

Transport Price Indices

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Transport Price Indices

1.0 Abstract

Over the past 10 years, the cost of motoring has risen by 25% and the cost of public transport fares by 57%, compared with a 41% rise in all prices (all as measured by the retail price index). However, the cost of *using* a car has risen faster than public transport costs while the cost of *buying* a car has fallen sharply. The method used to collect car prices for the RPI does not represent the true cost of change. It uses 3 year old car prices as a proxy for both new car prices and for all used cars, but changes in the company car market have distorted 3 year old used car prices so that they are not representative. New car prices have actually remained constant in money terms over the last 10 years. A simple model of the car market shows that the effect of used car prices falling faster than new cars is to *increase* the cost of change for new car buyers which is what most purchasers experience as they trade-in a used car when they buy a new car. The consumer price index does take account of actual new car prices but still does not account for the cost of change. However lower used car prices have made it easier for people to acquire a car for the first time as shown by the 50% growth in ownership in the lowest income quintile. There are other anomalies in the coding of costs in the RPI and in the treatment of insurance costs in the CPI which mean that they are not truly representative of the changes in motoring costs.

2.0 Introduction

According to many commentators, the cost of motoring has fallen while the costs of public transport have risen. As Figs 1 to 3 show, this is both true and false. The cost of *using* a car has risen faster than public transport costs, mainly due to the rising cost of fuel (ignoring the sharp rise and fall in the second part of 2008) (Fig 1) (see also Appendix 2). The cost of *buying* a car has fallen however (Figs 2 and 3). This note looks at the reasons behind the fall and suggests that this may not reflect the true cost of buying a car. This is important because the Government may feel that it can increase taxes on car ownership to offset the reduction in car prices without affecting the propensity to buy cars and without affecting the top level retail price index.

Table 1: Changes in Transport Components of Retail Price Index Q2 2008 compared with 1996

	% change
Maintenance	86
Petrol and diesel	108
Tax/insurance	65
Motor vehicle operations	83
Motor vehicle purchase	-31
Rail	50
Bus	66
Other	76
Private transport	25
Public transport	57
All items	41

