

# Rebasing and Other Developments to the Corporate Services Price Index

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## Summary

- The experimental Corporate Services Price Index (CSPI) has been rebased, which means the index has been re-referenced from 1995=100 to 2000=100 and the weighting structure has been updated to reflect market shares in the new base year.
- A CSPI survey of turnover (year 2000) by service product was undertaken to support the rebasing project.
- The methodology for deriving weights at all levels of aggregation has been reviewed.
- To improve further the accuracy of the statistic, the overall sample size of the CSPI survey has been substantially increased.
- A redeveloped index for *business telecommunications* and a new index for *banking* have also been introduced to the CSPI.
- Top-level growth has been predominantly revised down for most of the series as a result of rebasing and the other developments.
- The top-level CSPI is now published on a net sector output and gross sector output basis. Growth is generally higher on a net sector output basis.
- The experimental CSPI is under a continual programme of development and quality assurance.

## Introduction

This article is one of three detailing recent developments to the CSPI. It gives a brief overview of the CSPI, describes the methods used to rebase the index to the year 2000 and outlines other recent developments. The impacts of all these changes are then summarised followed by an outline of future improvements. The additional articles by Joanne Allen and Keith Hermiston detail developments to specific CSPIs (i.e. for business telecommunications and banking). The revised data set, along with all three articles, were first published in February 2004 in the

*Experimental Statistics* section of the *National Statistics* website ([www.statistics.gov.uk/cspi](http://www.statistics.gov.uk/cspi)).

## Part 1 - Overview of the CSPI

### Background

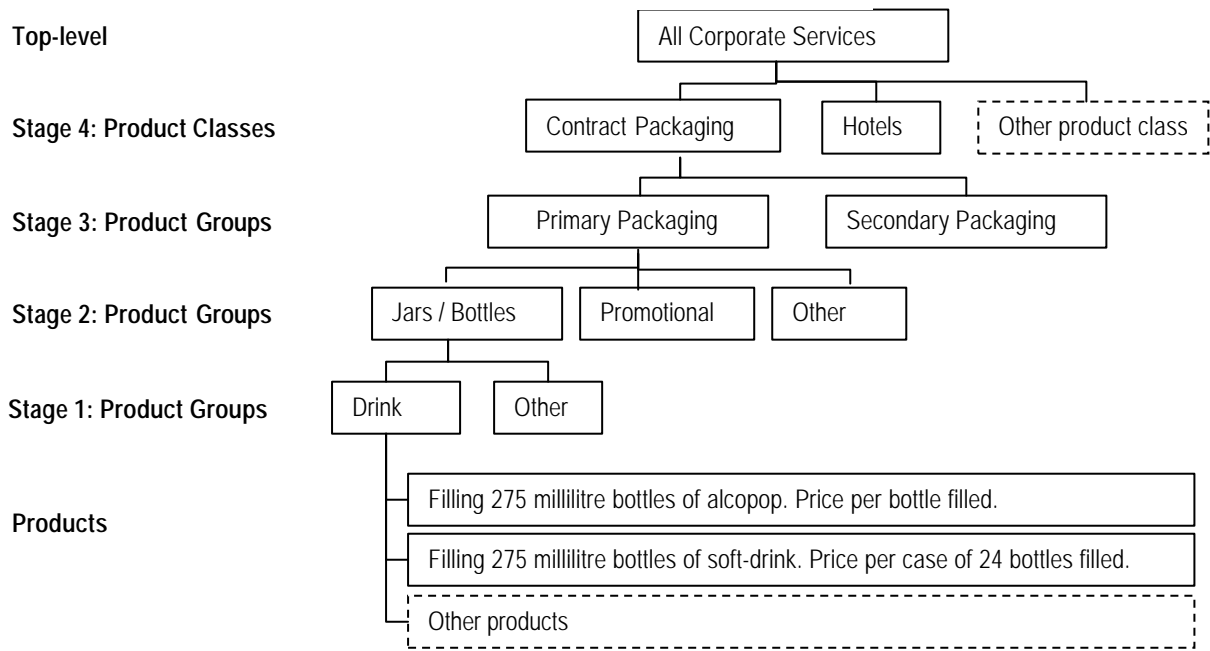
The full background and history to the CSPI can be found in *Economic Trends* articles by Nick Palmer (2000), Hugh Skipper (1998) and Jonathan Price (1996). To summarise:

