PERSONAL INFLATION: PERCEPTIONS AND EXPERIENCES

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ABSTRACT

One of the main reasons why people feel that their experience of price changes does not correspond with the national inflation figures is that the latter are based on averages. In reality every household is different and the impact of price changes depends on how and where people spend their money. This is so even within readily identifiable categories of people such as pensioners, one parent families and dual-income no-kids couples ("dinkies"). In addition people's perceptions of inflation are most influenced by those goods and service which they purchase more frequently. This paper does four things:

I. Presents an analysis of price trends relating to frequent purchases to show how the latter may have influenced people's perceptions of inflation.

II. Reports on the new on-line Personal Inflation Calculator (Personal Inflation Calculator), on the National Statistics website, which allows the public to put in an estimate of how much they spend on a range of goods and services to give them an indication of how the price changes faced by their household may differ from the average.

III. Uses expenditure profiles for different types of household derived from the Expenditure and Food Survey to show how they have been affected by price changes. First the analyses uses the highly aggregated price indices and fixed weights of the Personal Inflation Calculator, then it allows for variation in expenditure at a lower level by using the detailed indices and chaining of the published indices

IV. Finally the paper provides an initial report on an analysis that allows for the identification of expenditure patterns by exact product and place of purchase. Using household based scanner data for selected COICOP classes we show how the price changes experienced by different social groups is affected by precisely what they buy and where they buy it.

1. Inflation Perceptions and Experiences in the UK

ONS does not directly measure the public's perceptions of inflation but it is clear from the correspondence that ONS receives from the general public and from reports in the UK media that many people think that inflation is higher than that shown by the official figures and that this has gone some way in undermining confidence in them. Indeed, a survey commissioned in March 2005 by ONS found that the inflation figures were among the less trusted official statistics, ranking fourth out of six key statistics (Goddard).

Part of the explanation for the lack of confidence in the official inflation figures - whether based on the retail prices index (RPI) or consumer prices index (CPI) – is that they represent

the expenditure and price changes experienced by an average household and that not surprisingly most peoples' expenditure patterns, and their resulting experience of price changes, will differ from that average. In addition a person's perceptions of their personal price changes can be affected by how often they buy specific goods and services- the memory and awareness factor.

This article investigates some of the reasons why the price changes experienced will vary in practice between households. However, it begins by investigating the perceptions issue[1] and shows that the most frequently purchased goods and services, which might most heavily influence perceptions of inflation, have in recent years generally risen at a faster rate than prices overall.

This article will also give an overview of the Personal Inflation Calculator. ONS recognises that most people's spending patterns will differ from the average used to compile the RPI weights, in some cases significantly so. And that in consequence, it is almost certain that average price changes experienced will differ from those calculated using national spending patterns. This effect can be examined by combining the price changes of components of the RPI in a way which gets closer to an individual's expenditure pattern than the national averages used in the published RPI. In order to demonstrate this effect the ONS released a web-based tool called the Personal Inflation Calculator in January 2007.

The article will then use various data sources (including the Personal Inflation Calculator and household based scanner data) to explore how different 'household types', e.g. two adults with two children, single state pensioner, etc, are affected by price changes to differing degrees.

Both the analysis in the current article and the Personal Inflation Calculator are based on the RPI, the long-standing and familiar domestic measure of inflation whose uses include indexation of pension payments, state benefits and private contracts. It covers the full range of consumers' expenditure including council tax and owner-occupiers' housing costs but excludes some pensioner households and high-income households. The general conclusions reached apply equally to the CPI.

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2. Why people may experience inflation which differs from the average

An individual's personal inflation rate is more than likely to differ from the average because we all spend different amounts of money on different goods and services whose prices may move in different ways. Indeed, it would be against all expectations to find somebody who precisely represented and reflected the average, despite the strenuous efforts taken to ensure that the RPI is representative of average expenditure. The main reasons for this are:

- The RPI covers some expenditure which will only be relevant to a minority of households although included in the basket of goods priced to ensure that it is representative of household expenditure overall. An obvious example is expenditure on tobacco, even though only about a quarter of adults are smokers. Such expenditure is obviously irrelevant for a non-smoker's inflation rate.

[1] Interest in perceptions of inflation is not confined to the UK. It has also been considered in the European context by, among others, the European Central Bank (2006) and D'Elia (2005) in Italy.

- At a more detailed level consumption and expenditure patterns for a particular good or service will vary between consumers. For instance, the expenditure weight associated with a smoker's consumption of tobacco may differ from the average, depending on whether they are occasional or heavy smokers.
- Price changes experienced by consumers will vary according to where they shop. In compiling the RPI, retail outlets are selected to be representative of household expenditure across the UK as a whole. This means, for instance, that prices collected from the major supermarkets are represented in line with their market share. However, the retail outlets in which a particular individual does their shopping will be specific to that individual and may differ from the average.
- Price changes experienced by consumers will vary according to the precise products or brands that they buy. The range of products whose prices are tracked for a particular item, such as a white sliced loaf of bread, broadly reflects the pattern of expenditure on that item and will include some own-brand products as well as branded products. If an individual buys only branded products, say, this may contribute to their personal inflation rate differing from the average and from somebody purchasing only own-brand products. A particularly important and special example of this is council tax: the percentage change used in the RPI is an average across all councils, but the actual price change experienced by an individual will depend on where they live and which local council provides the local services.
- Finally the 650 or so items that make up the basket of goods and services which are priced for the computation of the RPI is a sample of all those available, as it is clearly impracticable to monitor the price of every product sold in every shop. It is assumed that the prices of similar items move in line with one another in response to market forces. For instance, changes in the price of bacon are represented by back bacon and gammon: it is assumed that other cuts of bacon will, on average, move in line with these two items. In practice, it is inevitable that the price movements for the particular items purchased by a particular individual rather than by the population as a whole move differently from those used in the index.

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3. Why perceptions of inflation may differ from actual inflation experienced: inflation rates by frequency of purchase

Regardless of whether an individual's personal inflation rate differs from the average, the evidence suggests that perceptions of inflation can be heavily influenced by changes in the prices of those goods and services that are bought most frequently.

