

Methodology for the Coniferous Standing Sales Price Index

Introduction

This paper explains the rationale for changing the method used to calculate the coniferous standing sales price index (CSSPI) and compares the results obtained from the new method with those under the previous (current) method. The assistance of ONS methodologists in the development of the new index is gratefully acknowledged.

Background

The Forestry Commission has published a Coniferous Standing Sales Price Index for many years. The index is published twice yearly:

- Data for the year to end March are published in May, and
- Data for the year to end September are published in November.

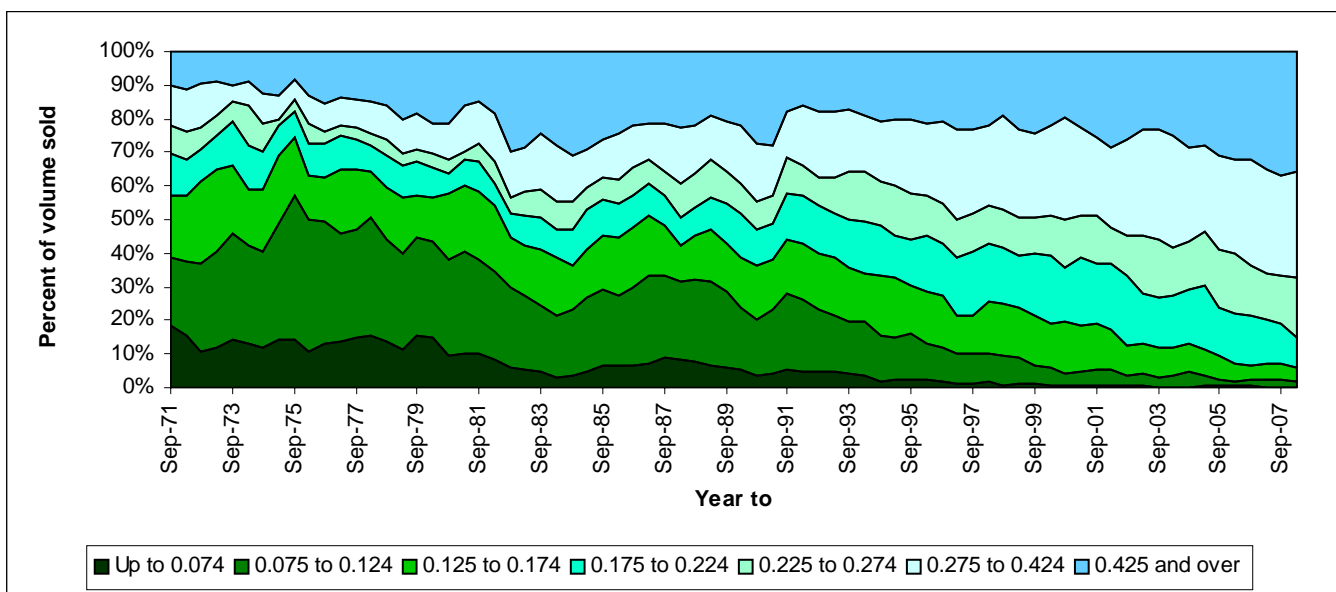
The CSSPI is an index of the average prices per cubic metre overbark standing achieved for Forestry Commission (FC) standing sales of conifers. Standing sales are those where the crop is sold standing, for the purchaser to harvest. It covers all conifer standing sales (open market and negotiated) on the FC estate over the twelve month period. All thinning and clearfell data is combined within the index. It includes all species, tree sizes, working practices and conditions on the FC estate. It does not include any private sector data.

The current index is constructed using the Laspeyres method, which corrects distortions in the average price caused by variations in average tree size. This enables prices in different years to be compared on the basis of a constant size mix (the size mix in the base year), but does not consider possible changes in quality or working conditions. At present, the base year is the year to September 1996.

Need for change

The base year for the index is currently September 1996. Over time, the size mix of standing sales has changed, with a reduction in the volume of sales from small size categories and a corresponding increase in some of the larger size categories. As a result, the index does not reflect the current size mix of standing sales. Chart 1, below, shows how the size mix of standing sales has changed between 1971 and 2008.

