.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

FES 1991 - Percentage distribution of expenditures, by quintiles of equivalent income

Quintiles	Gas	Electricity	Telecoms	Water	Bus	Rail
1	16.5	18.6	15.4	16.7	19.2	6.2
2	17.7	19.2	17.4	19.0	20.7	8.6
3	19.2	18.8	18.5	20.1	20.7	16.3
4	21.7	20.3	20.9	20.5	23.1	24.7
5	25.0	23.1	27.8	23.6	16.3	44.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

FES 1986 - Percentage distribution of expenditures, by quintiles of equivalent income

Quintiles	Gas	Electricity	Telecoms	Water	Bus	Rail
1	15.8	18.9	14.3	13.7	16.2	3.3
2	18.4	19.8	17.6	17.6	18.1	8.6
3	19.6	20.0	20.0	19.7	23.6	15.4
4	21.8	19.7	21.8	22.2	20.0	22.8
5	24.4	21.6	26.4	26.8	22.1	49.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's elaboration on FES data

Table 2 – Welfare changes, base 1979

Welfare changes (%)
Fes 2000 - Negative sign means welfare loss

TOTAL	Inequality aversion		
	1	0.5	2
Before privatization	-2.58	-2.37	-3.07
Five years after	-0.46	-0.38	-0.67
Remaining period	4.41	3.95	5.45

Telecom + Gas	Inequality aversion		
	1	0.5	2
Before privatization	-1.88	-1.68	-2.32
Five years after	0.50	0.44	0.64
Remaining period	3.56	3.22	4.33

Telecom + Gas + Bus	Inequality aversion		
	1	0.5	2
Before privatization	-2.05	-1.83	-2.54
Five years after	0.41	0.37	0.53
Remaining period	3.38	3.07	4.10

Telecom + Gas + Bus + Elec	Inequality aversion		
	1	0.5	2
Before privatization	-2.07	-1.85	-2.57
Five years after	0.17	0.16	0.20
Remaining period	4.48	4.02	5.57

Tel + Gas + Bus + Elec + Water	Inequality aversion		
	1	0.5	2
Before privatization	-2.23	-1.99	-2.80
Five years after	-0.42	-0.34	-0.64
Remaining period	4.40	3.95	5.45

Welfare changes (%)
Fes 1991 - Negative sign means welfare loss

TOTAL	Inequality aversion		
	1	0.5	2
Before privatization	-2.37	-2.10	-3.09
Five years after	-0.34	-0.29	-0.48
Remaining period	3.90	3.37	5.27

Telecom + Gas	Inequality aversion		
	1	0.5	2
Before privatization	-1.68	-1.46	-2.25
Five years after	0.57	0.50	0.77
Remaining period	2.74	2.39	3.65

Telecom + Gas + Bus	Inequality aversion		
	1	0.5	2
Before privatization	-1.95	-1.69	-2.63
Five years after	0.44	0.38	0.58
Remaining period	2.47	2.16	3.27

Telecom + Gas + Bus + Elec	Inequality aversion		
	1	0.5	2
Before privatization	-1.97	-1.71	-2.66
Five years after	0.11	0.10	0.12
Remaining period	3.95	3.42	5.35

Tel + Gas + Bus + Elec + Water	Inequality aversion		
	1	0.5	2
Before privatization	-2.09	-1.81	-2.82
Five years after	-0.32	-0.26	-0.45
Remaining period	3.89	3.37	5.27

Welfare changes (%)
Fes 1986 - Negative sign means welfare loss

1st set

TOTAL	Inequality aversion		
	1	0.5	2
Before privatization	-2.25	-1.99	-2.92
Five years after	-0.15	-0.13	-0.21
Remaining period	3.37	2.90	4.63

2nd set

Telecom + Gas	Inequality aversion		
	1	0.5	2
Before privatization	-1.60	-1.38	-2.15
Five years after	0.58	0.50	0.78
Remaining period	2.50	2.18	3.36

3rd set

Telecom + Gas + Bus	Inequality aversion		
	1	0.5	2
Before privatization	-1.91	-1.65	-2.58
Five years after	0.42	0.36	0.57
Remaining period	2.19	1.91	2.93

4th set

Telecom + Gas + Bus + Elec	Inequality aversion		
	1	0.5	2
Before privatization	-1.93	-1.67	-2.60
Five years after	0.15	0.14	0.17
Remaining period	3.41	2.93	4.68

5th set

Tel + Gas + Bus + Elec + Water	Inequality aversion		
	1	0.5	2
Before privatization	-2.01	-1.74	-2.70
Five years after	-0.13	-0.10	-0.18
Remaining period	3.37	2.89	4.63

Table 3 – Welfare changes, base 1984.