In particular, people may not notice or give sufficient weight to changes in the cost of infrequently purchased items, such as major household appliances (e.g. cookers), and audio-visual equipment (e.g. digital cameras, televisions). These items are being bought every week in the shops and it is important continuously to measure their price change so that they are represented in the overall inflation rate. But a change in price is irrelevant to the individual until they make a repeat purchase of a particular product. When they do make a repeat purchase it is likely to be of a slightly different model to the one which they previously bought. Thus there are two factors at work which will influence perceptions:

- From the point of view of the individual, infrequently purchased items do not form part of a typical monthly, or perhaps even annual, shopping basket.
- Even if they are included, an individual may find it difficult to judge how prices have changed because of the passage of time since they were last purchased and how technology has advanced so that it is only possible to find a product of better

"quality". An example of this is personal computers where specifications have risen and prices have gone down.

In reality the evidence indicates that these infrequently purchased items have typically shown lower than average price increases, or in some cases price falls, in the recent past. This is particularly so after allowing for improvements in quality.

In order to illustrate the possible effects of frequency of purchase on perceptions of inflation, ONS has undertaken a special exercise where each category of expenditure was classified by the frequency of purchase of the associated goods or services. It was not possible to do this from data gathered from household budget surveys, such as the ONS's Expenditure and Food Survey, because these are not normally designed to generate detailed shopping information. Instead, a four-way classification of frequency of purchase was used, based on the judgement of an expert team of price analysts as follows:

- At least monthly.
- At least quarterly but less frequently than monthly.
- At least annually but less frequently than quarterly.
- Less frequently than annually.

The composition of these four categories is summarised in Table 1.

Table 1: RPI goods and services classified by frequency of purchase:

	Goods	*Services*
At least monthly	Food Catering Alcoholic drinks Tobacco Most housing costs Fuel and light Household consumables Pet care	Chemists goods Most household services Motoring running costs Bus and rail fares Books and newspapers TV licences & rentals Entertainment & recreation
At least quarterly but less frequently than monthly	Clothing Disks and tapes Toys, photo and sports goods Gardening	Personal services
At least annually but less frequently than quarterly	DIY goods Footwear Vehicle maintenance Holidays	Fees and subscriptions Personal articles Air fares and other travel costs
Less frequently than annually	Consumer durables Motor vehicle purchase costs	Housing repairs

Corresponding price indices were then compiled according to the cumulative frequency of purchase. Namely:

- At least monthly.
- At least quarterly.
- At least annually.
- All purchases (the all items RPI).

Two caveats apply when analysing the results:

- There is inevitably a degree of judgement in deciding where some categories of expenditure should be classified, particularly for categories containing a mixture of products with different frequencies of purchase. For example, personal articles include monthly purchases, such as daily disposable contact lenses, but also many more articles purchased much less frequently such as jewellery and spectacle frames. The latter category accounts for the majority of the weight; so this section is categorised as "at least annually".

- Underlying the analysis is the assumption that perceptions of inflation are based on the frequency by which goods and services are paid for rather than when they are billed. Thus regular bills that change annually, such as council tax and water rates, are treated as monthly purchases, reflecting the fact that it is common for these bills to be paid in instalments and that they are expenses that accrue continuously. Similarly, gas and electricity bills are also treated as monthly, reflecting the fact that they are generally paid monthly. Clearly this approach to the categorisation may not always be appropriate as it will critically depend on an individual's perceptions, which will be influenced amongst other things by frequency and method of payment.

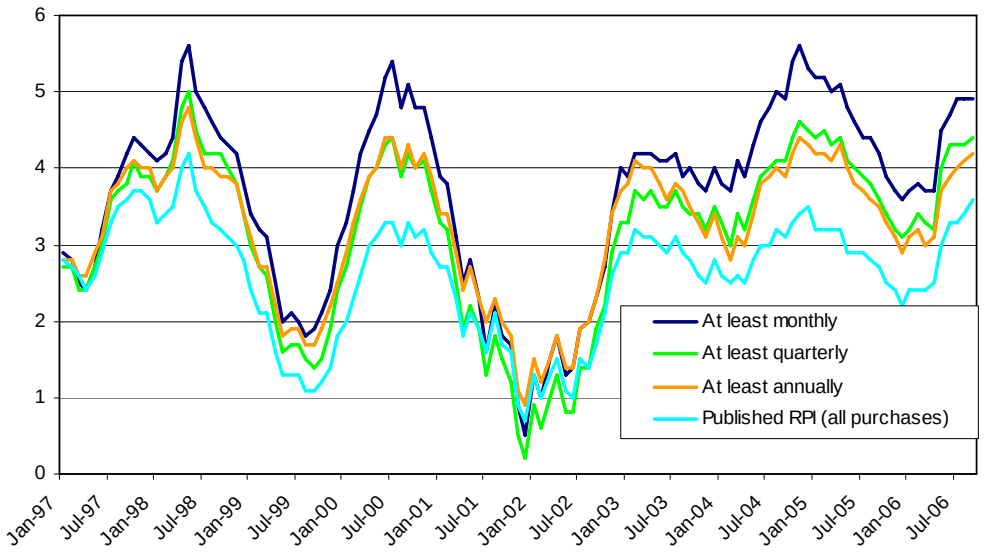
The results over the last ten years are illustrated in **Figure 1**.

The table and chart indicate that the most frequently purchased goods and services according to the classification described above have generally had a higher inflation rate than the published RPI in recent years. In many periods, including that from January 2003, the difference between the two exceeds one percentage point. In November 2004 the difference reached 2.2 per cent, around two-thirds higher than the all items rate.

A noticeable exception, where there was little difference between the two, is the period July 2001 to February 2002 when mortgage interest payments and petrol and oil prices were falling. These components are both classified as "at least monthly purchases" and have a relatively higher weight in that index than in the "all purchases" index. They therefore pull down the "at least monthly purchases" inflation rate by more than the "all purchases" rate, eliminating the gap between the two series.