Chart 1: Volume of sales by average tree size (m³)



Options for change

A first stage of the review considered whether factors in addition to size should be taken into account, particularly species mix or clearfell/ thinning. It concluded that the addition of these factors would have little impact on the standing sales index ("Review of Standing Sales Price Index 2007", June 2007). Charts of index values since 1971 show that standing sales prices have fluctuated over time, but there is no clear evidence of cyclical changes. Instead, prices are driven by a range of factors, including international (e.g. global supply and demand for timber, exchange rates, etc) as well as domestic factors. The chosen index should be selected to perform well over periods of changing size mix and fluctuating prices.

Once it had been decided that the index should continue to be based solely on size mix, a number of options for a revised index were considered. These covered:

- Type of index, i.e. the choice of index number formula;
- Whether to chain-link or rebase and, if so, how frequently.

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Type of index

Three types of index have been considered. These are:

- Laspeyres index – This is the current method, which uses the size mix in a base year (currently September 1996) to compare prices over time.
- Paasche index – This method uses the size mix in each year for that year's index value.
- Fisher index – A combination of the Laspeyres and Paasche indices, this is calculated as the geometric mean of the above two indices.

Chart 2 shows each of these indices, with September 1996 set to 100 for each and September 1996 used as the base for the Laspeyres index. Table 1 shows the effect of the different indices when comparing data for the most recent periods to establish trends over time. The Laspeyres and Paasche indices show very similar trends, with the Laspeyres index tending to show smaller increases (or larger falls) than the Paasche. However, the two indices can diverge by more in individual years, as shown by 2005-2006 and 2006-2007.

As the geometric mean of the Laspeyres and Paasche indices, the Fisher index produces figures that lie between the other two indices. As the Fisher index is considered to have more desirable properties than either the Laspeyres or Paasche index, a Fisher index is recommended.