- CSPI measures quarterly price changes in the domestic corporate services provided by businesses to other UK businesses, central and local government. Services provided to private individuals or to companies operating outside the UK are out of scope of the CSPI.
- The CSPI development began in 1990 as an adjunct to the established Producer Price Index (PPI), with the formation of a separate CSPI branch in 1995.
- The index has been gradually expanded and now covers thirty-two product classes. The development programme aims to increase further the coverage of the CSPI, to eventually include all significant corporate service activities, and to constantly improve the quality of data that are currently published.
- Nineteen of the CSPIs are used by the UK National Accounts as price deflators in the compilation of the experimental monthly Index of Services (IoS) and quarterly Gross Domestic Product by the output method (GDP(O)).

### Price Data

The CSPI survey collects quarterly price data from a fixed panel of respondents selected from the Inter-Departmental Business Register (IDBR) stratified by employment and industry classification.

**Figure 1 The structure of the CSPI**



Each respondent supplies prices for one or more service products that are representative of its activities. The specification or description of the product should remain fixed over time, so that any price changes relate to a consistent product and hence give a measure of inflation. If a respondent fundamentally changes the specification of the product being priced in some way (e.g. due to advances in technology) the effects of any resulting price changes are removed from the index by comparing subsequent prices to the new, re-specified value.

Note that in some cases, 'proxy' indices are calculated using price data or indices supplied for an entire product class by one or more external bodies such as trade associations, market research organisations or government regulators (see Annex A).

**Index Construction and Aggregation**

In modelling the pricing structure of a service product class, activity is decomposed into a family tree of product groups and products. An example of this hierarchical structure is depicted in Figure 1. A product group is a reasonably homogeneous category belonging to a product class. Within each product group, there will be a range of products whose prices are supplied by various respondents. Within the product group index (stage 1), each product is assigned a weight that represents the market share of the respondent in the base year, together with an amount that represents other unsampled businesses engaged in similar activity. The product weights sum to 100 per cent within each product group. If a respondent stops providing prices for a product, or the company ceases trading, the product (or products) concerned are removed from the sample and the remaining product weights within the product group (or groups) are recalculated.

The product group indices are aggregated to higher-level product groups (stages 2 and 3) and in turn to the product class level (stage 4), which is the lowest level of CSPI publication. Note that the product class index may be calculated at stage 2 or 3 depending on the number of intermediate product group levels. The product groups are weighted together according to the amount of revenue generated by activities within each product group in the base year.

The product class series are then weighted together to form the top-level CSPI. The PPI publishes its top-level series on both a net sector output (NSO) and a gross sector output (GSO) basis. For further details see the *Economic Trends* article (Morris and Gough, 2003). Until recently, the top-level CSPI has only been published on a NSO basis. The NSO product class weights reflect the total net sector revenue in the base year. For the CSPI product class this is the amount of revenue generated by services provided to UK companies (and government) outside of the corporate service sector, (i.e. in the manufacturing, construction, the wholesale and retail trades and agriculture sectors). From February 2004, the top-level CSPI has also been published on a GSO basis. The GSO weights reflect CSPI product class sales to all UK companies and government (i.e. including sales to the corporate service sector itself).

**Part 2 – Rebasing**

Rebasing is currently a five-yearly process and so this is the first time the CSPI has been rebased. The aim is to update all base prices and index weights. Over time the relative volumes and prices of service products will change and it is important to ensure

that the weighting structure of the index is updated at regular intervals to reflect recent information on the relative importance of service products and the businesses that supply them. All weights have been updated to reflect market shares in the year 2000, and base prices have been changed to 2000=100. It should be noted that changing base prices alone will revise the growth of aggregate indices (i.e. without updating the weights), especially if a component's movement differs substantially compared to the movement of other components.

For the proxies, the data series supplied by external sources have been re-referenced and any weights have been updated to 2000 using available data. The following sections describe the rebasing methods used at each level of aggregation for those product classes where prices of individual products are collected.

### **Product Class Weights**

The net sector output weights (NSO) and the gross sector output weights (GSO) are derived by pro-rating (to sum to 100 per cent) a set of net and gross sector turnover values respectively. The method for calculating net and gross sector turnover values uses primarily a combination of two ONS data sources:

- Current Price Input-Output (CPIO) Use Tables
- Annual Business Inquiry (ABI).