Figure 1 also shows a sharp increase between April and June 2006 in the inflation rates. This is driven in large part by a sharp increase in electricity and gas prices whose annual inflation rates increased from 17 to 25 per cent and 25 to 36 per cent respectively. Energy costs make up a greater proportion of the weight of the "at least monthly purchases" index than they do in the "all purchases" index, thus contributing to a widening of the gap between these two indices over this period.

Figure 1: RPI percentage change over 12 months by frequency of purchase



The chart also shows that the "at least quarterly" and "at least annually" series generally lie between the "at least monthly" and "all purchases" series. The reasons for this can be seen by looking at Table 1 and the frequency of purchasing services. In 2006, two-thirds of the commodity groups making up the RPI basket was classified as being at least monthly purchases, of which a substantial element is services whose costs have in recent years tended to rise at a faster rate than the all items RPI, reflecting in part movements in wage costs, which tend to be a relatively large element of the cost of services. The "at least annual but less than quarterly purchases" category also includes a substantial element of services. By contrast, the majority of expenditure covered by the "at least quarterly but less than monthly" and "less frequently than annual" categories are goods. In particular, these two categories cover clothing and consumer durables respectively, for both of which prices have been falling since 1998. Of course, the extent to which a given household's perceptions of inflation will be distorted by this effect also will depend on the overall proportions of a household's expenditure which are spent on goods and services associated with differing frequencies of purchase. The impact on perceptions is likely to be less the smaller the amount of money being spent. The above analysis doesn't take this into account. Also the categorisation of items by frequency of purchase is broad brush- some items in a particular expenditure category will be purchased more frequently than others. Nevertheless the results are instructive. .

It is also worth noting that the items included in the monthly purchases index tend to be those that might be regarded as "necessities". These are items that households have to purchase, such as food, heating and housing, regardless of how prices are moving. In times when these costs are rising faster than the average, the proportion of expenditure by households on "necessities" will tend to increase, while relatively less will be spent on "optional" infrequent purchases, such as durable goods where prices are falling. In these circumstances, in the short-term, an individual's inflation rate may tend to move closer to the monthly purchases index than the all items index reflecting changes in expenditure. This phenomenon, part of the substitution effect is not taken into account in price indices, like the RPI, which are designed to measure the impact on inflation solely of price changes.

To conclude, prices of regular monthly purchases have consistently risen at a faster rate than all purchases covered by the RPI. This may help to explain why some individuals think that they have experienced higher inflation than they really have. Although these perceptions are in fact inaccurate they are likely to persist and may undermine the official inflation figure in the eyes of the general public.

4. The Personal Inflation Calculator

In order to allow people to gain a better understanding of how price changes affect them and of how inflation estimates are produced, ONS launched a new on-line service, the 'Personal Inflation Calculator' in January 2007. This tool enables users to estimate the extent to which they are being affected by price changes based on something closer to their personal expenditure patterns rather than the averages used in the published statistics; it is available on the UK National Statistics web site (www.statistics.gov.uk). The calculator was of instant interest to the media and the general public generating massive interest with a record of over 100,000 'hits' on the day of launch.

The calculator allows people to calculate an average price change rate appropriate to their own spending on the main categories of goods and services. It works by re-assembling the price indices used to calculate the RPI to reflect the personal expenditure patterns entered by the user.

The personal inflation calculator is a user-friendly, user-focussed tool which has been created using Scalable Vector Graphics (SVG), a file format which is ideal for producing compact, high-quality and interactive graphics for the Web. The calculator has, and will continue to, add to the debate about inflation measurement and enable users to develop their understanding of how inflation affects them.

How the personal inflation calculator works

It is never possible to exactly estimate the effect of price changes on an individual as this would require detailed knowledge of where they shop, the precise purchases they make and the prices they pay. It is, however, possible to reassemble the price indices used to calculate the RPI to reflect something closer to their personal expenditure patterns. This is the approach adopted for the Personal Inflation Calculator. The expenditure groups in the calculator have been chosen to balance users' ability to make meaningful estimates with the level of detail needed to identify differences in price movements. In most cases, users are asked to estimate monthly expenditure but, for categories where purchases tend to be relatively infrequent, total expenditure in the last year or last three years is requested. These estimates are then scaled so that they can be compared with average monthly expenditure.

The calculator makes special calculations for housing and motor vehicle purchases:

- The RPI includes a range of housing costs such as rent, water charges and home insurance, which are relatively easy to calculate, but others, in particular mortgage interest payments and depreciation costs, which are more complicated. For mortgage interest payments users enter the value of their outstanding mortgage and the "national average" interest rate used in the RPI is applied to estimate mortgage interest payments. The calculation ignores the actual interest rate charged for the particular user for their particular mortgage. In the UK the latter can vary significantly between individuals depending on the particular mortgage deal they have taken up. The RPI is also designed to cover the cost to homeowners of major

repairs to their houses. As these costs are usually infrequent it is difficult to produce a price index directly from expenditure data so they are indirectly estimated using depreciation costs as a proxy. This latter calculation is too complex to replicate for an individual so homeowners are asked to estimate the value of their house and location and this is combined with information of average house prices and price trends by region to produce a broad estimate.

- Motor vehicle purchases are also infrequent and irregular and difficult to gauge in terms of importance to an individual household. In the personal inflation calculator the solution is to assume that anybody who inputs expenditure on petrol and oil is a car owner and the vehicle purchase is calculated by taking form the RPI the average expenditure weight adjusted to exclude non-car owners.

It should also be noted that the calculator holds the expenditure pattern submitted by the user fixed over a periods of time. This differs from the RPI where expenditure weights are updated and chain-linked annually to take account of changes in expenditure patterns between years.

From a practical perspective the calculator is easy to use. There are four simple stages:

- Price indices for each of the 23 categories of spending in the calculator have been produced using exactly the same methodology as the RPI.
- The user enters their personal spending pattern.
- The calculator produces a new index for the overall price level based on the user's expenditure pattern.
- The change in the new price index is used to estimate the personal inflation rate. Which is displayed alongside an estimate based on national expenditure patterns[2].

Annex A shows some 'screenshots' from the Personal Inflation Calculator.