Chart 2: Type of index

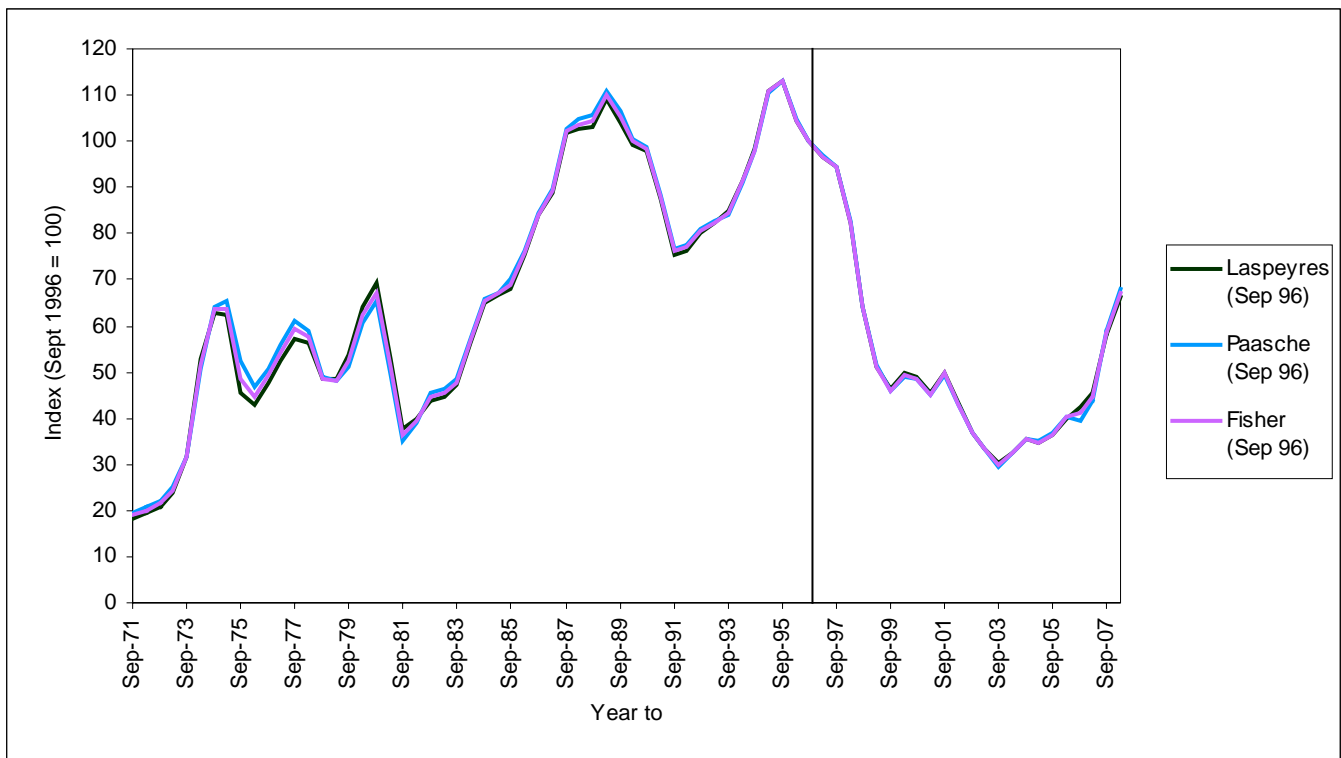


Table 1: Type of index

Time period	Type of index		
	Laspeyres (Sep 96)	Paasche (Sep 96)	Fisher (Sep 96)
Year to September			Per cent increase
1 year (2004-2005)	2%	4%	3%
1 year (2005-2006)	17%	7%	12%
1 year (2006-2007)	37%	49%	43%
5 years (2002-2007)	59%	60%	59%
10 years (1997-2007)	-39%	-37%	-38%
20 years (1987-2007)	-43%	-42%	-43%
30 years (1977-2007)	1%	-3%	-1%

Note:

1. In order to simplify the tables presented, tables 1 to 6 only show data for the year to September. Data for the year to March show a similar effect.

Chain-linking/ rebasing

Rebasing a Laspeyres index involves changing the base date that provides the index size mix. It is possible to change the full index series to the new base date, but that would make it less relevant for earlier time periods.

In order to ensure that the index remains relevant over time, chain-linking at regular intervals is recommended. This involves updating the size mix on a regular basis and linking the indices together in a chain, for example:

- 10 yearly – a ten-year chain linked index could be preferred if the fluctuating price could be represented as a 10-year cycle. However, as the long term size mix is changing, this could result in index values being calculated on the basis of less meaningful size mixes.
- Annual chain-linking – rebasing each year would ensure that the index takes account of the changes in size mix over shorter time periods. However, chain-linked Laspeyres indices tend to have an upward bias (that is, they tend to produce price increases in the upwards part of a cycle that are not fully offset by corresponding price decreases in the downwards part of a cycle).
- 5 yearly – would provide a compromise between the above two options, but may result in bias if the chain-linking coincides with the peaks and troughs of the cycle.

All the periods were selected to include year ending September 1996 as one of the base periods. For example, the 10-yearly chain-linking used:

- year ending September 1976 until September 1986;
- year ending September 1986 until September 1996;
- year ending September 1996 until September 2006; and then
- year ending September 2006.

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A further advantage of chain-linking is the opportunity to make use of additional data (more detailed size breakdowns for larger tree sizes) which are not available for the entire time series. Thus, the revised index can make use of the additional size breakdown for the average tree size category of "0.425 m³ and over", which is only available for data from October 1984.

Chart 3 shows the rebasing options for the Fisher index, each referenced to the year to September 1996. Table 2 shows the effect of the different rebasing options when comparing data for the most recent periods to establish trends over time.