Welfare changes (%)
Negative sign means welfare loss

TOTAL, FES 2000	Inequality aversion		
	1	0.5	2
Before privatization (*)	0.37	0.32	0.50
Five years after	0.27	0.25	0.32
Remaining period	3.56	3.17	4.49

TOTAL, FES 1991	Inequality aversion		
	1	0.5	2
Before privatization (*)	0.47	0.41	0.63
Five years after	0.14	0.14	0.16
Remaining period	3.13	2.74	4.06

TOTAL, FES 1986	Inequality aversion		
	1	0.5	2
Before privatization (*)	0.39	0.33	0.52
Five years after	0.17	0.16	0.19
Remaining period	2.79	2.40	3.56

(*) 1984-1989 for electricity; 1984-85 for gas; 1984-86 for bus
    no years for telecoms

Source: Author's elaborations on FES data.

Table 4 – A matrix for the counterfactual scenario

		RRPC	
		+	-
RRPI	+	RRPC - RRPI	RRPC
	-	RRPC	0 if RRPI>RRPC (in absolute values); RRPC-RRPI if RRPC>RRPI

Table 5 – Welfare changes due to privatisation

Welfare changes due to privatisation (%)
Negative sign means welfare loss

TOTAL, FES 2000	Inequality aversion		
	1	0.5	2
After privatisation (not corrected)	3.83	3.42	4.82
After privatisation (corrected)	0.70	0.62	0.92
% of welfare change due to privatisation	18.37	18.15	19.06

TOTAL, FES 1991	Inequality aversion		
	1	0.5	2
After privatisation (not corrected)	3.27	2.88	4.22
After privatisation (corrected)	0.60	0.53	0.77
% of welfare change due to privatisation	18.40	18.50	18.20

TOTAL, FES 1986	Inequality aversion		
	1	0.5	2
After privatisation (not corrected)	2.96	2.56	3.75
After privatisation (corrected)	0.53	0.46	0.67
% of welfare change due to privatisation	17.90	17.80	17.90

Source: Author's elaborations on FES data.

Table 6 – Sensitivity analysis

TOTAL, FES 2000	Inequality aversion		
	1	0.5	2
After privatisation (not corrected)	3.83	3.42	4.82
After privatisation (corrected)	0.70	0.62	0.92
% of welfare change due to privatisation	18.37	18.15	19.06

Excluding telecom

	1	0.5	2
After privatisation (not corrected)	1.38	1.18	1.89
After privatisation (corrected)	0.45	0.38	0.62
% due to privatisation	32.3	32.4	32.6

Excluding electricity

	1	0.5	2
After privatisation (not corrected)	3.09	2.77	3.87
After privatisation (corrected)	0.45	0.40	0.58
% due to privatisation	14.48	14.41	15.01

Excluding gas

	1	0.5	2
After privatisation (not corrected)	3.04	2.73	3.80
After privatisation (corrected)	0.33	0.30	0.43
% due to privatisation	10.92	10.95	11.21

Excluding bus

	1	0.5	2
After privatisation (not corrected)	4.07	3.62	5.13
After privatisation (corrected)	0.90	0.79	1.17
% due to privatisation	22.14	21.75	22.87

Adding water

	1	0.5	2
After privatisation (not corrected)	3.41	3.08	4.16
After privatisation (corrected)	0.31	0.30	0.35
% of welfare change due to privatisation	9.11	9.59	8.32

Telecom - 70% exogenous

	1	0.5	2
After privatisation (corrected)	1.21	1.08	1.53
% of welfare change due to privatisation	31.51	31.55	31.66

Telecom - 30% exogenous

	1	0.5	2
After privatisation (corrected)	2.24	2.02	2.77
% of welfare change due to privatisation	58.49	59.06	57.55

RRPI applied

	1	0.5	2
After privatisation	4.31	3.82	5.43
% of welfare with RRPC	112.38	111.75	112.76

Source: Author's elaborations on FES data.