For more information on the calculator itself, see Powell and O'Donoghue, ELMR vol.1, 2007.

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5. Impacts of Price Changes on different Household Types

The launch of the Personal Inflation Calculator was followed by an extensive discussion in the UK media of results for various so called "typical" expenditure patterns. The majority of the latter which were put together by the media themselves, showed impacts of price changes higher than the published inflation rate- not surprisingly given the fact that it is these stories which generate the greatest news and media interest..

In order to contribute to the debate, ONS conducted a study on the impact of price changes on different to household types, which is summarised here. The study did three things:

- Firstly, it looked at the results that the Personal Inflation Calculator gives when data is entered which follows expenditure profiles for various 'typical' household types (derived using actual data from the ONS's Expenditure and Food Survey). It

[2] This may differ from the published RPI because of rounding. The Personal Inflation Calculator is based on the weighting together of 23 expenditure categories, compared with 85 sections in the RPI.

illustrates the potential analytical power of even a simple tool like the Personal Inflation Calculator.

- Secondly it tested the extent to which the results can change when the restrictive and simplistic assumptions of the calculator are replaced with ones that mirror the methodology actually used in calculating the RPI. This comparative analysis partially tested the extent to which the Personal Inflation Calculator provides a reliable guide to the inflationary experiences of different population groups despite the simplistic assumptions.
- Thirdly it used household-based scanner data for selected COICOP classes to investigate the way in which the price changes experienced by different social groups are affected by precisely "what they buy and where they buy it.. This provided a more fundamental test of the appropriateness of re-weighting as a means of measuring the price changes experienced by sub-groups of the population whether via the personal inflation calculator or by a re-computation of the RPI using the prices collected to represent all households.

A more detailed description of the data underlying the analyses and the methodology used is given at Annex B. The results are presented below.

1. Personal Inflation Calculator (Personal Inflation Calculator) results for "typical" household types

Table 2 gives the results of the Personal Inflation Calculator based analysis based on the re-weighting of 23 expenditure categories. The first column shows the number of households in the sample in the 2005/06 Expenditure and Food Survey (EFS). This is followed by average annual price changes for January to June 2007 and January 1998 to June 2007. The final column shows the deviation of the 1998-2007 10-year average from the figure for all households using 2007 weights. The table provides an interesting insight into the impact of increasing prices on different population groups and, more speculatively, on the role of substitution.

Table 2: Summary of Personal Inflation Calculator based results:

Average of 12 month price change for selected Household Types/Methods	Number of' H'holds	End period Jan'07 Jun'07	Whole period Jan'98 – June''07	Average deviation Whole Period
All households Chained (actual RPI)	6785	4.4	2.6	-0.4
All households 07 fixed weights (end period)	6785	4.7	3.1[3]	
All households 97 fixed weights (start period)	6785	4.3	2.7	-0.4
Results by Characteristics of Reference Person				
a. Large employers & higher managerial	283	5.3	3.2	0.1
b. Higher professional	410	5.1	4.0	0.9
c. Routine manual workers	436	4.2	2.6	-0.5
d. Long-term unemployed	145	4.1	2.6	-0.5
e. Employees Full time	2838	4.9	3.2	0.2
f. Students	90	4.3	2.8	-0.3
g. Unemployed	123	4.3	2.9	-0.2
Results by Household Characteristics				
h. Income decile 1 (bottom 10%)	674	4.2	2.8	-0.3
i. Income decile 5	699	4.6	3.0	-0.1

[3] The reference period for the final column.

j. Income decile 10 (top 10%)	611	5.0	3.3	0.2
k. Single State Pensioner	200	5.6	3.2	0.1
l. One adult with one child	236	4.4	2.8	-0.3
m. Two adults with two children	615	5.1	3.3	0.2

N.B. Decile household numbers are unequal as they are unweighted. Deviations may not add due to rounding

The first three rows of the table compare the chained (published) index with results produced using fixed weights from the start period (1997) and the end period (2007). Somewhat surprisingly the fixed 2007 weights give higher results than either the chained estimates or the 1997 weights, possibly reflecting the fact that price increases in the past year have been concentrated in commodities such as food, heating and lighting, and mortgage interest payments where demand is relatively inelastic. This hypothesis is supported by an analysis at the Personal Inflation Calculator expenditure category level (not shown here) that shows a 60% positive correlation between average annual price changes in 2007 and the increase in weights between 2006 and 2007.

Rows 4 to 16 of table 2 present the corresponding results for various population subgroups. Looking at the final column, the results overall show a consistent picture of households with reference persons of a higher social status, with higher incomes, and couples with children facing higher price rises than the poor, unemployed and students suggesting that relative price changes may have slightly blunted the growth in income inequality. The major exception to this pattern is households consisting of people living alone on the state pension who have faced slightly higher than average price changes.

One of the advantages of the simplistic Personal Inflation Calculator assumptions is that it is particularly easy to decompose the deviations in table 1 by commodity group.

Such an analysis, not presented here, clearly shows the extent to which more affluent groups have been more affected by the increase in mortgage interest rates and housing depreciation which has more than offset the benefit from the relatively low price rises in car expenditure and rents. One point to note is the apparent differential inflationary impact of council taxes, which have been subject to particularly large increases over recent years. Higher professionals have felt the consequences of this much more than the higher managerial group. This is tentatively supported by EFS data which shows higher professionals spending much more on council tax.

But how reliable is the calculator for analytical purposes? The next two sub-sections test this.

2. RPI calculations for "typical" household types.

A mentioned earlier, this set of calculations tests the sensitivity of the results to the restrictive and simplistic assumptions of the calculator by computing the corresponding calculations based on the precise methodology used in the RPI.