The ABI provides total turnover for the base year (2000) by industry, at a detailed level of disaggregation. However, total turnover includes exports and sales to non-business users (primarily households), which are not covered by the CSPI. To calculate the net and gross sector turnover appropriate to the CSPI for each industry, the ABI total industry turnover is multiplied by net and gross sector proportions respectively, for the appropriate CPIO Input-Output Group (IO Group). These proportions are derived from the CPIO Use Tables (2000) as follows.

The gross sector proportion for an IO Group is calculated as the sales to all UK business users and government divided by total sales, for all products included in the IO Group. The net sector proportion excludes sales to business users within the UK corporate service sector.

In some cases, the IO Group is at a more general level of disaggregation than the product class of interest. For example, the IO Group for *rail transport* encompasses two corporate service product classes, *business rail fares* and *rail freight*. The sector proportions of total sales may be different for these distinct product classes. In such cases efforts have been made to refine the proportions using supplementary information from a number of sources (an improvement over the calculation of the 1995 product class weights). The CSPI turnover survey (see below) has provided an alternative measure of the gross sector proportion.

Under the 1995 NSO weighting pattern, the top-level CSPI has been published in two forms; one including the *property rental payments* product class and one excluding this component. This is because *property rental payments* had such a high weight and dominated the top-level index. Following the rebasing of the product class weights *property rental payments* has received a smaller weight and there is no longer a need to publish an index excluding this product class.

### **Product Group Weights**

The product group weights are based on the relative sales to businesses in the domestic market. The PPI uses the Products of the European Community (ProdCom) total sales estimates, adjusted using export data from Customs and Excise (C&E), to calculate its 'home sales' values. ProdCom is also used to calculate the PPI product weights on an annual basis (for further details on PPI rebasing and estimation methods see (Morris and Birch, 2001) and (Morris and Gough, 2003)). The equivalent of ProdCom for the service sector (ServCom) is currently at a pilot stage. In the absence of ServCom, a dedicated turnover survey was undertaken to facilitate the rebasing of the CSPI.

### **The CSPI Turnover Survey**

The CSPI survey of turnover, for the year 2000, by service product, was undertaken in 2001 for 28 product classes (mostly at 4 or 5 digit SIC level). Its primary purpose was to provide information for the rebasing of the product group weights. Five thousand questionnaires were issued in October 2001 and nearly 80 per cent were returned by March 2002. The businesses selected were chosen at random from the population (the IDBR) stratified by employment size-band and industry. They were asked to report their sales for the year 2000, categorised by product groups appropriate to the industry to which the business belongs. Additional questions captured sales of other UK business services (i.e. for non-characteristic product groups) and other sales (e.g. manufactured goods, exports and sales to non-business users).

The product group weights are derived by pro-rating the product group turnover estimates within a product class (or higher-level product group). The product group turnover estimates are calculated by applying a simple expansion estimator to the sampled product group turnover for each stratum and then summing across strata. As a future development the use of an appropriate ratio estimator is being explored.

Where product groups in the existing structures are found to have negligible weights, or where respondents have indicated that a significant proportion of turnover belongs to an unidentified product group, changes are made to the family tree structures to ensure that they accurately represent corporate service activities in 2000.

### **Product Weights**

The product weights are derived from two factors:

- The base period turnover for the product.
- A sample weight, to reflect the fact that the product also represents products from other, unsampled businesses.

The CSPI survey is stratified by industry and employment size-band (based on the employment variable on the IDBR). Within some industries, size-bands are combined in order to ensure that each contains a sufficient number of businesses. The sample weights are based on a ratio estimator using register employment as the auxiliary variable. For each stratum, the number of employees in the stratum population is divided by the total number of employees in the stratum sample. Therefore, all respondents in the same industry and size-band have the same sample weight.

For businesses that provide a price for only one product for any given product group, the product turnover is the product group turnover for that respondent. For businesses that supply more than one product within the same product group, the product group turnover for that respondent is divided equally between the products they provide.

A respondent's product group turnover is either taken from the CSPI turnover survey (if the respondent was sampled and returned a value) or it is imputed. The imputation of a respondent's product group turnover again uses a ratio estimator with register employment as the auxiliary variable. The number of employees for the respondent is multiplied by a turnover per head factor for the stratum and by the product group weight (see section on *Product Group Weights* above.)

The turnover per head factor for the stratum is calculated using CSPI turnover survey data from those respondents that were sampled (and responded), along with their respective employment values from the IDBR.