Chart 3: Comparison of rebasing periods for Fisher index

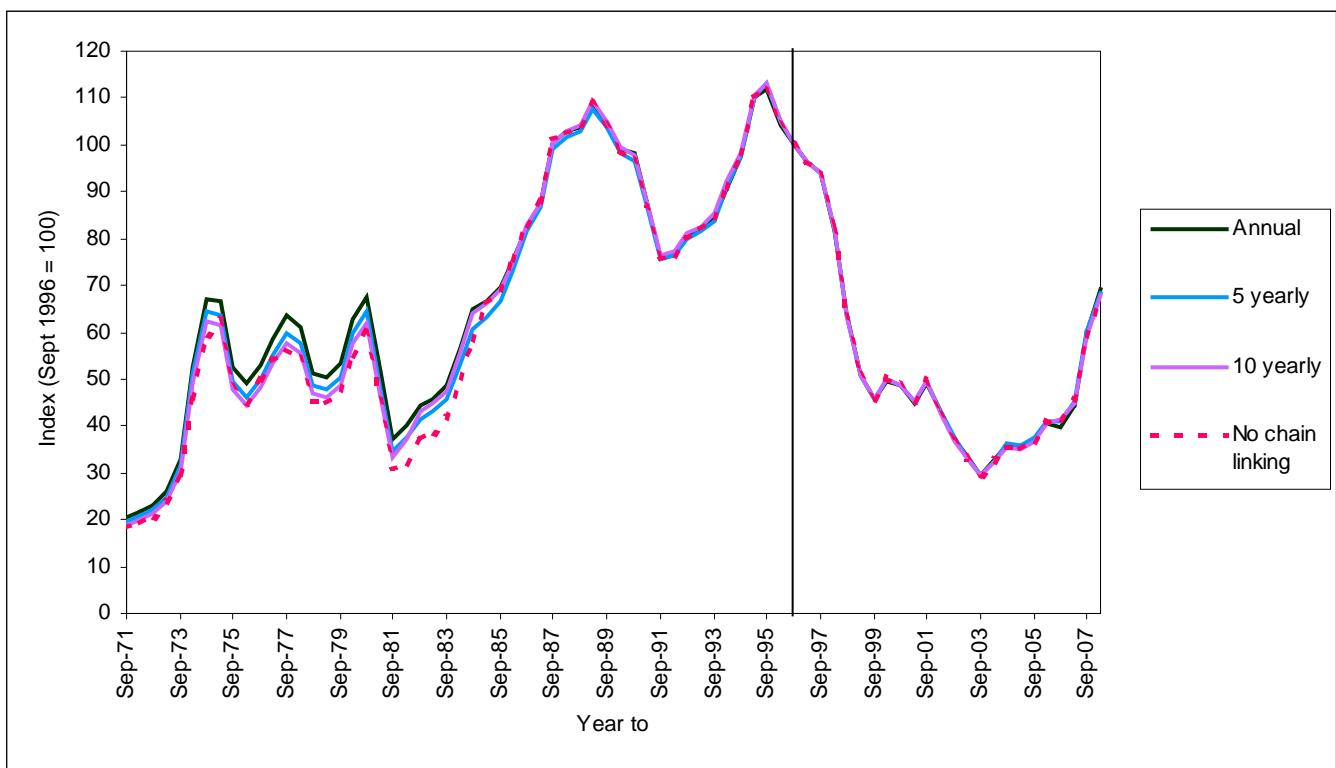


Table 2: Comparison of rebasing periods for Fisher index

Time period	Per cent increase			
	Annual	5 yearly	10 yearly	No chain linking
Year to September				
1 year (2004-2005)	3%	4%	4%	4%
1 year (2005-2006)	8%	9%	12%	12%
1 year (2006-2007)	50%	46%	43%	43%
5 years (2002-2007)	61%	60%	60%	60%
10 years (1997-2007)	-36%	-36%	-37%	-37%
20 years (1987-2007)	-40%	-39%	-41%	-42%
30 years (1977-2007)	-6%	0%	2%	5%

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In order to consider which of the rebasing options is most suitable for the coniferous standing sales price index, the effects are clearer if we compare the resulting index movements under each option for all three of the index types previously considered.