Table 3 compares Personal Inflation Calculator based results and RPI consistent results for the household types as featured in table 2. It is instructive to note that, although almost all the RPI consistent results are lower, the pattern for the different household groups is maintained suggesting that differences in consumption patterns between the different household types at the high level of the Personal Inflation Calculator categories are more important than differences within those categories. This appears to indicate that the substitution effect at a higher level between the 23 expenditure categories used in the

Personal Inflation Calculator is uniform between the different population categories. Additionally, it would appear to suggest a substitution effect at a lower level which is broadly uniform across the different households. This is perhaps counter-intuitive and an area worth investing additional research in. It may, at least to some extent, be influenced by the dominance of the owner-occupier housing cost calculations (and to a lesser extent the calculation for cars). As noted above, these latter calculations are not based on direct calculations of costs but rather are based on complex iterations which do not necessarily mirror exactly changes in costs incurred by households. In addition, for all household types a large element of owner-occupier housing costs is inelastic.

It is interesting to note that the only exception to the pattern described above is households in income decile 1 (the lowest 10% of households when ranked by income) where there is a large difference between the Personal Inflation Calculator-based calculation and the calculation using the full RPI methodology. The Personal Inflation Calculator indicates that this group has a relatively low level of inflation when compared with the fixed-weight index all households but a slightly higher-than-average inflation rate when fully replicating RPI methodology. It would seem to suggest a relatively low level of substitution compared with other groups.

Table 3: Comparison of Personal Inflation Calculator and RPI based results for Average of 12 month price change for selected Household Types

	Personal Inflation Calculator based			RPI consistent		
Household Types	2007 Jan-Jul	1998-2007	Deviation from all HH 07 weigh	2007 Jan-Jul	1998-2007	Deviation from all H'Hold RPI.
All households chained				4.4	2.6	
All households fixed weights	4.7	3.1				
Results by Characteristics of Reference Person						
a. Large employers & higher managerial	5.3	3.2	0.1	5.0	2.7	0.1
b. Higher professional	5.1	4.0	0.9	4.9	3.6	0.9
c. Routine	4.2	2.6	-0.5	3.8	2.3	-0.3
d. Long-term unemployed	4.1	2.6	-0.5	3.9	2.4	-0.3
e. Students	4.3	2.8	-0.3	4.2	2.3	-0.3
f. Employees Full time	4.9	3.2	0.2	4.5	2.8	0.2
g. Unemployed	4.3	2.9	-0.2	4.0	2.6	-0.1
Results by Household Characteristics						
h. Income decile 1 (bottom 10%)	4.2	2.8	-0.3	4.2	2.7	0.1
i. Income decile 5	4.6	3.0	-0.1	4.2	2.6	-0.0
j. Income decile 10 (top 10%)	5.0	3.3	0.2	4.7	2.9	0.3
k. Single State Pensioner	5.6	3.2	0.1	5.1	3.0	0.4
l. One adult with one child	4.4	2.8	-0.3	4.1	2.4	-0.2
m. Two adults with two children	5.1	3.3	0.2	4.7	2.7	0.1

As previously mentioned none of the above results allow for detailed differences in shopping patterns. The impact of the latter is examined in the next section, which reports on an initial analysis of household panel data.

Household Panel data results

Table 4 summarises the results of third part of the investigation which, using household panel data derived from TNS's household-based scanner data for selected COICOP classes, looked into how an individual's experience of inflation may be affected by precisely "what they buy and where they buy it." and whether this undermines the two approaches described above, and most particularly the Personal Inflation Calculator, to calculating inflation rates for sub-groups of the population.

The Household panel dataset consists of individual purchase records for approximately 15,000 households covering drink, non durable household goods, toiletries, and some personal care products and consumer durables. The dataset includes: product (at the level of the individual barcode); shop purchased from; date of transaction; and expenditure. The characteristics of each participating household are also recorded. The panel provides a powerful analytical tool despite the fact that the expenditure coverage is more limited than in the RPI and differences exist in the target population.

Annual inflation rates, covering the commodity groups in the household panel survey, were calculated for the 20-month period February 2004 to October 2005. It should be noted that both the price relatives (based on January 2003=100) and the weighted price indices (for the 2003 calendar year) were computed entirely from the panel data. These inflation rates were then compared with parallel calculations for the RPI covering broadly the same expenditure categories but not the same household coverage. Table 5 gives the average annual inflation rates.

When interpreting the comparative results it is important to note that, unlike the RPI calculations, the household panel survey will reflect the effects of consumer substitution between outlets but that the expenditure weights for aggregating the indices for each COICOP category in the survey are fixed.

Table 4 Average annual inflation rates (February 2004 - October 2005) by social class: estimates from household panel compared with RPI.

	Mean from Panel	Mean From RPI ONS	Correlation Between series from Panel and series from RPI	Rank from Panel	Rank from ONS
AB - Managerial and professional	0.73%	0.54%	19%	4	3
C1 -Supervisory and clerical	0.64%	0.52%	20%	5	4
C2 -Skilled Manual	1.14%	0.52%	4%	1	5
D-Unskilled manual	0.99%	0.56%	23%	3	2
E-Long Term Unemployed	1.18%	0.59%	55%	2	1
All HH (including unclassified)	0.85%	0.56%	22%		

The first thing to note is that the mean price change for these commodities in the panel dataset is distinctly higher than that in the ONS data for the same categories. This is counterintuitive given the fact that the Panel data allows for substitution between outlets as the RPI calculation does not. Further investigation is needed. The correlation between the two series is also low.

The pattern of price changes faced by the different social groups is also quite different with no correlation between the rankings for the estimates from the two sources. Interestingly the

results from the panel dataset are far more diverse than those from the re-weighted RPI, suggesting that differences in spending patterns at a detailed lower-level can make a significant difference to experienced inflation.

If these initial results are correct then it suggests that the apparent benefits that some disadvantaged groups in society are receiving from relatively favourable overall price movements in the total basket of commodities they purchase may be being eroded by less favourable price movements in the precise products they buy and the outlets they use. In the context of a cost-of-living index it also points to the analytical limitations of producing inflation rates for some subgroups of the population based solely on a re-weighting of expenditure categories, as in the personal inflation calculator.

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6. Conclusions

The debate on inflation perceptions versus inflation experiences is an interesting one which will no doubt continue to be a hot topic in the media, amongst the general public and amongst analysts for the foreseeable future.

