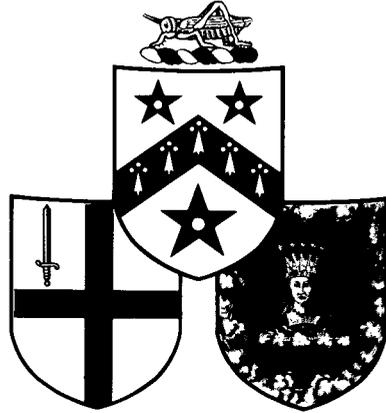


**G R E S H A M**  
**COLLEGE**



**GOVERNMENT STATISTICS**  
**MEASURING PRICES AND INFLATION**

A Lecture by

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## Measuring Prices and Inflation

### **1. Description of the Problem**

- 1.1 Across the ages, the value of money has consistently been considered an important issue. There have been many periods when it has been broadly accepted that the value of money was stable; there have been a few periods when the value of money has actually improved, but the most commonly held view is that money tends to deteriorate over time. Such deteriorations may have been slow, but there have also been periods of rapid inflation. For example the Weimar Republic in Germany in the 1920's produced inflation of such a magnitude that workers were paid daily! Many South American countries have had inflation of several hundred percent per annum in recent times, and yet have lived to tell the tale.
- 1.2 Why is there a need for a measure of the real worth of money? Precisely because, if there is no measure, there is nothing by which to judge the changes in prices and wages on a comparable basis. Wage bargaining and savings become difficult and, in practice, invites a series of 'amateur' indices which inevitably vary very widely, and lead to disputes. Having a standard form of index will not solve (or cure) inflation itself, but it can demonstrate what might be considered fair and reasonable in terms of changes to wages and prices. This was first formally recognised in the UK at the outbreak of World War One when money prices rose sharply in 1914-15, leading to massive discontent, particularly amongst the lower paid workforce. A crude index was produced to mitigate the problem by linking together the costs of many basic food items, from which an index was then derived. Over time this crude index has been polished and made more comprehensive, spawning other indices. The following sections discuss the current methods used to formulate a consumer oriented price index and, consequentially, a measure of inflation.

### **2. Analysis of the Problem**

- 2.1 The most common index of prices used in the UK (and indeed similar to the methods used in many other countries) is the Retail Prices Index (RPI) which is

frequently quoted in the media. Responsibility for its computation rests with the Central Statistical Office. The aim of the index is to establish first, how the average or typical household spends its cash and, secondly, how the prices of the various commodities purchased change over time. (The index incidentally excludes pensioner expenditures and the top 5 per cent of earners, so that the index is not strictly relevant to all individuals.) The RPI is a measure (or index) of prices published monthly, but the media use the term RPI in a different sense, namely the percentage change of the RPI from one month over the RPI the same month one year earlier. Thus the RPI as quoted in the media for, say, March 1994 is calculated as

$$\frac{\text{RPI(March 1994)} - \text{RPI (March 1993)}}{\text{RPI (March 1993)}} \times 100$$

To demonstrate the confusion, a quote from the Evening Standard front page (15 September 1993) read 'Prices rose 1.7 per cent last month (August), compared with 1.4 per cent in July'. The true figure for the change in RPI during August was +0.2 per cent! It is obviously a pity that this confusing use of the RPI is not given a different title, eg. if it were labelled the Annual Price Change (APC) it could be differentiated from the price level itself and thus emphasise the annual change in the index.

Table 1 gives in the middle column the RPI for December in each of the last 15 years. The figures have been re-calculated so as to make the RPI 100 figure for January 1987. The right-hand column gives the APC for each of the fifteen years and it is this latter figure that the media call, erroneously, the RPI. The APC (for December 1992) is calculated as

$$\frac{\text{RPI(December 1992)} - \text{RPI(December 1991)}}{\text{RPI(December 1991)}} \times 100 \text{ or } \frac{139.2 - 135.7}{135.7} \times 100 \text{ or } 2.6 \text{ per cent}$$

and correspondingly for other months.