Figure 1 – Real prices of utilities

Real prices of utilities (1979=100; water 1987=100) - adjusted with RPI 2002
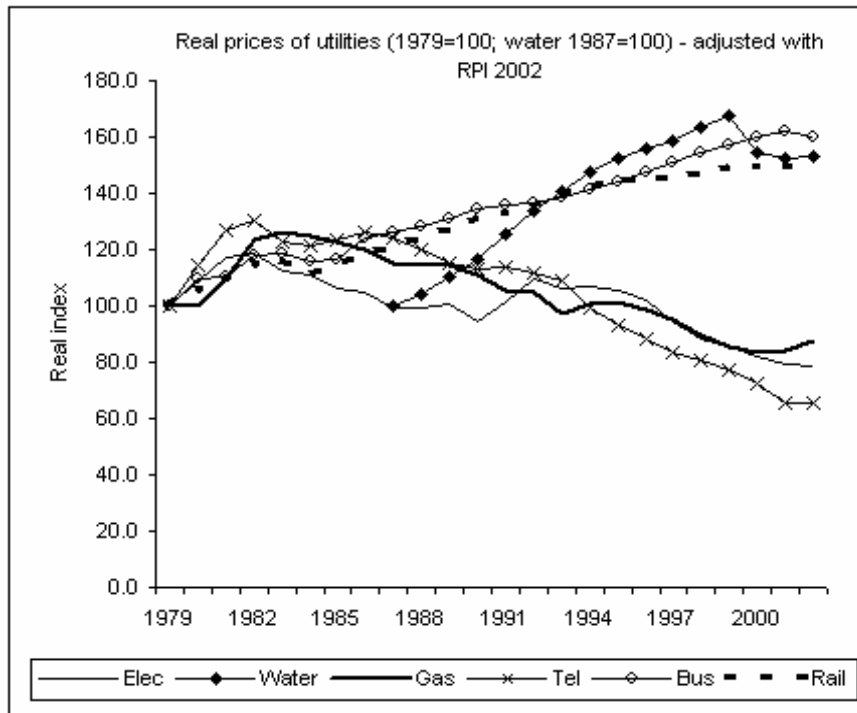
Source: Author's elaborations on data from Appendix C.