Some individuals will have genuinely experienced higher-than-average inflation rates and undoubtedly some will think that they have whilst in reality this is due to perceptions emanating from significant price increases in frequently purchased items (section 3).

Inevitably the use of averages means that for some household types or patterns of expenditure the actual inflation experienced will be above the published national average whilst for others it will be below (Section 4). But the initial results from the analysis in section 5 indicate that the extent to which this is true may depend not just on broad differences in the types of expenditure but also on where and precisely what people buy.

The conclusions from the preliminary analysis in Section 5 require further verification and research if we are to fully assess the adequacy of using re-weighting methods (such as the Personal Inflation Calculator) to calculate an individual's personal inflation rate. The latter meets a public demand and can give the public a better understanding of the official inflation figures. It can also generate an inflation rate for a subgroup of the population for analytical purposes to formulate and comment on economic and social policy.

Investigations to date indicate that further work is warranted to ensure the value and integrity of such "re-weighting" calculations.

References

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5. Knipe (March 2006) 'Consumer Prices Index and Retail Prices Index: The 2006 Basket of Goods and Services' http://www.statistics.gov.uk/cci/article.asp?ID=1455
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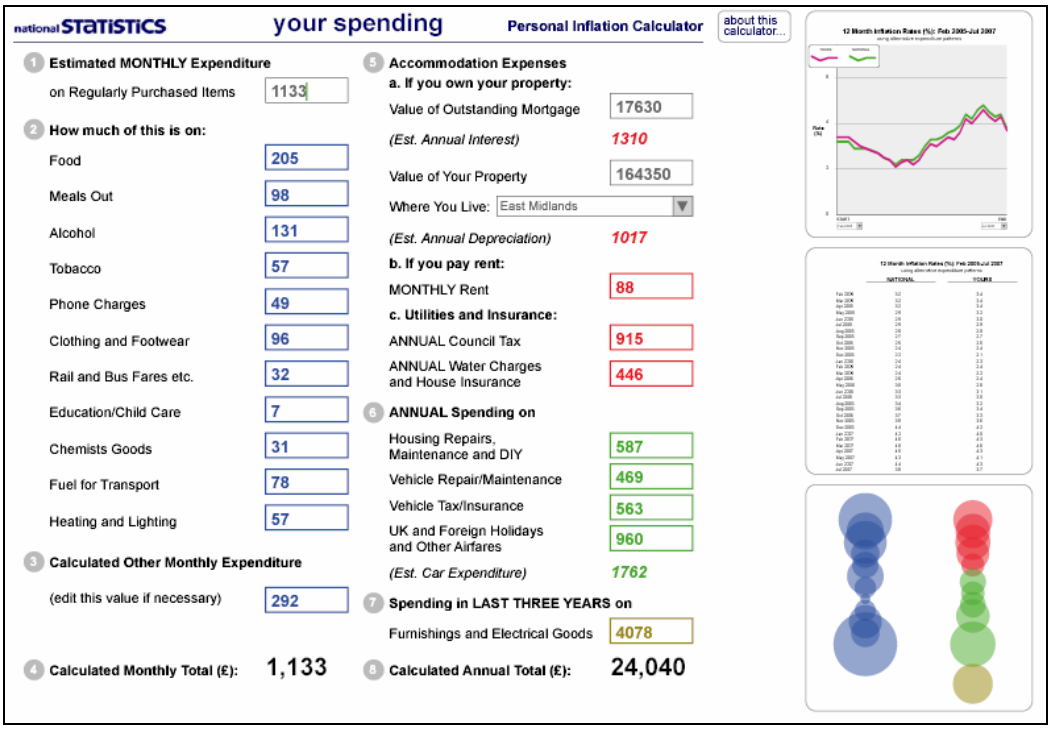
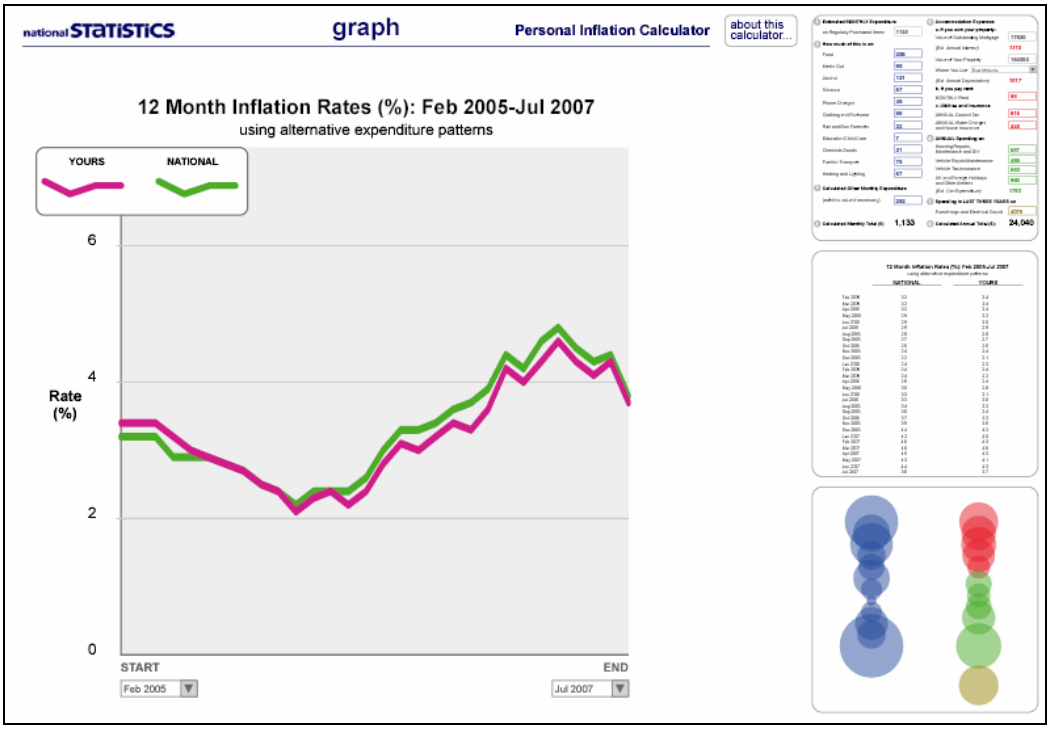
Annex A – Personal Inflation Calculator Screenshots.