Fig 1

RPI Transport Components

1996=100

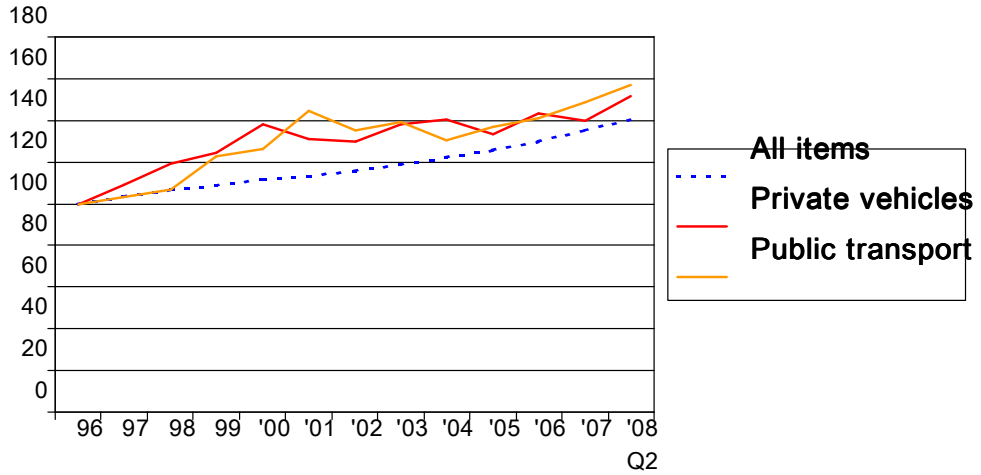


Fig 2

RPI Transport Components

1996=100

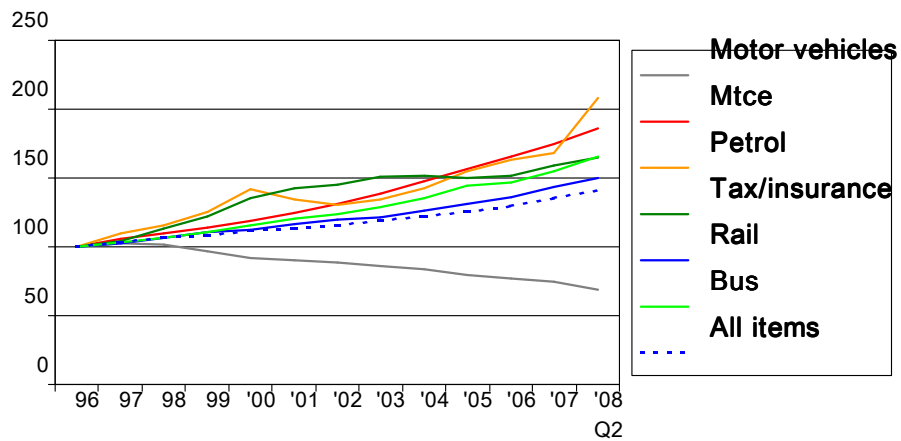
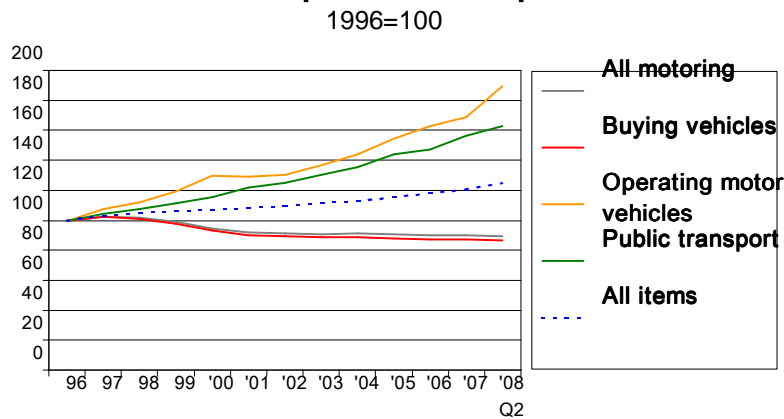


Fig 3
CPI Transport Components



3.0 Calculation of RPI and CPI

There are two commonly used price indices – the retail price index (RPI) which is the historical and most commonly used index of prices and the consumer price index (CPI) which the Government now preferring to use as part of the harmonisation of statistics across Europe. Both indices involve the regular monitoring of prices which are then weighted according to measures of consumption to prepare weighted price indices. While many of the elements are the same, there are significant differences, among them the treatment of new car prices.

3.1 RPI

The RPI weights are based on the spending of private UK based households only, excluding the top 4% of households by income, and 'pensioner' households which are excluded because RPI aims to represent average spending patterns of typical UK households. Information on spending patterns underlying the RPI weights mainly comes from the ONS's Expenditure and Food Survey (EFS), which is also one of the major inputs into the household expenditure component of the UK National Accounts used for the CPI. The transport elements are :

Motoring Expenditure

- Purchase of Motor Vehicles
- Maintenance of Motor Vehicles
- Petrol, diesel and Oil¹
- Vehicle Tax and Insurance

Fares and Other Travel Costs

- Rail Fares²
- Bus and Coach Fares
- Other Travel Costs

¹ DfT also publishes indices for petrol and diesel which match the RPI closely. See Appendix 2.

² DfT also publishes indices for rail and bus fares which diverge from those in the RPI. See Appendix 3.

Other travel costs two items – road tolls and car park charges - which really should be allocated to motoring as well as items such as taxi fares. A full list is given in Appendix 1.

3.2 CPI³

The CPI covers all expenditure within the UK made by private households, residents of institutional households such as university halls of residence or nursing homes and tourists. It is therefore more comprehensive than RPI. The items included in the CPI are defined by the COICOP (classification of individual consumption by purpose) agreed as a common international standard.⁴ Unlike the RPI, the CPI does not include council tax, vehicle tax, and a number of housing costs faced by homeowners, but it does include items such as charges for financial services.

Information on spending patterns, which underlie the CPI weights, largely comes from the household expenditure component of the UK National Accounts. This is in accordance with the European System of Accounts 1995 (ESA 95).

The table in Appendix 1 lists the items in the CPI and compares them with the list above for the RPI. The transport groups are:

07.1 Purchase of Vehicles

07.1.1a New Cars

07.1.1b Second Hand Cars

07.1.2/3 Motorcycles and Bicycles

07.2 Operation of Personal Transport Equipment

07.2.1 Spare Parts and Accessories

07.2.2 Fuels and Lubricants

0 7.2.3 Vehicle Maintenance and Repairs

07.2.4 Other Services including MOT, tolls, car parking

07.3 Transport Services

07.3.1 Passenger Transport by Railway

07.3.2 Passenger Transport by Road (mainly bus and taxi)

07.3.3 Passenger Transport by Air

07.3.4 Passenger Transport by Sea and Inland Water

Vehicle excise duty is not included in CPI as CPI does not include any taxes which are treated as transfer payments. Vehicle insurance comes under 012.9 of CPI – “Insurance”, together with foreign holiday insurance.