### **Part 3 - Other Developments to the CSPI**

The CSPI dataset published in February 2004 also included the following developments:

- A substantial increase to the index sample size.
- A redeveloped CSPI for *business telecommunications*
- A new CSPI for *banking*.

#### **Recruitment of Additional Respondents and Products**

The rebasing project and the CSPI turnover survey provided the opportunity to increase the sample size of the index. The recruitment exercise has resulted in the number of respondents approximately increasing from 1000 to 1500 and the number of products from 3500 to 5000. The turnover survey was used as the

sampling frame from which to recruit the new respondents. The additional respondents were allocated across strata based on an analysis of the coverage of the existing sample. The respondents were recruited in phases during 2002-3, with each phase covering from five to ten product classes. Therefore, data from the new respondents only affect the last few quarters of the 2000 based series, depending on when they were recruited.

#### **Redeveloped CSPI for Business Telecommunications**

The original business telecommunications CSPI was a proxy index calculated from prices collected from a variety of market sources, based on a set of profiles of 'typical' customers. The customer profiles were difficult to identify and maintain given the fast changing nature of the industry, driven by technological innovation, competition and regulation changes. Consultations with the industry regulator Office of Communications (Ofcom) confirmed concerns regarding the lack of movement in the series, i.e. the CSPI did not show the expected decline in prices, particularly in the late 1990s, brought about by increased competition.

The redeveloped index consists of a change to the family tree structure, the source data and pricing mechanism. Revenue and volume data are taken from Ofcom's quarterly census. Unit values are derived for the various product groups to track price movements, with the product group weights based on the relative revenues in 2000. The series now depicts a notable decline in business telecommunications prices in the late 1990s and this has had a substantial impact on the top-level CSPI.

#### **New CSPI for Banking**

A new banking index has been developed under a joint working group comprising of the ONS, the Bank of England (BoE) and the British Bankers' Association (BBA) to ensure an appropriate index. The index covers loans and interest bearing deposits and is not intended to be a proxy for all banking services. The index utilises data from the statistical returns collected by the BoE and also data from the IDBR. The statistical returns include data on loans and deposits, interest earned and interest paid. Fees earned from lending services have been estimated. Such data have supported an approach based on the principles of FISIM (Financial Intermediation Services Indirectly Measured). The Banking index has a product class weight of approximately 3.2 per cent on a 2000 NSO basis and 2.9 per cent on a GSO basis.

Additional articles detailing the developments to business telecommunications (Hermiston, 2004) and banking (Allen, 2004) can be found in the *Experimental Statistics* section of the *National Statistics* website.