Figure 2 – Composition of the welfare change, FES 2000
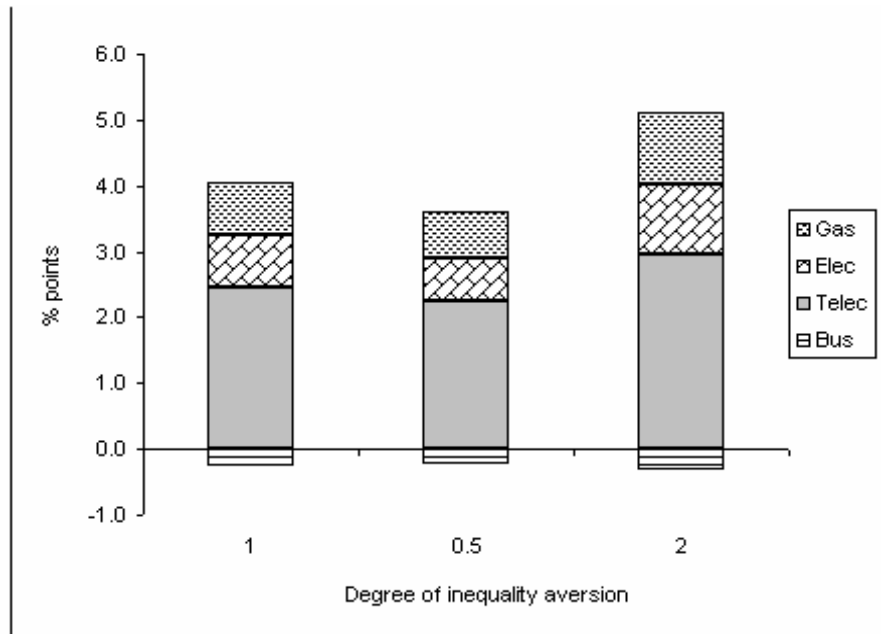
Source: Author's ela borations on FES data.
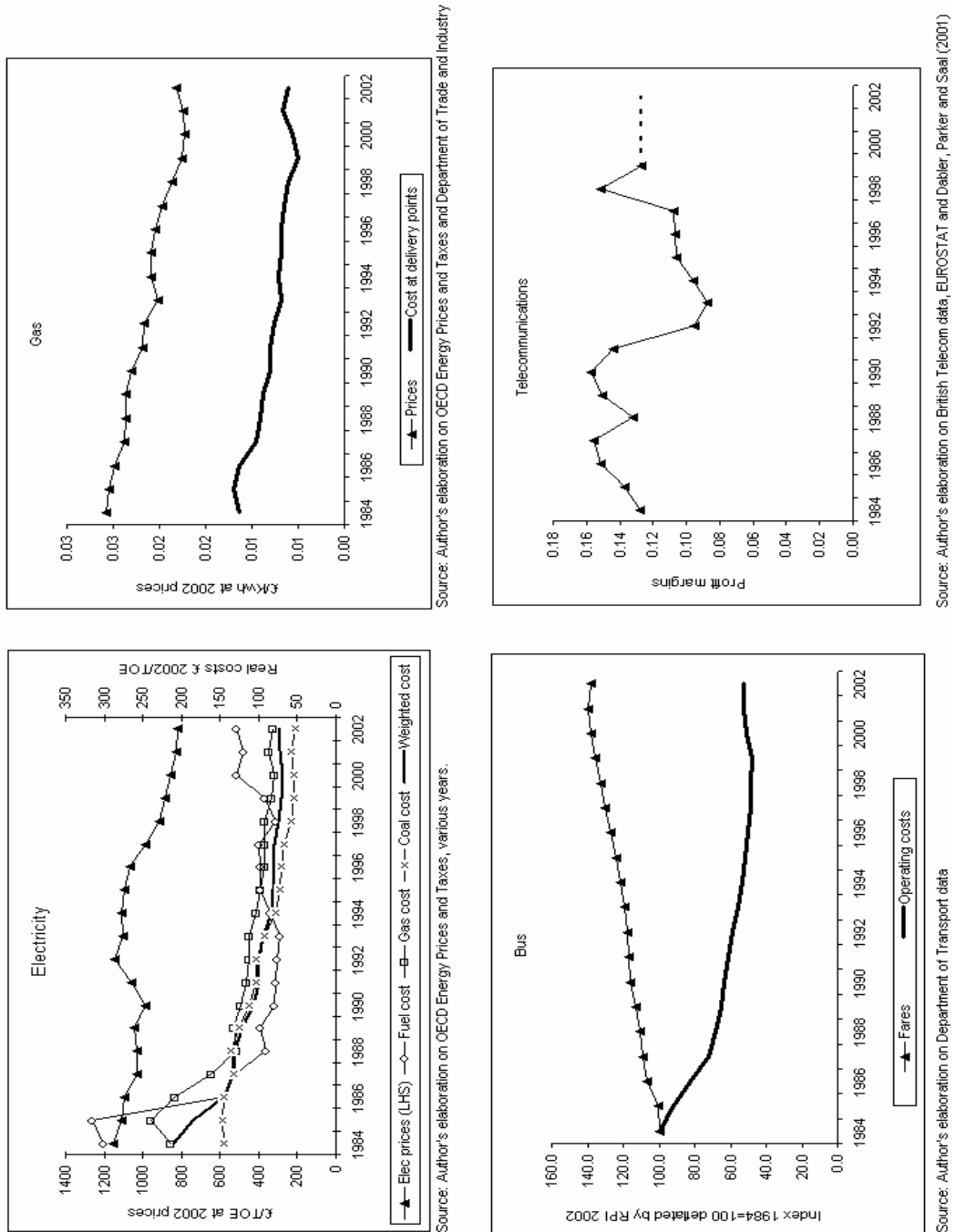
Figure 3 – Real prices and costs

Gas

Source: Author's elaboration on OECD Energy Prices and Taxes and Department of Trade and Industry

Telecommunications

Source: Author's elaboration on British Telecom data, EUROSTAT and Dabler, Parker and Saal (2001)

Electricity

Source: Author's elaboration on OECD Energy Prices and Taxes, various years.

