The British public is increasingly sceptical that official inflation numbers reflect the true rise in the cost of living. Nicholas Oulton explains the problems in creating an accurate measure of inflation, and outlines a new method of measuring rising prices.

How to measure the rising cost of living
When I tell my friends that I have been studying the problem of path-dependence bias in chain index numbers of the cost of living, their eyes tend to glaze over. But aside from its purely intellectual interest, the study of cost-of-living (and other) index numbers has many important practical implications. After all, whenever you read that the consumer prices index (CPI) rose at an annual rate of 2.5% last month or that GDP in the first quarter rose by 1.5%, you are being told something about index numbers.

To what extent do price indices like the retail prices index (RPI), used to update pensions and social security benefits in Britain, or the CPI, used by the Bank of England as its inflation target, measure the true cost of living? An index is a group (or ‘basket’) of goods, and by measuring the price change of each good you can estimate the price change of all. But because some goods take up a larger proportion of our disposable income than others, we need to adjust (or ‘weight’) the index to reflect this.

In the past, such price indices quickly became out-of-date as they were based on a fixed basket of goods: the weight of different goods in the baskets didn’t change over time. And as people tend to substitute goods that have quickly rising prices for ones that have slowly rising prices, the share of our spending that each good takes up varies, and becomes less and less similar to that of the original index.

So in Britain the basket of goods is not fixed but is changed every year in line with the latest spending patterns – in the jargon, the CPI or the RPI is a chain index. But conventional price indices like the CPI and the RPI, considered as measures of the true cost of living, do suffer from what I call ‘path-dependence bias’. This second type of bias arises because the poor spend their money in different ways from the rich, even when both face the same prices.

One of the earliest and most robust empirical findings in economics is Engel’s Law, named for an 1857 study by Ernst Engel of household budgets in Saxony. Engel found that richer households spent more on food but that the richer the household, the lower the share of food in total expenditure.

Engel’s study is not just of historical interest. The share of the household budget devoted to food in Britain has fallen by around half in the last 30 years and it’s likely that this is mostly due to the rising average level of prosperity over this period.

Engel’s Law illustrates a general problem with measuring the cost of living. Consider a household with a very low standard of living, spending say 60% of its budget on food, just like the majority of the households Engel studied in 1857 or indeed hundreds of millions of people in poor countries today. Suppose the price of food rises by 20%, with other prices remaining unchanged. Then money income will probably have to rise by close to 12% (0.60 x 20%), to leave the standard of living unchanged.

Notice that we can’t say it must rise by exactly 12% since it might be possible for the household to substitute some other goods for food. For example, the need for food could be reduced a little by burning more fuel (this is the substitution bias point). But at such a low standard of living, the substitution possibilities are clearly limited.

Compare this household with a modern day British one, spending only 15% of its budget on food. Now the maximum rise in income required to maintain the standard of living intact is only 3% (0.15 x 20%). In fact, it may be a good bit less as substitution opportunities are greater: if the price of food rises, households can buy cheap food instead of expensive food (more bread and less meat) or substitute other products for food, though poorer households will obviously find this harder than richer ones.

The general point is that though prices tend to rise over time, they don’t all rise at the same rate. The increase in the cost of living depends on the pattern of expenditure, this pattern differs between richer and poorer households and also changes as the average standard of living rises over time. So a single number that tries to measure the change in the cost of living will be necessarily inaccurate, as poor families spend their money on different things than rich families do.

So when we find that a conventional price index like the RPI has risen at an average rate of about 6% per year over the period 1974-2004, the key question is: whose standard of living is being taken as the base for measuring the cost of living? The answer is, roughly, that of someone with the average standard of living in the middle of this period – around 1989.

But what’s so special about 1989? Why not take the viewpoint of people today, who are of course considerably richer on average than their counterparts in 1989? Or the viewpoint of people in 1974, who were considerably poorer?

Because people’s incomes change over time, so do their spending habits. But if
Accurate measurement of the rising cost of living in the developing world is needed to inform development policy.

We want a true picture of how the cost of living is changing, this change in incomes confuses things. We can’t simply use the original shares of each item in the household budget (in the base year, here 1974) as substitution bias means that the price index will overstate the cost of living: people would naturally buy fewer of the goods that have seen quickly rising prices. But we shouldn’t really use the actual budget shares in 2004 either, as this will lead to path-dependence bias – since people now are richer than they were in 1974, they want to buy different things.

What we would ideally like to know are the hypothetical budget shares: what the shares would have been if prices were at their actual level in 2004 but the standard of living had been at its 1974 level (or any other year taken as the point of comparison). Of course these hypothetical shares cannot be directly observed.

Fortunately, there is a way of estimating the hypothetical shares indirectly. This can be done using only available data, namely prices and (actual) budget shares. When the hypothetical shares have been estimated, we can construct an RPI for any level of the standard of living we like.

For example, taking 1974 as the base year for the standard of living, we could ask: by how much would the income of a household with the typical 1974 standard of living have to rise in order for it to enjoy the same standard of living at the prices of 2004? The same could apply to any other year.

Figure 1 shows the results of estimating an RPI appropriate to the standard of living of each year between 1974 to 2004. It reveals a very interesting pattern. The growth rate of the cost of living tends to be higher the further back in time the base year is. As incomes have grown steadily over time, this implies that the rise in the cost of living was greatest if we take the viewpoint of the poorest (the British in 1974) than if we take the viewpoint of the richest (the British in 2004).

In other words, over this period, inflation hurt the poor more than the rich. The difference between the highest and the lowest inflation rate is around 0.5% per year: this is the maximum size of the path-dependence bias.

This method can also be applied between countries. Policy towards poverty and development should be informed by the size of the gap between the rich and the poor – and so how the cost of living is changing for different groups is important, not least due to the rapidly rising food prices that we are seeing at the moment.

But exactly the same problem of path-dependence bias arises here too. And the bias is potentially much larger: across the globe, living standards vary by much more than they did over the period 1974-2004 in Britain, during which they approximately doubled.

The World Bank has just completed the latest and fullest round of the International Comparison Program, which has delivered detailed price and spending comparisons for virtually every country of any size in the world, including (for the first time) China. Applying the new method to these data will allow us to develop better measures of living standards across the globe.


Nicholas Oulton is a senior visiting research fellow at CEP.

Figure 1:
Average growth rate of true cost-of-living index, 1974-2004 by base year for standard of living (per cent per year)