December	RPI (January 1987=100)	APC (per cent per annum)
1978	51.8	-
1979	60.7	17.1
1980	69.9	15.2
1981	78.3	12.0
1982	82.5	5.4
1983	86.9	5.3
1984	90.9	4.6
1985	96.0	5.6
1986	99.6	3.8
1987	103.3	3.7
1988	110.3	6.8
1989	118.8	7.7
1990	129.9	9.3
1991	135.7	4.5
1992	139.2	2.6

**Table 1**  
**RPI and APC calculations**

2.2 At present there are nine main categories of expenditure incorporated in the RPI index. The current (1993) expenditure weights (adding to a total of 1000) allocated to the various categories are shown in Table 2. Food, housing and household expenditures account for about a half of total expenditure, motoring and fares about a further sixth. Each weight is equal (on average) to the relative expenditure on the category concerned. Thus, with a total weight of 1000, housing is about a sixth of total consumer expenditure, ie. a weight of 164.

Housing	164
Fuel, light, household	172
Motoring and fares	157
Food	144
Alcohol and tobacco	114
Leisure and services	108
Clothing and footwear	58
Catering	45
Personal	39

**Table 2**  
**Weights (per 1000) in the Retail Price Index**  
**(January 1993)**

Each major category is again split further into a number of components. For example, food has some 24 sub-categories such as bread, cereals, beef, milk, tea, potatoes, etc. Each has its own weighting and a current price. Inspectors tour the country to examine the prices of items within each category, and the total cost is linked against some base number, say 100, at the start date. Next month the prices are re-worked and the total costs revalued against the 100 benchmark. Applying the nine weights to the separate indices then provides the new overall index number. The process is repeated every month. From time to time the actual weights themselves (as in Table 2) are re-assessed, as are the items to be included within each category. When such changes are made, the index is re-based so that there is no discontinuity, ie. at the date of change, the calculations are made on

both the old and the new bases, and the new basis is scaled to the old as a starting point. The UK updates its relative weights for the different categories of expenditure frequently; many other countries only do so at infrequent intervals, which creates problems if the actual patterns of expenditure go out of line, with the weights being used.

- 2.3 As a skeleton calculation, assume that there are just three commodities in the index, namely food, housing and household costs. The weights (in terms of the relative levels of financial expenditure) given to the three commodities are 500, 300 and 200 respectively. The prices for the three commodities in June of year 1 are given in the second column of Table 3, with the prices for June in the second year given in the fourth column. Two of the commodities have gone up in price, one has gone down. The product of the

	Weights (w)	Prices year 1 (p')	wp'	Prices year 2 (p'')	wp''
Food	500	24	12,000	28	14,000
Housing	300	35	10,500	34	10,200
Household Costs	200	18	3,600	21	4,200
Total	1000	-	26,100	-	28,400

**Table 3**  
**Calculation of Index Change**

weights with the appropriate prices are multiplied and summed. The index for year 1 would be 26.1 ie. 26,100 divided by 1000, the sum of the weights, and for year 2 the index would be 28.4. The percentage change in the index over the year 2 from year 1 would thus be

$$\frac{28.4 - 26.1}{26.1} \times 100 \text{ or } 12.6 \text{ per cent.}$$

### 3 **The Use of the RPI**

There are some important issues that have to be carefully considered in compiling

and using the index. The first lies in the items that are to be included in the index. At present, virtually all substantive items of expenditure are included, with direct taxes such as income tax, higher rate tax, etc. omitted. VAT and excise duties (beer, tobacco, etc) are effectively included which means, for example, that a rise in VAT rates (or in the coverage of items included within VAT) will raise the RPI. If the equivalent tax revenue were raised from income tax it would leave the RPI unchanged. The Government is not entirely satisfied with the RPI as it now stands believing that the index does not accurately reflect the Government's record in curbing inflation. This is because a number of big-ticket items such as refrigerators, washing machines etc. are omitted from the basket of prices that make up the monthly inflation figures. Changes in composition are indeed made, eg. expenditure on foreign holidays were included in 1993. From next year, new car prices are expected to join the index. The long standing Advisory Committee has also been asked to examine the case for including house prices. Since housing, food and motoring are three of the biggest items in the index any decision to include house prices and new cars could put significant downward pressure on the RPI.