Bus

Source: Author's elaboration on Department of Transport data

Figure 4 – Composition of welfare changes due to privatisation
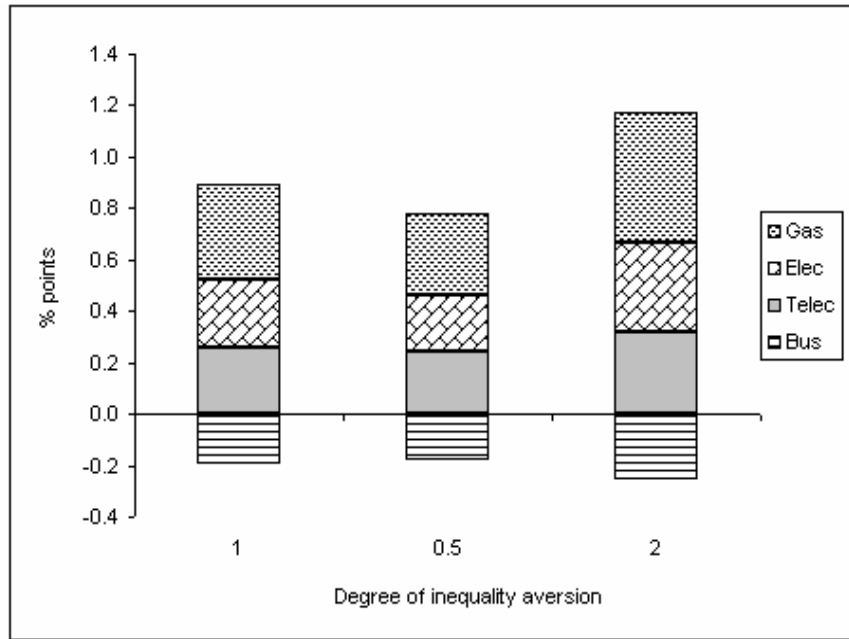
Source: Author's elaborations on FES data.

Appendix A – Use of FES data

1) The variable total personal expenditures (xp127 in 1986; xp153 in 1991; p153t in 2000) has been used for total expenditures. The variable is recorded at personal level. Aggregation to household level has been carried out. It basically includes expenditures on: housing, fuel, light and power; food; alcoholic drink; tobacco; clothing and footwear; miscellaneous; household goods; household services; personal goods and services; motoring; fares and other travel costs; leisure goods; leisure services. Both adult and children expenditures are taken into account.

2) For **electricity**, the following variables have been considered:
a) electricity amount paid in last account (xb175 in 1986 and 1991; b175 in 2000). It includes board budgeting scheme in 1986.
b) electricity amount paid through board budgeting scheme (xb222 in 1991; b222 in 2000).
c) electricity amount paid by slot meter less rebate (xd255 in 1986; xp250 in 1991; p250t in 2000). p250t in 2000 is the difference between d020203 (slot meter payments) and b178 (rebates).
d) 2nd dwelling electricity account (xd225 in 1986 and 1991; d010604t in 2000).

In FES 2000, a) includes electricity account and electricity stamps; b) includes board budgeting and Northern Ireland electricity; c) includes electric key, electric meter, electric token, electricity card, electricity slot meter, power key and power cards.

3) For **gas**, the following variables have been considered:
a) gas amount paid in last account (xb170 in 1986 and 1991; b170 in 2000);
b) gas amount of payment with board budgeting schemes (xb221 in 1986 and 1991; b221 in 2000);
c) gas slot meter payments less rebates (xp249 in 1986 and 1991; d020103t minus b173 (rebates) in 2000);
d) 2nd dwelling gas account (xd226 in 1986 and 1991; d010605t in 2000).