The main differences in items included are relatively minor and will have little impact on differences between the two indices although the classification between the main headings is different.

There are however significant differences in the treatment of new car prices and insurance which are dealt with below.

³ Consumer Price Indices Technical Manual - 2007 Chapter 7: Special Issues, Principles & Procedures http://www.statistics.gov.uk/downloads/theme_economy/CPI_Technical_Manual.pdf

⁴ http://www.statistics.gov.uk/articles/nojournal/CPI&RPI_basket_2005.pdf

4.0 Treatment of purchase of motor vehicles

This section is based on the Consumer Price Indices Technical Manual – 2007 Section 7.4.8 Purchase of Motor Vehicles (ref 1).

The RPI uses the same used car index as a proxy for new and used cars with appropriate weightings for each category. It notes that a proportion of new cars are sold to companies (in practice around a half) which are not relevant to a consumer price index. Monitoring new car prices is said to be difficult because of the constantly improving specification of cars over time and because of varying discounts. In practice both of these reservations apply to used car transactions and there is the added complication of trade-ins which apply to most car transactions.

The ONS produces two price indicators for used cars: one for two-year old and one for three-year old cars. The two indicators are combined (with equal weight to each) to give a single price index for used cars. The two component sub-indices are constructed identically, using the same sample of cars within any given year. A sample of 50 models of two-year and three-year old cars is priced using retail prices information from a monthly trade guide (Glasses). These prices are weighted together according to the corresponding manufacturers' approximate market shares of new car sales two and three years before the current year, using data provided by the Driving and Vehicle Licensing Agency (DVLA).

Prices are then "quality adjusted" monthly to allow for depreciation due to extra mileage. The exact formula is given in the manual.

A similar methodology is used to calculate prices for other motor vehicles such as mopeds and motorcycles.

The price of new cars is included as a proxy by taking the same individual model prices as for the used car index but weighted according to manufacturers' current market shares rather than historic ones. This item has the weight of households' expenditure on new cars net of trade-ins.

In the CPI, the regulations require the use of a real new car price index so prices of around 50 new cars representing a range of manufacturers are collected and then quality adjusted for changes in specifications by estimating the value of the options which have become standard since the last price was measured. Section 9.6 of the Manual gives the example of adding air conditioning as standard – only 50% of the value of the air conditioning option is included as it is assumed that standard fitting of an extra costs less than adding it as an option. The weighting in the final CPI index is based on National Accounts which in turn is based on turnover returns from car dealers. No account is taken of discounts or offers such as "free" insurance or extras which vary to some extent with the state of supply and demand and which are difficult to measure exactly because of the impact of trade-ins where the value of the used car may be adjusted in lieu of a discount or vice versa.

5.0 Treatment of car insurance

In the RPI, gross expenditure on car insurance premiums is used in the item under vehicle expenditure. In the CPI, only the difference between expenditure on insurance premiums and the amount paid out in claims (i.e. the service charge) is allocated to the relevant insurance heading; the amount paid out in claims i.e. expenditure on repairing a car, is attributed to the heading for maintenance and repair of vehicles. As noted above, the service charge element of car insurance in the CPI does not appear under motoring expenditure but under the “travel insurance” heading 012.9.

The insurance indices themselves for both indices are based on gross premiums paid.

This difference in approach means that the weight of insurance in the CPI is significantly lower than in the RPI, typically one-quarter to one fifth, and car insurance does not influence the motoring costs index. The RPI treatment of insurance would seem to be a better indicator of how consumers feel the changes in costs of motoring.

6.0 Other price indices

6.1 Producer prices

As part of its collection of manufacturing industry data, the ONS produces an input price index, Motor vehicles, trailers and semi trailers, which monitors new vehicle prices (reference RACE GSI34⁵). ONS has been unable to explain how it is collected other than by confidential questionnaire to a random sample of industries.

6.2 European price comparisons

The European Commission has been monitoring new prices in the EU since the 1992 to determine whether manufacturers are controlling prices unfairly in certain markets and preventing consumers from buying in the cheapest markets⁶. (In practice the major difference in pre-tax prices were a function of taxation – countries with the highest taxation had the lowest pre-tax prices to offset the high tax). A sample of 17 European, 8 Japanese and 2 Korean manufacturers supply the Commission with their recommended retail prices for 87 of their best-selling models. Since 2003 this information has been presented as an index (the weighting method is not published); prior to that it was published as individual prices which could, with considerable analytical work, be used to extrapolate the index back to 1992. Rhys and Bridge analysed the effect of these price restraints in 1990⁷.