The screenshots below are taken from the Personal Inflation Calculator available at www.statistics.gov.uk/pic

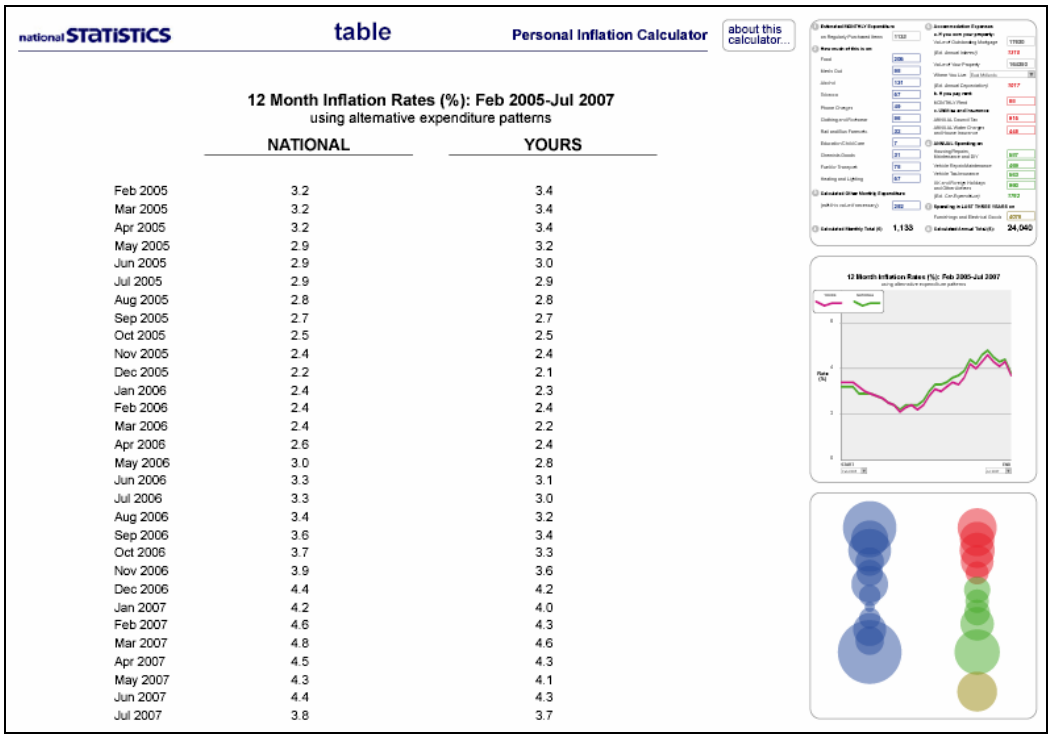
Data input screen



Personal inflation chart



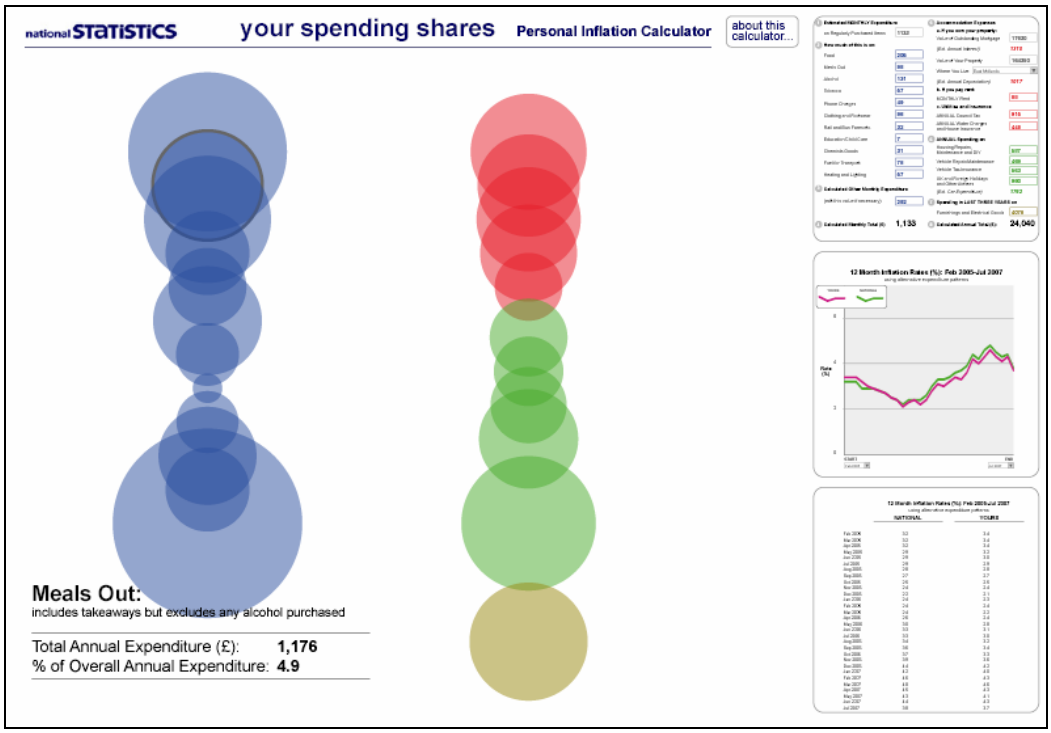
Personal inflation table


national STATISTICS table Personal Inflation Calculator about this calculator...