In FES 2000, a) includes gas account, gas bill and gas stamps; b) includes gas board budgeting; c) includes gas card, gas key, gas meter, gas slot meter, gas token, power key gas.

4) For **telecommunications**, the following variables have been considered:
a) telephone household share of account (xb166 in 1986 and 1991; as it is, it disappears in 2000);
b) telephone account (fs83 in 2000), which includes telephone account and mobile phone account;
c) telephone coins and other payments (d080204t only in 2000);
d) 2nd dwelling telephone account (xd227 in 1986 and 1991; d080204t in 2000).

In FES 2000, b) includes telephone account, telephone budgeting, telephone stamp, telephone installation, car phone account, mobile phone account; c) includes payphone, phone call, telephone card.

5) For **water**, the following variables have been considered:
a) water charges – last payment (xb050 in 1986 and 1991; fs1304 in 2000). In 2000 the variable includes water and sewerage charges.

In FES 2000, a) includes water rates for England and Wales, cesspit charges, water sewerage charge, council water charge for Scotland, water tokens, septic tank clearance.

6) For **buses**, the following variables have been considered:
a) bus and coach fares (not season) – (xd552 in 1986 and in 1991; d110204t in 2000);
b) bus and coach season tickets ((xb255-xb219) in 1986; xb217 in 1991; d110203 in 2000).

In FES 2000, a) includes concessionary bus tickets, OAP concessionary bus pass, bus fare, coach ticket, tram fares; b) includes bus season tickets and coach season tickets.

6) For **rail**, the following variables have been considered:
a) rail and tube fares (not season) – (xd551 in 1986 and 1991; fs111 in 2000);
b) b) rail season tickets – (xb219 in 1986; xb218 in 1991; d110201 in 2000).

In FES 2000, a) includes metro fare, network railcard, OAP railcard, student railcard, shuttle, train fare, tube fare, single train ticket, underground fare, rail fare, rail travel; b) includes train season tickets and tube season tickets.

Appendix B – Distributional characteristics and budget shares

Table B.1. – Distributional characteristics and budget shares.

	FES 1986			
	1	**0.5**	**2**	**BS**
Electricity	0.972	0.985	0.948	0.02990
Gas	0.914	0.955	0.840	0.03080
Buses	0.962	0.988	0.887	0.00854
Telecoms	0.885	0.937	0.802	0.02160
Water	0.874	0.933	0.777	0.00991
Rail	0.596	0.768	0.368	0.00609

	FES 1991			
	1	**0.5**	**2**	**BS**
Electricity	0.957	0.976	0.920	0.03720
Gas	0.915	0.954	0.848	0.02990
Buses	1.010	1.010	0.976	0.00680
Telecoms	0.889	0.940	0.804	0.02550
Water	0.928	0.963	0.851	0.01450
Rail	0.661	0.816	0.427	0.00648

	FES 2000			
	1	**0.5**	**2**	**BS**
Electricity	0.926	0.964	0.830	0.02840
Gas	0.909	0.955	0.809	0.02160
Buses	0.954	0.985	0.819	0.00518
Telecoms	0.818	0.906	0.657	0.04380
Water	0.978	0.988	0.942	0.01910
Rail	0.574	0.767	0.295	0.00908