⁵ <http://www.statistics.gov.uk/statbase/Product.asp?vlnk=10722&More=Y>

⁶ http://ec.europa.eu/competition/sectors/motor_vehicles/prices/report.html

⁷ Rhys G, Bridge J, International Trade and Consumer Working Paper 4 “Cars - the cost of trade restriction on customers”, National consumer council PD23/90/N3

6.3 “What Car”/ Alliance and Leicester

From October 1998 to March 2004, Alliance and Leicester published a series of new and used car indices, broken down into eight different segments (from city cars to executive cars). The source of the data was “What Car” magazine and the figures were processed by the Centre for Economic and Business Research⁸ which weighted them by current sales to ensure that the index was weighted according to the most up-to-date buying patterns.

6.4 Commercial sources

JATO is a consultancy which collects data on new car prices and specifications in the major car owning countries worldwide. Its data base is used extensively by manufacturers for the pricing of new models. It does not publish any data but could provide a weighted index of new car prices.

Glasses Guide monitors used car prices and is extensively used by the motor trade for valuing used car prices for trade-in transactions (“trade price”) and then for the re-retailing of the used car (“retail”). Details of actual transaction prices are supplied by dealers and auctioneers; Glasses also monitors used car small ads. Many of the detailed prices in the monthly guide, including adjustments for high mileage cars, are obtained by interpolation or formulas. It is the main source of new and used car prices for both RPI and CPI. Parkers provides a similar service for the general public.

CAP (Car Auction Prices) monitors prices of mainly ex-company cars at auctions and publishes a “Black Book” of prices against which actual realisations are measured. It also attempts to predict used car prices three years ahead to provide leasing companies with residual values they can factor into their leasing rates.

Lex, the vehicle leasing company, has made available its internal index of used car prices, which measures the prices of three year old cars at auction as this is the main method of disposing of used cars at the end of a company car lease which is typically for three years. It is based on CAP data weighted by the most frequently leased cars.⁹

7.0 What do the different car price indices show

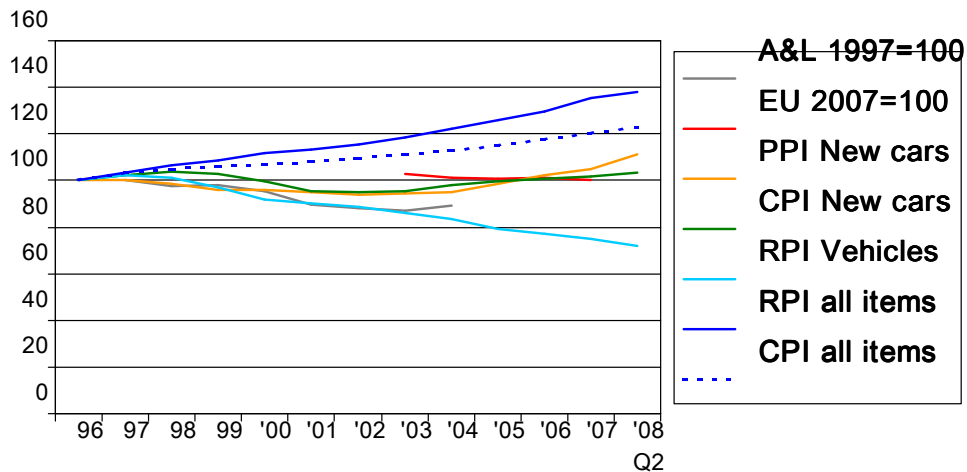
Figure 4 shows that new car prices are now at about the same level as they were 10 years ago although this represents a fall of between 20 and 30% in real terms and even more if improved specification and quality are taken into account. They did fall slightly in money terms in the early 2000s but have risen in the past 4-5 years. The pattern is similar for each of the sources of data. This stability of prices has been led by the UK regulatory regime, sterling's buying power, ready supply of finance often based on loans based on increased house prices and average earnings growth of 4.3% pa.

⁸ Data supplied by CEBR direct but also available in part on Alliance and Leicester website.