Figure 2 Top-level CSPI: Comparison of 1995 and 2000 based indices and growth

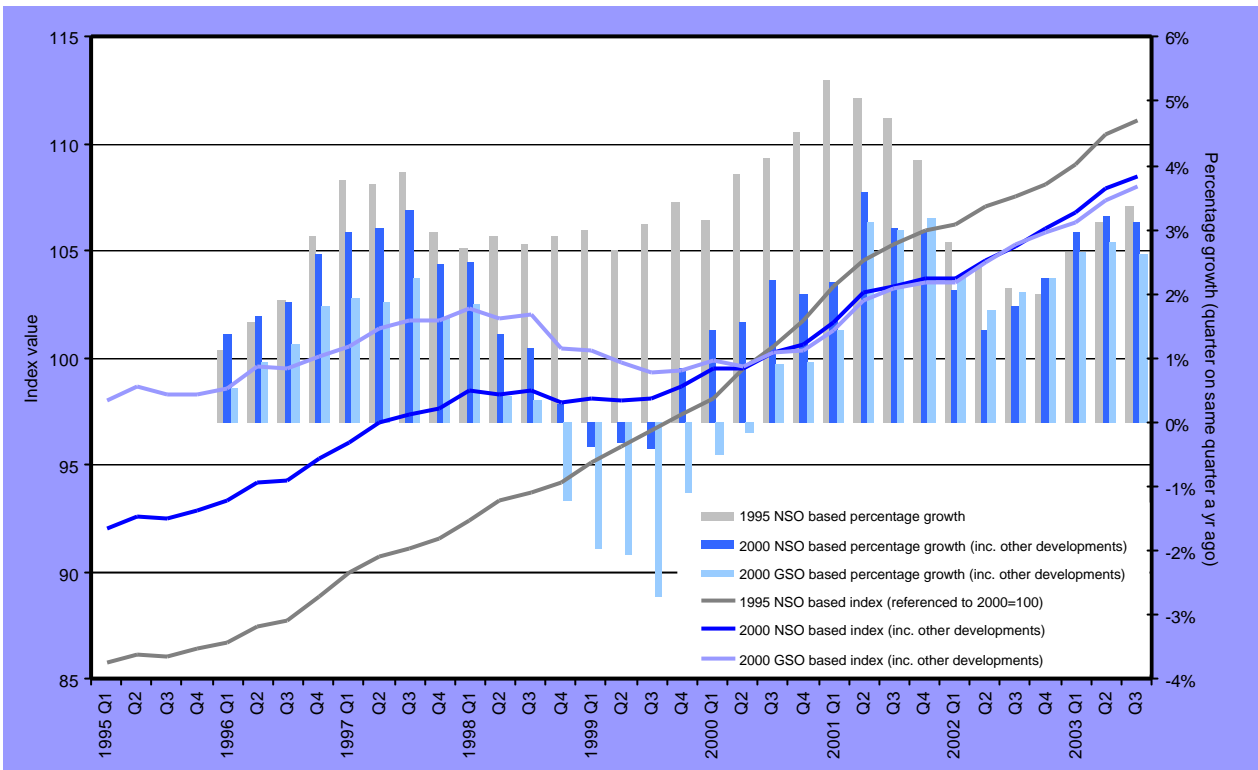
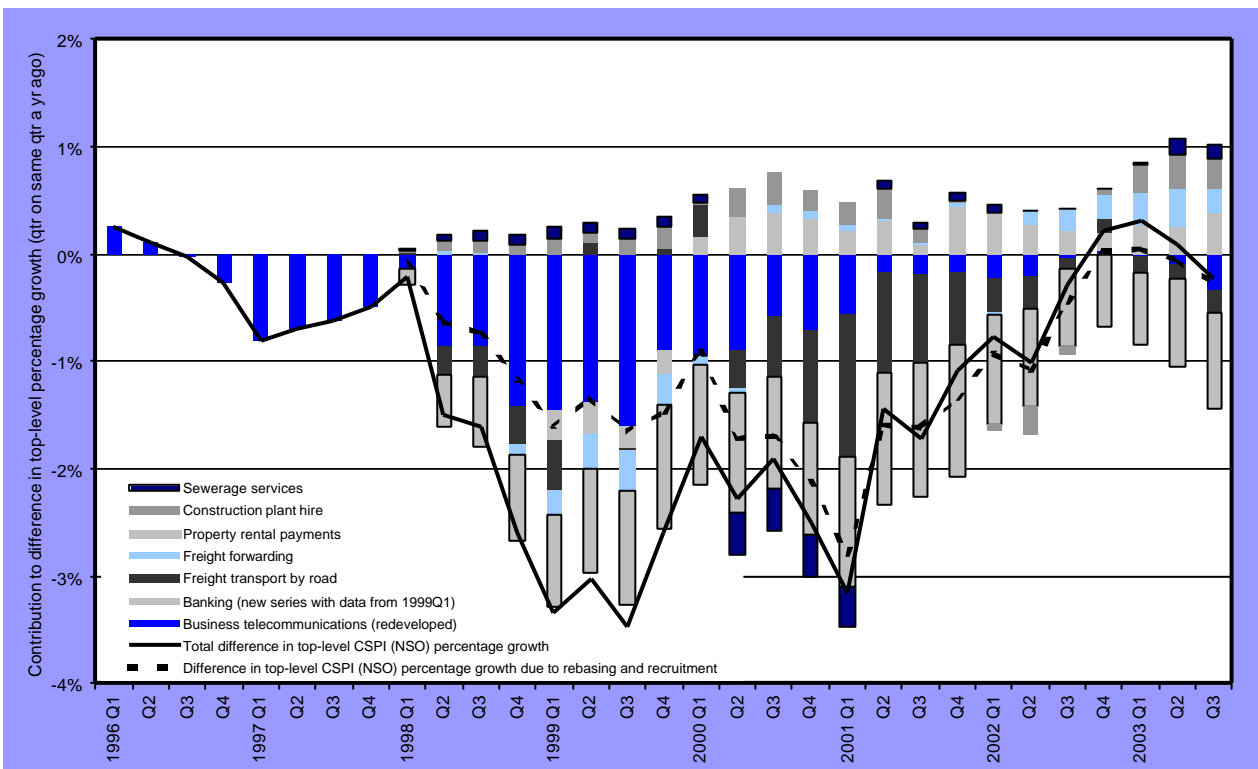