Source: Author's elaboration on FES data
Note: BS = Budget share

Appendix C – Source of data for UK

Year	Electricity (£ per Kwh) (1)	Natural gas (£ per 10E7 kcal GCV) (1)	Water (price index january 1987 = 100) (2)	Telecom price index jan 1987=100 (3)	Local bus fares index (1995=100) (4)	Rail fares index (1995=100) (17)	RPI (January 1987=100) (16)	Price heavy fuel oil for elec generation (£/toe) (5)	Price natural gas for elec generation (£/toe) (6)	Price coal for elec generation (£/toe) (7)	Electricity production from heavy fuel oil (% of total) (8)	Electricity production from gas sources (% of total) (8)	Electricity production from coal (% of total) (8)	Weighted cost of electricity (£/toe) (9)	Natural gas at UK delivery points (pence/kwh) (13)	Telecom profit margins (11)	Telecom operating costs (index january 1987=100) (15)	Bus operating costs (pence x vehicle/km at 2001/02 prices) (12)	Bus operating costs (pence x vehicle/km at current prices) (14)
1979	0.0302	81.12		46.4	27.7	27.5	58.5	89.3	57.3	56.3	11.7	0.7	73.2	60.8	0.236	0.0391	44.7		
1980	0.0384	94.55		62.2	35.4	34.2	63.3	112.4	121.9	66.2	9.4	0.5	74.8	71.7	0.365	0.0717	58.0		
1981	0.0462	116.08		76.9	39.8	39.0	76.3	114.0	110.0	71.1	9.7	0.5	71.9	76.4	0.455	0.0636	72.3		
1982	0.0507	141.77		85.6	46.1	44.8	82.6	125.7	111.2	75.2	9.0	0.6	70.7	81.1	0.511	0.1212	76.3		
1983	0.0502	151.73		84.7	48.7	47.5	86.8	157.5	111.5	75.7	32.7	1.0	45.7	109.9	0.590	0.1297	75.0		
1984	0.0519	156.65		87.4	49.8	47.7	90.6	173.5	131.7	80.9	16.4	1.0	60.5	101.0	0.658	0.1278	77.5	199	106
1985	0.0522	162.08		93.2	52.4	51.6	95.2	81.7	118.4	81.8	10.4	0.6	67.7	82.1	0.641	0.1375	81.9	183	102
1986	0.0532	164.03		98.2	57.7	54.8	98.3	76.1	95.0	77.4	8.4	1.1	70.1	77.5	0.562	0.1517	85.3	164	95
1987	0.0520	162.22	104.5	100.3	60.9	58.0	101.8	55.5	78.8	83.4	9.1	1.1	67.0	80.1	0.556	0.1555	86.8	144	86
1988	0.0544	168.52	113.6	101.2	64.6	62.4	106.3	63.6	85.9	81.0	9.2	1.1	64.7	78.9	0.568	0.1319	89.4	136	85
1989	0.0582	178.27	127.3	102.4	69.8	67.5	112.3	55.4	86.0	77.4	10.8	1.1	65.3	74.5	0.562	0.1507	89.0	129	85
1990	0.0589	185.27	144.2	108.3	76.8	74.5	120.4	59.0	87.0	76.9	9.5	1.3	65.5	74.8	0.607	0.1572	93.6	126	89
1991	0.0680	190.26	167.7	117.5	83.6	81.3	130.0	60.2	88.0	81.1	10.7	1.9	61.0	78.2	0.595	0.1441	102.7	122	93
1992	0.0772	197.70	187.4	120.7	88.4	87.2	136.4	58.2	90.8	75.1	6.2	10.2	52.9	75.9	0.556	0.0953	110.2	118	95
1993	0.0770	190.09	203.7	121.4	92.4	92.6	140.8	70.7	86.2	64.3	4.4	15.3	50.0	69.5	0.588	0.0876	111.6	111	92
1994	0.0795	201.68	218.9	113.9	96.7	96.7	144.3	83.8	83.1	62.1	3.8	19.0	47.3	69.0	0.584	0.0961	103.9	106	90
1995	0.0806	208.45	232	109.6	101.2	101.1	148.3	86.3	81.2	62.3	4.0	23.7	42.2	70.1	0.592	0.1063	99.1	103	90
1996	0.0804	208.76	244.2	106.9	106.3	104.3	152.4	90.1	83.6	59.7	2.3	31.2	34.8	71.7	0.593	0.1070	96.6	100	90
1997	0.0764	206.66	255.2	104.0	112	107.2	156.5	72.2	84.8	53.4	1.8	32.5	34.2	68.8	0.560	0.1073	93.9	97	89
1998	0.0729	199.67	269.4	102.6	117.1	111.5	160.4	86.4	78.8	51.4	1.5	38.8	29.3	67.4	0.468	0.1515	89.1	97	91
1999	0.0720	193.38	281.9	100.0	122.0	115.2	163.7	123.1	76.9	51.9	1.9	33.9	34.8	65.6	0.534	0.1271	88.7	96	92
2000	0.0706	193.55	264.5	95.8	126.4	117.4	166.9	117.0	85.8	57.0	1.7	31.5	37.4	71.3	0.647	0.1271	85.0	102	100
2001	0.0699	198.83	266.1	88.5	130.6	120.0	170.2	128.8	81.6	52.8	1.6	33.6	35.4	72.9	0.601	0.1271	78.5	105	105
2002	0.0702	211.43	272.4	90.0	131.5	122.0	173.6									0.1271	79.8	105	107

(1) Energy prices and taxes, IIQ 1992 from 1980 to 1990, and 2003. Data for 1979 recalculated according to index in Florio (2001).