⁹ Private communication from Lex

Fig 4 New Car Price Indices

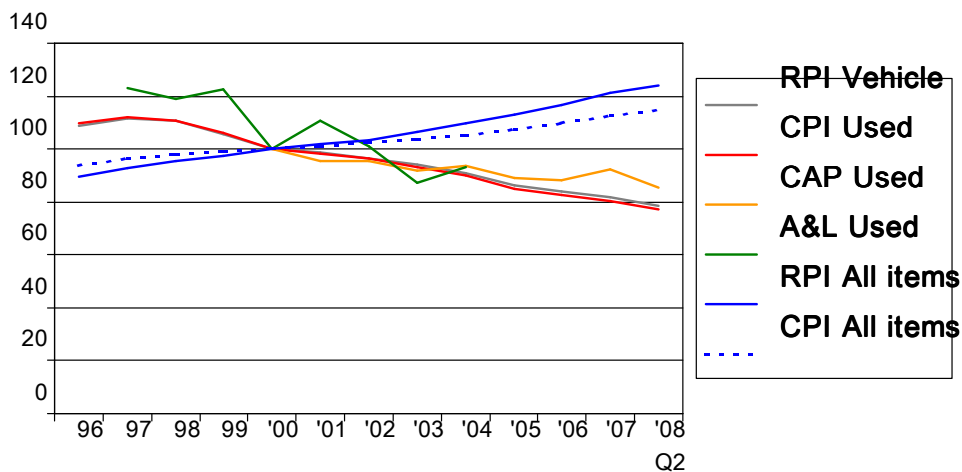
1996=100



The RPI vehicle index, which as noted above is based on used car prices as a proxy for new car prices, shows a money decline of 30% or a real decline of 50%. (See below for a discussion on this point).

Fig 5 Used Car Price Indices

2000=100



As with new car price indices, the various sources of data for used car prices show similar patterns, with a fairly consistent decline in monetary terms of around 30% equivalent to a real decline of about 50%. This is the same as the decline in the RPI vehicle index which is based on used car prices.

If the RPI components of new and used cars were weighted according to the CPI ratio (27:19), then the decline in the RPI vehicle index would be only 10-15% instead of 30% in money terms or 35% instead of 50% in real terms. Even on this simple analysis, the RPI overestimates the decline in car prices.

As noted above, the used car indicator is based on 2 and 3 year old cars which will normally be the result of sales by companies who buy around half of all new cars and keep them for around between 2 and 3 years¹⁰ as this minimises the maintenance and repair costs (much of which would be covered by the manufacturers' warranty) and avoids becoming involved with MOT testing. Companies did reduce the number of company cars by encouraging their employees to use their own cars but concerns about corporate liability of employees using their older and possibly poorer maintained private cars on work-related journeys has recently reversed this trend. The proportion of new cars sold to companies decreased from 52% in 1998 to 49% in 2003 and rose to 58% in 2007¹¹. This has led to increase sales of used cars and a decline in the number of purchasers of 3 year old cars who would typically have been the employees now getting company cars. This change in the supply/demand balance has contributed to the fall in the prices of 3 year old used cars. However, this does not necessarily reflect the change in prices of 4-12 year old cars which make up the bulk of the transactions in numbers if not in value.

8.0 A critique of the present methodology of including car prices

However, gross vehicle prices are not the best indicator of the effect of price changes on the cost of motoring because for most transactions a previously owned vehicle (either traded as a part exchange or sold privately) is involved. The true cost is the cost of change in car ownership which takes into account of the traded-in vehicle. It is also affected by the discount on list prices which varies to some extent with the supply/demand balance in the industry although in practical terms no published figures are available. Discounts are often distorted by adjustments to the trade-in price and offers of low cost finance, "free" insurance or servicing or increased specification.

The following shows a simple model of car ownership and cost of change. It is based on the simplified assumption that a car is sold each time after four years of ownership and is scrapped with nil value after 16 years.¹²

¹⁰ Source: RAC Report on Motoring quoted in "Car Ownership in Great Britain", RAC Occasional Paper October 2008

¹¹ "Vehicle Licensing statistics 2007, table 10

<http://www.dft.gov.uk/adobepdf/162469/221412/221552/228052/367097/vehiclelicensing2007.pdf>

¹² "Car Ownership in Great Britain", RAC Occasional Paper October 2008

Table 2 Simplified model of the car market (Base case)

	Time of sale	New	4 years	8 years	12 years	16 years
	How sold	New and used car dealers		Used car dealers and private sales		Scrappage
1	Typical annual unit volume	2.5 million	2.3 million	2.2 million	2.1million	2.0 million
2	Value of vehicle	100	50	26	14	0
3	Transaction price	90	55	29	15	0
4	Cost of change	40	29	15	15	0
5	Total market cost of change	100	67	33	31	0
6	% of market	43%	29%	14%	13%	0