12 Month Inflation Rates (%): Feb 2005-Jul 2007
using alternative expenditure patterns

	NATIONAL	YOURS
Feb 2005	3.2	3.4
Mar 2005	3.2	3.4
Apr 2005	3.2	3.4
May 2005	2.9	3.2
Jun 2005	2.9	3.0
Jul 2005	2.9	2.9
Aug 2005	2.8	2.8
Sep 2005	2.7	2.7
Oct 2005	2.5	2.5
Nov 2005	2.4	2.4
Dec 2005	2.2	2.1
Jan 2006	2.4	2.3
Feb 2006	2.4	2.4
Mar 2006	2.4	2.2
Apr 2006	2.6	2.4
May 2006	3.0	2.8
Jun 2006	3.3	3.1
Jul 2006	3.3	3.0
Aug 2006	3.4	3.2
Sep 2006	3.6	3.4
Oct 2006	3.7	3.3
Nov 2006	3.9	3.6
Dec 2006	4.4	4.2
Jan 2007	4.2	4.0
Feb 2007	4.6	4.3
Mar 2007	4.8	4.6
Apr 2007	4.5	4.3
May 2007	4.3	4.1
Jun 2007	4.4	4.3
Jul 2007	3.8	3.7

Personal expenditure pattern



Annex B: Impacts of Price Changes on different Household Types – Data Description

Three sources of data were used in the analysis presented in this paper: the 2005/06 Expenditure and Food Survey (EFS); the price indices and weights in the RPI/CPI production system for the period February 1997 to July 2007; and purchases data collected from a representative panel of households by TNS, a market research company.

EFS data

The EFS is a continuous survey in which over six an a half thousand households each year keep diaries of everything they spend for two weeks. The results are grossed to produce nationally representative estimates of the average expenditure of various groups of households on each COICOP category of goods and services in pence per week.

The EFS presents various alternative household groupings according to the classifications of the household as a whole (number of members, location, total expenditure etc.) or of the "Household Reference Person" (employment status etc.). The expenditure patterns that seemed most relevant to examine for the purposes of this paper were those for households classified by the gross income decile and the composition of the whole household and by the employment and occupational status of the reference person.

Two categories of expenditure that are important to the RPI, mortgage interest payments and council tax, were not available separately for all household breakdowns and so figures had to be imputed using the national pattern. One category, vehicle excise duty, was not available separately for any category while the cost of house depreciation was not captured at all. Instead proxy measures were used based on "other motoring costs" and "house maintenance costs" respectively.

RPI(CPI) item indices and weights

The RPI for each month is calculated using price indices for a basket of approximately seven hundred items representative of consumption in that year. Each item index is designed to represent the change in price level between the month in question and the previous January. The weighted average of these within year item indices are chained to the previous year by multiplying the figure for each month by the estimate for the previous January and inflation rates are calculated by comparing this chained index with the figure in the same month in the previous year.

Personal Inflation Calculator- based profiles, indices and rates of change

Each item in the RPI is allocated to one of the Personal Inflation Calculator's 23 expenditure categories to produce a set of chained price indices using the procedure described above. Producing weights to apply to these indices is more complex as some COICOP categories fall into more than one Personal Inflation Calculator category. The solution adopted was to produce a mapping from COICOP to RPI items and allocate each profile's expenditure for each COICOP category to the items using the national item weights for 2007. These results were then uprated on an item by item basis to replicate the processes normally applied to EFS data when producing RPI weights and to bring the "All households" profile's item weights into line with those actually used in the calculation[4]. The item expenditures for each

[4] Although RPI weights rely heavily on the EFS they are calculated from figures that are much more detailed than the published estimates and exclude certain households. These estimates are up-rated to allow for price changes between the collection date and the RPI base date and adjustments are made to in certain areas such as

profile were then aggregated by Personal Inflation Calculator category to produce weights and these were then used to calculate overall chained indices and twelve month rates of change for each household type.

RPI consistent indices and rates of change

Producing RPI consistent rates of change required two variations on the above procedure: firstly the item weights for each profile for each year were calculated using the RPI weights for each year rather than the 2007 weights; secondly the chained indices for each profile were calculated directly from the item indices rather than via the Personal Inflation Calculator categories.

Household Panel data

The Household panel dataset was obtained form the market research company TNS. It consists of individual purchase records from a panel of approximately 15,000 households who scan in all of their shopping purchases of food and drink, non durable household goods, toiletries, and some personal care products and consumer durables for as long as they remain in the panel. The dataset contains a thorough breakdown of each individual transaction including: product (at the level of the individual barcode); shop purchased from; date of transaction; and expenditure. An associated dataset contains an extensive array of information about each individual household including the social class of the head of the household. As well as the obvious difficulty that the dataset only covers about 15% of the RPI basket by weight there are a range of other differences between the TNS dataset and the RPI target population of purchases. Nevertheless the fact that it contains actual purchase data for individual households makes it a unique resource for examining the way in which households have been affected by price changes.

The procedure adopted in processing the data was to sum the total expenditure and quantity purchased by each social class in each household in each month. Expenditures were divided by quantities to produce average prices for each product and social group in each month and price relatives calculated by comparing the price in each month with that in January 2003 for all product and social group pairs for which there were entries in both months. Price indices for each month were produced by weighting together the price relatives using the expenditure on the appropriate products in the calendar year 2003. The indices for each COICOP+[5] category were then weighted together using the expenditure for the whole category in 2003 to produce an overall index.

In some respects the result of the procedure described above bears more resemblance to a cost of living index than the traditional price index construction used in the RPI as it reflects expenditure changes arising from switching purchases of a specific product from one outlet or location to another. Although it would be possible to compile separate price relatives for individual shops and household locations (down to the two digit postcode level) this would still not replicate the RPI's same product, same outlet rule as it would not distinguish between purchases from different outlets of the same shop. More importantly it would drastically reduce the proportion of transactions falling into a price relative. Even if it were possible to replicate the RPI procedure exactly the results would still be different because of

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alcohol and tobacco expenditure where it is felt that there is under-recording and data is added for areas such as housing depreciation which are not covered in the survey (See Consumer Prices and Retail Prices Index: Updating Weights for 2006 www.statistics.gov.uk/articles/nojournal/CPI&RPI_2006_weights_article.pdf for more details).

[5] COICOP+ is a breakdown of COICOP used for RPI weights calculation. The TNS data falls into 17 COICOP categories that divide into 40 COICOP+ categories.

the different price quotes used. The reader should focus on the relative results for the different social classes in each dataset rather than the comparison between the two although the latter does lead to a debate on a number of issues..

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