Figure 3 Contributions of specific components to the difference in top-level CSPI (NSO) percentage growth between the 1995 based and the 2000 based equivalent (inc. other developments)

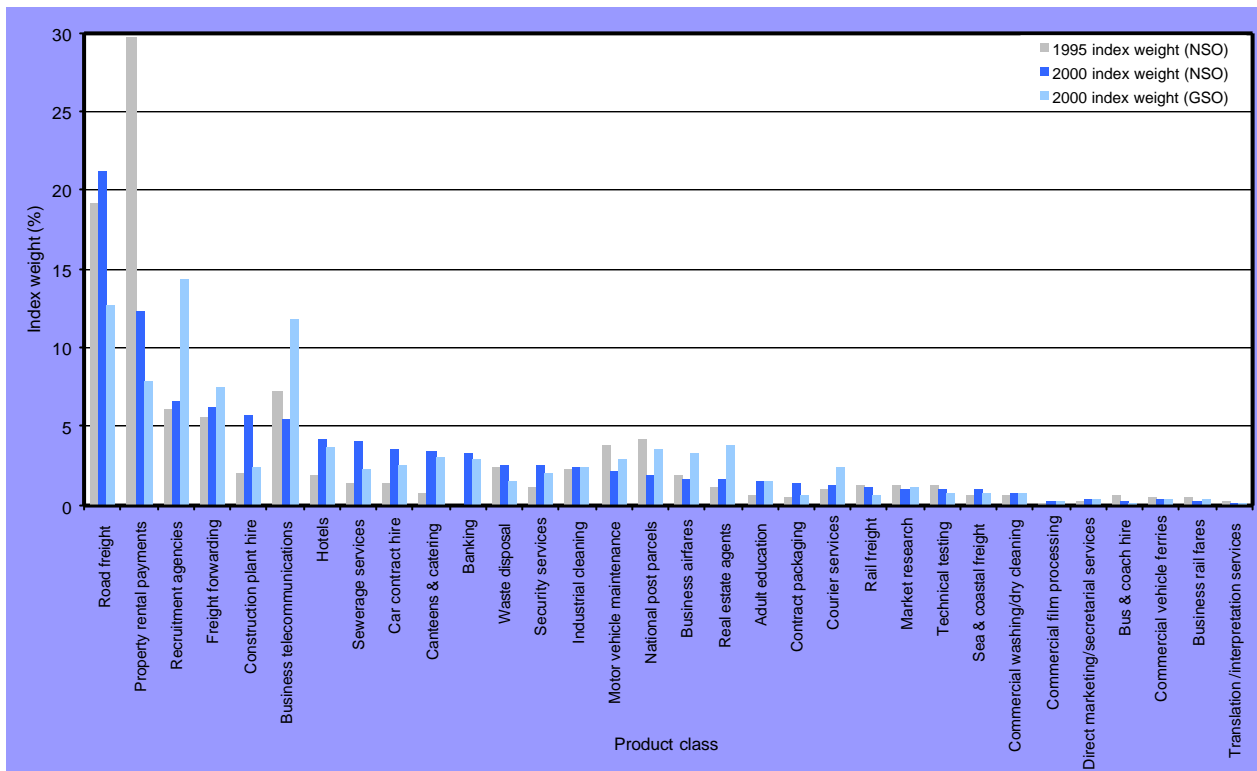


### Part 4 – Impact Analysis

The headline series is the top-level CSPI (NSO) percentage growth, quarter on the same quarter a year ago, and this provides the starting point for the analysis. Note that, at all published levels,

the 1995 based series are linked on to the 2000 based series at 1998 Q1 (i.e. the 'link period'). The lowest level of publication is at the product class level. The 2000 based top-level series include the redeveloped business telecommunications index, the new

Figure 4 Comparison of top-level CSPI weighting patterns



banking index and the additional respondents, collectively termed as 'other developments'.

Figures 2 and 3 show that growth has predominantly been revised down for most periods in the series as a combined result of rebasing, and introducing the other developments described above. The effect of just rebasing and recruitment (i.e. excluding the effects of business telecommunications and banking) is depicted by the dotted line in Figure 3.

For Q1 and Q3 1999 the total difference in growth is more than 3 per cent in magnitude, sufficient to push the CSPI into depicting a decline (negative growth) in prices for this period. The revision is less for more recent years.