Line 1 shows the number of transactions at each stage of the car’s life and takes account of incremental additions to the car parc and scrappage. Line 2, the transaction price line, shows the new car “list” price and the used car “trade-in” price. The transaction price will be typically 10% lower for new cars in line with industry practice on discounting and 10% higher for used cars to allow for the dealer’s margin on the used car when resold (line 3). The decline in value of the car over time has been based on various sources of car depreciation¹³

The critical line is the cost of change (line 4) which is equal to the discounted price of the vehicle being purchased less the list price of the vehicle being traded in, i.e. line 4 minus line 3 lagged a period. For example, the cost of change for a new car is the 40 shown on line 4, which is derived from the discounted purchase price from line 3 (90) less 50 - the value of the 4 year old used car being traded in from line 2. The dealer will resell this used car for 55 (line 3).

Line 5 shows the total cost of change for the whole market (line 1 multiplied by line 4) and line 6 shows the % of the total market. New car net transactions account for around 43% of the total vehicle sales market in value terms. Note that the CPI weights new car transactions as 60% of the market.

To calculate the effect of differential inflation in car prices, the following table shows the model recalculated with used car prices falling 30% lower:

¹³ What Car? 0-4 years for typical volume models: <http://www.whatcar.co.uk/depreciation-index>
<http://www.money-zine.com/Calculators/Auto-Loan-Calculators/Car-Depreciation-Calculator/>
<http://www.carprice.com/depreciation-calculator>

Table 3 Simplified model of the car market Effect of deflation of 30% in used car prices

	Time of sale	New and used car dealers		Used car dealers and private sales		Scrappage
		New	4 years	8 years	12 years	16 years
1	Typical annual unit volume	2.5 million	2.3 million	2.2 million	2.1million	2 million
2	Value of vehicle	100	35	18	10	0
3	Transaction price	90	38	20	11	0
4	Cost of change	65	20	10	11	0
5	Total market cost of change	162	46	22	23	
6	% of market	64%	18%	9%	9%	0

This example shows that *decreasing* used car prices lead to an *increase* in the cost of change for new car buyers because they receive *less* for their trade-in. As the car gets older the lower used car prices benefit the used car purchaser who has a lower cost of change.

In this simplified model the total cost of change for the whole market has risen by about 10%. Interestingly the ratio of new to used car transactions (64:36) is closer to the CPI formula.

This analysis demonstrates that the RPI has three conceptual errors

- Using the used car price for a proxy for the new car price
- Taking the 2 and 3 year old used car prices as typical of all used car transactions
- Not taking into account the cost of change in calculating the effect on prices¹⁴

The CPI does at least take into account the different price indices for new and used cars although it still only uses 2 and 3 year old used car prices and does not take account of the cost of change.

There are other anomalies in the RPI such as the inclusion of car parking and road tolls in the “Fares and other Travel Costs” category rather than motoring expenditure. The CPI does not include insurance or vehicle excise duty, both of which are felt by motorists when they are paying for the use of their car, although the cost of insurance repairs is included.

¹⁴ The weightings for new and used cars in the index are based on the amount spent by households on the cost of change but the prices used are based on the gross prices

9.0 Conclusion

Both the RPI and CPI show that the costs of operating motor vehicles have risen in line with public transport fares and ahead of general inflation but the cost of buying a motor vehicle has fallen substantially in real terms. However, this is based on the cost of the vehicles themselves not on the cost of change which is the real cost to the consumer. As the second hand car prices used in the index (2 and 3 year old cars) have fallen faster than new car prices (largely based on the supply demand balance of the company car market), the cost of change for new car buyers has risen. This means that those who already own a car and want to change are faced with higher costs (not lower as the index would suggest). However the fall in used car prices has made it that much easier for those entering the market for the first time, and this has led to an increase in car ownership particularly amongst the lowest income quintile where the ownership of cars has risen from 0.4 cars to 0.6 cars per household over the past decade.

10.0 Acknowledgements

Additional analysis of RPI data has been kindly undertaken by William Davies of ONS. Rob Pike of ONS, Robert Baker of SMMT and Professor Garel Rhys of the University of Wales have also provided valuable input.