(2) ONS Monthly Digest of Statistics - Series DOBSAU - Housing, water and other charges

(3) ONS Monthly Digest of Statistics - Series DOCHAU RPI - Household services: telephones and telemessages (1987-2002) Florio (2001) from 1980 to 1986

(4) www.statistics.gov.uk/STATBASE/Expodata/Spreadsheets/D4030.xls from 1991 to 2001. Focus on public transport www.dtf.gov.uk/stellent/groups/dft_transstats/documents/downloadable/dft_transstats_505659.pdf from 1979 to 1990. Data for 2002 imputed.

(5) Energy prices and taxes IIQ 1992 from 1980 to 1990. Energy prices and taxes IQ 2000 from 1991 to 1999. Energy prices IIQ 2003 from 2000 to 2002. As prices are expressed in £/tonne the original prices have been divided by two conversion factors: a) 0.987 to pass from tonne to kt; b) 0.987 to pass from kt to 10E7 kcal=1 toe. See the conversion factor tables on the same publication. Data from 1990 to 1992 are missing in the original series.

(6) Energy prices and taxes IIQ 1992 from 1980 to 1989. Energy prices and taxes IQ 2000 from 1993 to 1999. Energy prices and taxes IIQ 2003 from 2000 to 2002. Original prices are expressed in 10E7 Kcal GCV. They are converted by multiplying the original prices by a factor of 1.1106, which is the implicit factor between the two series when prices are observed in both units of measure.

(7) Energy prices and taxes IIQ 1992 from 1980 to 1989. Energy prices and taxes IQ 2000 from 1990 to 1999. Energy prices and taxes IIQ 2003 from 2000 to 2002. Original prices are expressed in £/tonne. They have been divided by a factor of 0.5653 to obtain prices in 10E7 Kcal = 1 toe.

(8) World Development Indicators from 1980 to 1999. www.dtf.gov.uk/energy/inform/energy_stats/electricity/tables5_4.xls from 2000 to 2002

(9) Author's elaboration. Weighted average between prices of sources for electricity generation.

(10) OFWAT Water and Sewerage service unit costs and relative efficiency 2001-02 report from 1992 to 2001. Sum of cost of operations and cost of capital maintenance. The value for 2002 is imputed

(11) Dassler, Parker and Saal (2001) - Economic performance in European telecommunications, 1979-98: a comparative study - from 1980 to 1998. Average of the post-privatisation period (1985-1998) for 1999 to 2002.

(12) www.dtf.gov.uk/stellent/groups/dft_transstats/documents/downloadable/dft_transstats_507479.pdf from 1985 to 2001. Data for 2002 imputed. Data for 1984 imputed. Data includes depreciation.

(13) www.dtf.gov.uk/energy/inform/energy_prices/tables/table321.xls from 1990 to 2002. From 1980 to 1989 prices are reconstructed according to price index in the annex graph.

(14) Author's elaboration on the base of the RPI. Current price series from 1991 to 2001 is also available at the same source as in (12).

(15) Author's estimation. It is obtained by applying to the telecom price index the relation CPI=TPI(1+p) where CPI is the cost index, TPI is the telecom consumer price index and p is the profit margin as in (11).

(16) ONS Monthly Digest of Statistics - Series DGADAU - RPI: all items excluding mortgage interest payments and council tax.

(17) Transport Statistics Bulletin - 2002 Edition - from 1980 to 2001. www.dtf.gov.uk/stellent/groups/dft_transstats/documents/downloadable/dft_transstats_505659.pdf for 1979. Data for 2002 imputed.