Figure 3 also depicts the contributions of seven of the component product classes to the difference in top-level growth, i.e. for those product classes deemed to have the most significant impact.

#### Impact of Business Telecommunications

The redeveloped business telecommunications CSPI has effectively been introduced to the 1995 based top-level index before rebasing. This has been done so that the impact of its redevelopment is included prior to the link period of 1998 Q1 in the 2000 based top-level index. Indeed, Figure 3 shows that it is the only component that causes a revision to growth in the top-level index prior to 1998Q1. The redeveloped business telecommunications series depicts a much greater decline in prices in the late 1990s than the original series (see (Hermiston, 2004)). This substantially decreases the growth of the top-level CSPI. The impact is amplified after the link period because, as

previously mentioned, re-referencing a component series that differs substantially in its movement compared to other components will revise growth in the aggregate index. The impact lessens over more recent years as the redeveloped telecommunications index flattens to depict a similar trend to the original series. These effects are slightly off-set by the reduction in its weight (NSO) within the top-level index i.e. from 7.1 per cent on a 1995 basis to 5.4 per cent on a 2000 basis (see Figure 4).

#### Impact of Banking

The new banking CSPI has data back to 1999 Q1 and so only contributes to the revision of the top-level index from this point onwards, as depicted in Figure 3. A 1995-based version of the index was not created, as there is no data prior to the link period. The series depicts a continual rise in prices with growth ranging from 2.8 to as much as 13.5 per cent in 2001 Q4 and so causes a positive revision to top-level growth. The new index has a NSO weight within the top-level of 3.2 per cent. Its introduction obviously causes a slight decrease to the top-level weights of all the other product classes.

#### Impact of Property Rental Payments

The Gross Income series from the Investment Property Databank Ltd (IPD) monthly index is used as a proxy for the property rental payments CSPI. The series depicts a steady rise in prices with growth ranging between 2.0 and 6.6 per cent. For the purpose of rebasing the proxy has been re-referenced to 2000=100, hence the growth of the series will not have changed. However, re-referencing has caused a slight negative revision to the growth of

the top-level CSPI. The weight of property rental payments within the top-level has decreased substantially, from 29.8 per cent (NSO) in 1995 to 12.3 per cent in 2000 (see Figure 4). It is important to note that this is due to a change in the data source used to calculate the weight as opposed to an economic effect, i.e. the 1995 ABI data for the associated industry was unavailable when the 1995 weight was first calculated. This has caused sizeable and relatively constant negative revisions to top-level growth (see Figure 3).

### ***Impact of Freight Transport by Road***

Figure 4 shows that road freight has the largest weight within the top-level CSPI on a 2000 NSO basis at 21.1 per cent, greater than its 1995 weight of 19.1 per cent. The product class index depicts positive growth in prices for most periods and so the increase in its top-level NSO weight causes a positive revision to top-level growth. However, this is offset by a reduction in the product class growth for most periods (although growth remains positive), particularly for quarters around 2001. The total contribution of this product class to the revision of top-level growth is negative and prominent for this period, as depicted in Figure 3.

### ***Comparison of Top-level CSPI on a NSO and GSO basis***

Figure 2 shows that growth is generally higher in the top-level CSPI when weighted on a net sector output basis as opposed to a gross sector output basis. The main reason for this is the large weight business telecommunications has on a GSO basis (11.8 per cent) compared to its NSO weight (5.4 per cent), as shown in Figure 4. Intuitively, this is to be expected. The increase in output to the gross sector (which includes users from the corporate service sector), compared to output to just the net sector, is likely to be proportionally larger for business telecommunications than it is for a product class such as road freight. The large GSO weight for business telecommunications, combined with the substantial decline in the index, results in reduced growth (or greater decline) in the top-level GSO index than the NSO equivalent.

Furthermore, product classes such as road freight and property rental payments, that have positive growth but smaller GSO weights in respect to their NSO weights, will have less of an effect on the growth of the top-level GSO index than they have on the NSO index. However, this is largely offset by the recruitment agency index that has both positive growth and the largest weight within the top-level GSO index. Intuitively one might expect recruitment agencies to have a relatively large turnover from users in the corporate service sector.

## **Future Developments**

The experimental CSPI is under a continual programme of development and quality assurance. A dedicated ONS development team is working on a programme to expand the coverage of the CSPI to include wider economic activity where there is substantial provision of corporate services. A quality assurance team is focusing on a programme of assessment and improvement.