3.2 A second issue concerns the volatility of the index. The current mortgage interest rate is an example of this phenomenon. The 'average' earner generally has a substantial mortgage outstanding and for most borrowers, the interest cost of this mortgage fluctuates according to the current mortgage interest rates. In 1990 the mortgage rate rose sharply from 10 to 15 per cent in a year and subsequently fell back to around 8 per cent very slowly. As a consequence the RPI (and APC) rose steadily (housing being about one sixth of the index) and then fell markedly in mid-1993. This, in government terms, could be counter productive because, if government policy is to squeeze the economy through higher interest rates, those whose pay is linked to the RPI changes are made immune from the Chancellor's aims. Ironically if the Government wants to squeeze the economy it is better for the Chancellor to raise income tax, whilst if he wants to engender a boom he should lower income tax but raise VAT. Most countries exclude mortgage payments from their retail index and, for a time, the UK Treasury favoured

omitting mortgage payments from the RPI to form what they called 'core inflation' or RPIX as it has been christened by the Bank of England. When they discovered that 'core inflation' could be higher than the APC, they reverted to the APC! Another area of volatility centres around oil prices which can also fluctuate markedly (the oil price over the past three years has varied from about \$US 14 to \$US 34 per barrel with large commensurate variations in the RPI, motoring and fares also being nearly a sixth of the RPI). The importance that the Government gives to the RPI figure was signalled by the shift that was made in July 1989 when responsibility for the RPI was moved across from the Department of Employment to the Central Statistical Office, ie. to the Treasury.

3.3 A third issue with the RPI, and the yearly change (ie. the APC) which is commonly quoted, is not really much use for planning into the future. Whilst it is a means of suggesting what is needed to catch up in monetary terms over the past year, indicating how much more money an individual needs today to buy specified goods and services as against the equivalent cost a year ago, it does not, provide a good current indicator of the direction and speed with which the RPI is actually moving. Indeed it is possible for the year on year APC change to be going down at a time when the underlying RPI changes on a monthly basis are currently going up. (June 1991 was one such an occasion). Conversely it is also possible as was shown earlier, for the RPI to be currently going down when the APC is going up. Since the RPI itself is not seasonally adjusted, projecting forecasts from the crude RPI figures can be misleading, eg. the effect if all mortgages are adjusted annually in one particular month. Such apparently contradictory signals demonstrate the need to be clear as to the information that is made available from these indicators when looked at in isolation.

3.4 Contradictory signals will occur from time to time, even if the mortgage interest item is omitted. In October 1992 the APC went down, but the 'core inflation' (of RPIX) went up, thus demonstrating yet again that indicators depend upon their definitions and there is no universal indicator that everybody would agree to be the perfect indicator. The aim should be to make the indicator as relevant as

possible and then to use it as a guide rather than a rigid rule, whilst at the same time making its composition transparent to the interested observer. There are frequent attempts made by negotiators to use different indices (eg. fireman's pay changes are linked to changes in the upper quartile of the manual earnings index). With so many social benefits and wage increases of one form or another governed by indices or percentiles, the system usually breaks down at some point, with individuals believing that the basis should be changed in order that they can better themselves. It is noteworthy, for example that whereas increases in state retirement pensions increases used to be linked to the higher of changes in average prices (APC) or in the average earnings index, the link was broken by the Government in 1980 when it realised that the earnings index usually ran about 2 to 3 per cent above the annual prices (APC) change. The ongoing fury of many state pensioners when the switch to RPI annual adjustments was inaugurated has not yet abated. The state retirement pension for a married couple, which was around 40 per cent of average earnings in 1979, had fallen to well below 30 per cent in 1993, because of this change.

3.5 The Bank of England has muddied the waters further (or, as they would say, clarified) by introducing a further refinement of the RPI. They propose to exclude not just the mortgage interest payments element but also all local authority and indirect taxes (VAT and duties such as alcohol, petrol etc.) About 60 per cent of the RPI currently attracts VAT and excise duties representing about 15 per cent of the basket. This adjusted index, christened RPIY, removes that part of the final price which the retailer passes on to the government in the form of tax and duties; it can therefore be thought of as a pure index of the prices paid by final suppliers.

3.6 The two indices RPIX and RPIY have been tracked over the past 15 years and they have moved very similarly except in 1980 and 1990 when the RPIX on both occasions exceeded the RPIY by about 1.5/2 per cent, presumably caused by VAT and excise duty increases. It is noteworthy that the Government now tends to use RPIX rather than RPI (not always making it clear in their press releases which

index is being used) but they may be less keen on the switch when the earlier high interest mortgage rates are removed from the annual change in the index.