Appendix 1

Detailed classification of items in the Retail Price Index

Motoring Expenditure

- Purchase of Motor Vehicles
 - Second-hand cars (proxy for new cars)
 - New motorcycles
 - Second-hand motorcycles
 - Caravans
- Maintenance of Motor Vehicles
 - Car service
 - MOT test fee
 - Roadside recovery services
 - Automatic car wash
 - Exhaust / brake fitting at fast fit auto centre
 - Hourly labour charge for car mechanical repairs
 - Selected spare parts and accessories - eg wiper blade, battery, tyres
- Petrol and Oil
 - Ultra low sulphur petrol
 - Ultra low sulphur diesel
 - Motor oil
- Vehicle Tax and Insurance
 - Vehicle excise duty
 - Selection of premiums charged by a sample of motor insurance companies

Fares and Other Travel Costs

- Rail Fares
 - UK rail fares
 - London Transport fares
 - Northern Ireland rail fares
 - EuroTunnel fares
 - Other underground/metro fares
- Bus and Coach Fares
 - Fares charged by principal bus and coach operators
- Other Travel Costs
 - Taxi fares
 - Minicab fares
 - Self-drive car and van hire charges
 - Various ferry and sea fares
 - Air fares
 - Road tolls
- Other means of transport - eg bicycles, boats
- Car park charges
- Push chairs

Detailed classification of items in the Consumer Price Index

Comparison with RPI

07.1 Purchase of Vehicles

07.1.1a New Cars	
New cars	Only as proxy via used cars
07.1.1b Second Hand Cars	
Second hand cars	
07.1.2/3 Motorcycles and Bicycles	
New motorcycles	
Second-hand motorcycles	
Bicycles	In other means of transport

07.2 Operation of Personal Transport Equipment

07.2.1 Spare Parts and Accessories	
Selected spare parts and accessories	
- eg wiper blades, battery, tyres	
Car steering lock	Not in RPI
07.2.2 Fuels and Lubricants	
Ultra low sulphur	
Ultra low sulphur diesel	
Motor oil	
07.2.3 Vehicle Maintenance and Repairs	
Vehicle service	
Labour charge for vehicle repairs	Fast fit not included in CPI
Automatic car wash	
Roadside recovery services	
07.2.4 Other Services	
Mot test fee	In maintenance
Car park charges	In other travel costs
Driving lesson fee	Not in RPI
Driving test fees	Not in RPI
Road tolls	In other travel costs
Self-drive car and van hire charges	In other travel costs

07.3 Transport Services

07.3.1 Passenger Transport by Railway	
British rail fares	
London transport fares	
Northern Ireland rail fares	
Eurostar fares	
07.3.2 Passenger Transport by Road	
Bus fares	
Minicab fares	
Coach fares	
Taxi fares	
Charge for home removals	In RPI as Domestic services
07.3.3 Passenger Transport by Air	
Air fares	
07.3.4 Passenger Transport by Sea and Inland Water	
Various ferry and sea fares	

Vehicle excise duty is not included in CPI as CPI does not include any taxes which are treated as transfer payments. Vehicle insurance comes under 012.9 of CPI – “Insurance”, together with foreign holiday insurance.

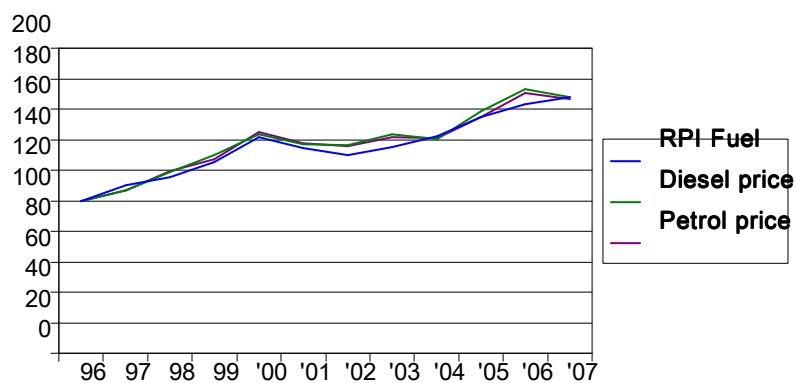
In the CPI Caravans are included in 09.2 “Other Major Durables for Recreation and Culture” and push chairs in 012.3 “Personal effects not elsewhere classified”.

Appendix 2 Petrol and Diesel prices

The DfT publishes data on petrol and diesel prices, showing the amount of tax in the annual Transport statistics GB Table 3.5¹⁵.