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## Annex A

### Publication, Development and Survey Status by CSPI Product Class

Index description	SIC(92)	Number of respondents or name of external suppliers if a proxy is used	Number of services / product groups prices are measured for	Number of separate price quotes (products) collected per quarter	Price mechanisms
<b>Published indices - as at Feb 2004</b>					
Maintenance and repair of motor vehicles	50.21	Yewtree.com Ltd and RPI	2	n/a	H
Hotels	55.11	77	8	282	A,B,C
Canteens and catering	55.51	30	4	68	B,E
Rail freight	60.10	3	10	18	A,B
Business rail fares	60.10/1	Strategic Rail Authority (SRA)	2	n/a	A,H
Bus and coach hire	60.23	91	7	386	A,B,D
Road freight	60.24	177	7	348	A,B,D
Commercial vehicle ferries	61.10/1	9	5	30	A,B,C
Sea and coastal freight	61.10/2	17	3	33	A,B,C
Business airfares	62.10/1	3	3	49	C
Freight forwarding	63.40	87	4	258	A,B
National post parcels	64.11	Parcel Force	1	n/a	H
Courier services	64.12	53	9	228	A,B,C
Business telecommunications	64.20	Office of Communications (Ofcom)	10	n/a	H, I
Banking services	65.12/1	Bank of England	4	n/a	H, I
Property rental payments	70.21	Investment Property Databank	1	n/a	H
Real estate agents	70.31	32	24	310	B,G,H
Car contract hire	71.10	Yewtree.com Ltd	1	n/a	H
Construction plant hire <sup>1</sup>	71.32	58	1	183	C
Market research	74.13	41	5	145	A,C
Technical testing	74.30	46	6	154	A
Recruitment agencies	74.50	115	13	488	B,G,H
Security services	74.60	62	7	175	A,B,C
Industrial cleaning	74.70	97	7	237	B
Commercial film processing	74.81	13	4	47	A,C
Contract packaging	74.82	41	5	60	B
Translation and interpretation services	74.83	10	6	196	A,C
Direct marketing / secretarial services	74.83	37	8	174	A,C
Adult education	80.42	65	5	183	A,C
Sewerage services	90.10	Office of the Water Regulator (Ofwat)	2	n/a	H
Waste disposal	90.20	43	11	171	B,D
Commercial washing/dry cleaning	93.01	39	6	150	B,D
		<b>1246</b>		<b>4373</b>	
<b>Indices undergoing development:</b>					
Computer Services (Phase I)	Div 72	147	3	113	A,B,D,E,G
Computer Services (Phase II)	Div 72		6	238	B,D,E
Accounting	74.12	34	7	106	E,F
Placement Of Advertising	74.401/2	Various external suppliers	9	n/a	H
Architecture	74.2	No collection yet	9	n/a	E
Air Transport	Div 62	No collection yet	To be decided	n/a	To be decided
Other Supporting Air Transport Activities	63.23	No collection yet	To be decided	n/a	To be decided
Other Supporting Land Transport Activities	63.24	No collection yet	To be decided	n/a	To be decided
Legal services	74.11	No collection yet	To be decided	n/a	To be decided
Management Consultants	74.14	No collection yet	To be decided	n/a	To be decided
Consulting engineer	74.2	No collection yet	To be decided	n/a	To be decided
Quantity of Surveying	74.2	No collection yet	To be decided	n/a	To be decided
Motion Picture, Video & News Agency Activities	92.1/4	No collection yet	To be decided	n/a	To be decided
Radio & Television Activities	92.2	No collection yet	To be decided	n/a	To be decided
Sporting Activities & Other Recreational Activities	92.6	No collection yet	To be decided	n/a	To be decided
		<b>181</b>		<b>457</b>	

#### Price mechanisms key:

- A = Actual transactions: monitor price for transactions of a particular kind.
- B = Contract prices: monitor the periodic payments under a continuing contract.
- C = List prices: monitor the list price for typical services from the price list.
- D = Model prices: monitor price for a fictional service or contract.
- E = Fee-based method, model fees: price or re-price on basis of time for a given mix of staff.
- F = Fee-based method, fees per period: monitor total fees/total hours by activity/market.
- G = Fee-based method, percentage-based fees: compute price on basis of fee percentage combined with other information.
- H = Price data acquired from external suppliers.
- I = Unit value method: turnover divided by volume.

#### Notes:

1. Data provided by the Construction Plant Hire Association until 2002 Q3