#### 4. An Alternative Index

- 4.1 The Government has always believed that the RPI does not reward them when taxes are reduced, particularly with regard to income tax. As a consequence the Government in August 1979 designed and published a Tax and Prices Index (TPI) to eliminate this anomaly. This index aims to measure the impact of changing taxes and prices on tax-payers. Basically it shows by how much the gross incomes of individuals would need to grow in order to compensate for changes in both taxes and prices. The Retail Prices Index (RPI) measures how changing prices affect the overall cost of the goods and services which people buy. Or, put another way, the RPI measures the change in the purchasing power of money in people's pockets. But it is also useful to know how much earnings (before tax) need to change in order to maintain the purchasing power of individuals. The tax and price index answers this question by allowing, not only for prices, but also for changes in the income tax and national insurance payments that have to be met out of gross incomes. The TPI thus measures the change in gross incomes which people need in order to maintain their spending power in the face of changing prices and taxes. Like the RPI, the TPI computations excludes those with top incomes, whose taxes and spending are regarded as atypical. Otherwise everyone is included, whether working, unemployed or retired, as long as they pay tax.
- 4.2 The TPI adds to the information provided by the RPI. The latter is a general indicator of consumer price inflation and can be used for a variety of purposes. In contrast, the TPI is for a very specific purpose relating to gross incomes. It was introduced at a time when a substantial shift had occurred between direct and indirect taxation as a means of raising revenue, which was not fully reflected, of course, in the RPI. By definition, the TPI moves closely in line with the RPI except when rates of income tax and/or national insurance charge levels change. If there is a large change in the make-up of government revenues in the personal sector as there was following the June 1979 Budget, the TPI shows the effect of

both direct and indirect tax changes. For most tax-payers, the impact of the 1979 Budget was broadly neutral but the RPI reflected only the changes in VAT, not those of income tax. The TPI thus added a useful piece of new information, throwing light on the change in purchasing power of gross earnings before tax.

4.3 The calculation of the TPI is based on a sample of taxpayer's incomes, gross and net. For this purpose, all non-tax payers are excluded and also the top 4 per cent earners. About 7 million individuals are thereby excluded. Non-taxpayers are clearly not relevant to a TPI, since no tax is paid and the RPI is more relevant to this group. The top 4 per cent earners are believed to have spending patterns that are very different from the average taxpayer and such non-representative elements are also excluded. A sample is then drawn - randomly it is hoped - of some 120,000 tax returns. These are allocated to ten income bands and the average tax rates for each of these bands are calculated. The gross percentage income rise (or fall) is then calculated to maintain the purchasing power change from one month to the next. A monthly series of indices similar to that followed by the RPI is thereby generated.

4.4 There was considerable controversy when the TPI was introduced. It had the immediate effect of mitigating to a considerable extent the big rise (of some 17.5%) in the RPI in November 1979, because the TPI for that period was much lower due to simultaneous large income taxation cuts. There were a number of relatively small details in the calculations, over which the pundits squabbled in public, but probably the most potent query was that raised by the TUC. The TUC had defended the RPI for many years against other people who wanted a plethora of indices, each for their own purposes. The TUC had upheld the view of one broadly based index. This new index came out, with no consultation, and no attempts were made to get agreement with either employers or employees. It is fair to say that now, 15 years on, very little notice is taken by the media or other groups in using the TPI on a regular basis. Indeed, it is only when the two indices diverge - which will happen again in April 1994 - that the issue gets dusted down and given an airing.

5. **Commentary**

- 5.1 The RPI (or APC) has achieved considerable status over the years. It is probably the one statistic that is best known to the population at large. Incidentally, in the USA the price of rump steak is the common surrogate for the RPI. Yet, like virtually all statistics, the RPI is really only one of a wide range of possible statistical indices. For example, different indices would surely emerge if one looked at non-taxpayers, at part-time workers, pensioners, etc. In all these latter groups there are many who are entitled to Social Security benefits of one form or another and relevant RPI's become important. Statistics are complicated beasts and must be treated with both care and discretion. An index such as the RPI should be a measure of costs and should not, in itself, attempt to measure the impact of Government taxes and imports. Separately Government should provide an index of the recoveries required from year to year from individuals. By this means the RPI itself becomes more meaningful to the public at large.