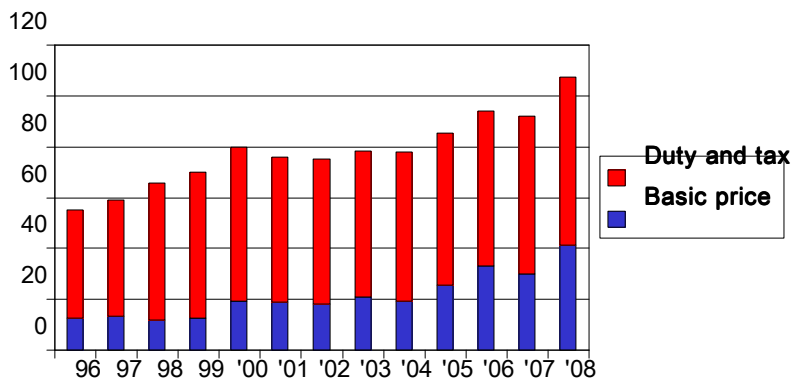
Fuel Prices

1996=100



Petrol Prices

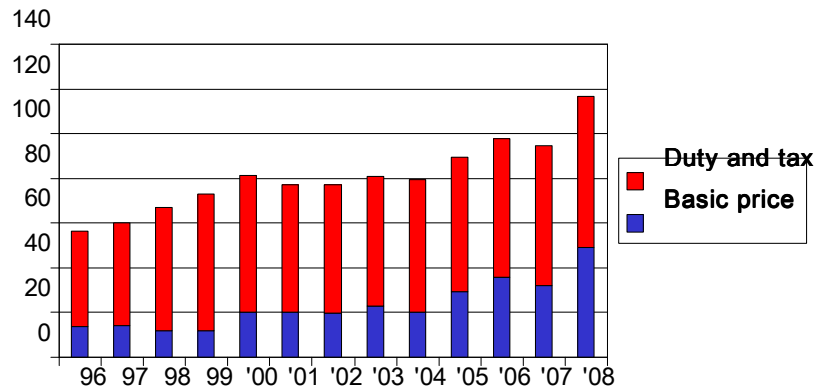
Pence per litre



¹⁵ <http://www.dft.gov.uk/pgr/statistics/datatablespublications/tsgb/2008edition/>

Diesel Prices

Pence per litre



Both petrol and diesel prices rose by about 60% between 1996 and 2007; they then rose sharply in 2008 before falling back again. Fuel prices have risen considerably faster than overall retail price index which rose by 35% over this period. Following the sharp rise in crude oil prices in recent years, tax (duty and VAT) now accounts for around 65% of the pump price for both petrol and diesel but this ratio was around 80% in 1999 when oil prices were depressed.

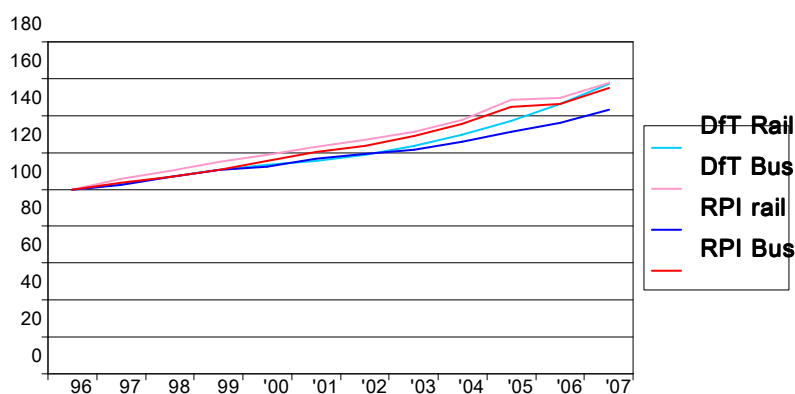
Appendix 3

Rail and Bus Fares

The DfT publishes data on rail and bus fares in the annual Public Transport Statistics Bulletin GB, Table G¹⁶. Rail fares come from the Office of Rail Regulator, while the bus index comes from the DfT survey of operators.

Rail and Bus Fares

1996=100



The data for bus from the DfT and the RPI are almost identical but the DfT figures for rail (from the ORR) show a slightly faster rate of increase than the RPI; over the 11 years from 1996 to 2007 the ORR indicator has risen by 57% but the RPI index by only 43%. This may be because the ORR index is based on headline figures while the RPI figure, being based on actual prices paid, may take into account discounted tickets.

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<http://www.dft.gov.uk/pgr/statistics/datatablespublications/public/annualbulletins/publictransportstat/sbul08>