### The Retail Price Index

	87	88	89	90	91	92	93
Jan	100.0	103.3	110.0	119.5	130.2	135.6	137.9
	(3.9)	(3.3)	(7.5)	(7.7)	(9.0)	(4.1)	(1.7)
Apr	101.8	105.8	114.3	125.1	133.1	138.8	140.6
	(4.2)	(3.9)	(8.0)	(9.4)	(6.4)	(4.3)	(1.3)
July	101.8	106.7	115.5	126.8	133.8	138.8	140.7
	(4.4)	(4.8)	(8.2)	(9.8)	(5.5)	(3.7)	(1.4)
Oct	102.9	109.5	117.5	130.3	135.1	139.9	141.8
	(4.5)	(6.4)	(7.3)	(10.9)	(3.7)	(3.6)	(1.4)

Table 3

### The Tax and Price Index

	87	88	89	90	91	92	93
Jan	100	101.4	107.1	113.9	123.6	128.1	128.7
	(2.6)	(1.4)	(5.6)	(6.3)	(8.5)	(3.6)	(0.5)
Apr	99.7	101.4	109.8	118.2	125.4	129.6	131.3
	(2.5)	(1.7)	(8.3)	(7.7)	(6.1)	(3.3)	(1.3)
July	99.7	102.4	111.1	120.0	126.2	129.6	131.4
	(2.8)	(2.7)	(8.5)	(8.0)	(5.2)	(2.7)	(1.4)
Oct	100.9	105.4	111.7	123.8	127.5	130.8	132.6
	(2.9)	(4.5)	(6.0)	(10.8)	(3.0)	(2.6)	(1.4)

Table 4

### Comparison of Index changes TPI and (RPI)

	87	88	89	90	91	92	93
Jan	2.6	1.4	5.6	6.3	8.5	3.6	0.5
	(3.9)	(3.3)	(7.5)	(7.7)	(9.0)	(4.1)	(1.7)
Apr	2.5	1.7	8.3	7.7	6.1	3.3	1.3
	(4.2)	(3.9)	(8.0)	(9.4)	(6.4)	(4.3)	(1.3)
July	2.8	2.7	8.5	8.0	5.2	2.7	1.4
	(4.4)	(4.8)	(8.2)	(9.8)	(5.5)	(3.7)	(1.4)
Oct	2.9	4.5	6.0	10.8	3.0	2.6	1.4
	(4.5)	(6.4)	(7.3)	(10.9)	(3.7)	(3.6)	(1.4)

Table 5

## Appendix

Refer back to Table 3 and calculate the Retail Price Index annual change for year 3 given the following prices and revised weightings including the addition of a new category of Foreign Travel (which add to 1000 as before):

Category	Year 2			Year 2 (modified)			Year 3		
	Weights	Prices	WP	Weights	Prices	WP	Weights	Prices	WP
Food	500	28	14,000	450	28	12,600	450	30	13,500
Housing	300	34	10,200	270	34	9,180	270	33	8,910
Household Goods	200	21	4,200	180	21	3,780	180	20	3,600
Foreign Travel	-	-	-	100	20	2,200	100	24	2,400
Totals	1000	-	28,400	1000	-	27,560	1000	-	28,400

$$\begin{aligned} \text{Percentage change of year 3 over year 2} &= \frac{28,400 - 27,560}{27,560} \\ &= 3.1 \text{ per cent} \end{aligned}$$

Gresham College was established in 1597 under the Will of the Elizabethan financier Sir Thomas Gresham, who nominated the Corporation of the City of London and the Worshipful Company of Mercers to be his Trustees. They manage the Estate through the Joint Grand Gresham Committee. The College has been maintained in various forms since the foundation. The one continuing activity (excepting the period 1939-45) has been the annual appointment of seven distinguished academics "sufficiently learned to reade the lectures of divyntyte, astronomy, musicke, and geometry" (appointed by the Corporation), "meete to reade the lectures of lawe, phissicke, and rethoricke", (appointed by the Mercers' Company). From the 16th century the Gresham Professors have given free public lectures in the City. A Mercers' School Memorial Chair of Commerce has been added to the seven 'ancient' Chairs.

The College was formally reconstituted as an independent foundation in 1984. The Governing Body, with nominations from the City Corporation, the Mercers' Company, the Gresham Professors and the City University, reports to the Joint Grand Gresham Committee. Its objectives are to sponsor innovative research and to supplement and complement existing facilities in higher education. It does not award degrees and diplomas, rather it is an active collaborator with institutions of higher education, learned societies and professional bodies.