Table 3 shows the effect of annual chain-linking for each of the three index types when comparing data with the most recent periods to establish trends over time. Whilst all three indices are very similar over 1 year, there are some large differences in the estimated percentage increase in coniferous standing sales prices over longer time periods.

Table 3: Comparison of index types – annual chain-linking

Time period	Per cent increase		
	Laspeyres	Paasche	Fisher
Year to September			
1 year (2004-2005)	4%	3%	3%
1 year (2005-2006)	9%	6%	8%
1 year (2006-2007)	51%	50%	50%
5 years (2002-2007)	66%	55%	61%
10 years (1997-2007)	-29%	-43%	-36%
20 years (1987-2007)	-34%	-46%	-40%
30 years (1977-2007)	4%	-14%	-6%

Table 4 shows the effect of 5 yearly chain-linking for each of the three index types when comparing data with the most recent periods to establish trends over time. Under this option, the index types are reasonably similar when compared over both short and long time periods.

Table 4: Comparison of index types – 5 yearly rebasing

Time period	Per cent increase		
	Laspeyres	Paasche	Fisher
Year to September			
1 year (2004-2005)	4%	4%	4%
1 year (2005-2006)	12%	7%	9%
1 year (2006-2007)	43%	49%	46%
5 years (2002-2007)	61%	59%	60%
10 years (1997-2007)	-36%	-37%	-36%
20 years (1987-2007)	-39%	-40%	-39%
30 years (1977-2007)	2%	-1%	0%

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Table 5 shows the effect of 10 yearly chain-linking for each of the three index types when comparing data with the most recent periods to establish trends over time. Whilst all three indices are reasonably similar for longer time periods (10 years or 20 years), there are some large differences in the percentage changes in the index over shorter time periods.

Table 5: Comparison of index types – 10 yearly rebasing

Time period	Per cent increase		
	Laspeyres	Paasche	Fisher
Year to September			
1 year (2004-2005)	3%	4%	4%
1 year (2005-2006)	18%	7%	12%
1 year (2006-2007)	37%	50%	43%
5 years (2002-2007)	61%	59%	60%
10 years (1997-2007)	-37%	-37%	-37%
20 years (1987-2007)	-41%	-42%	-41%
30 years (1977-2007)	0%	4%	2%

Based on the above results, it is concluded that the Fisher index with 5 yearly rebasing offers the best compromise for producing reliable results over both short and long time periods.

Effect of the change in index

Table 6 shows the current Laspeyres index (as published in “Timber Price Indices”, May 2008) and the new Fisher index with 5 yearly chain-linking. The Fisher index is expressed on two scales:

- The first (Sept 1996 = 100) is provided for ease of comparison with the currently published Laspeyres index, which uses this September 1996 date as a base.
- The second (Sept 2006 = 100) shows the Fisher index re-referenced to give September 2006 as 100, to illustrate the format of the index in future publications.

The change to the new Fisher index with 5 yearly chain-linking gives a larger price increase in the most recent year. The new coniferous standing sales price index is estimated to be 46% higher in nominal terms in the year to September 2007, compared with the previous year, whereas the current index reported a 37% rise. However, this is balanced by a similar change in the opposite direction for the previous year, resulting in similar percentage changes over the 5 year period to September 2007.

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Table 6: Comparison of current and new indices

Year to:	Index			Year-to-year % change	
	Laspeyres (Sept 1996) (Sept 1996 = 100)	Fisher (5 yearly) (Sept 1996 = 100)	(Sept 2006 = 100)	Laspeyres (Sept 1996)	Fisher (5 yearly)
30-Sep-71	18.2	19.8	48.2
30-Sep-72	21.0	22.3	54.3	15%	13%
30-Sep-73	31.5	31.6	76.9	50%	42%
30-Sep-74	62.9	64.6	157.5	100%	105%
30-Sep-75	45.3	49.4	120.4	-28%	-24%
30-Sep-76	47.8	50.0	122.0	6%	1%
30-Sep-77	57.4	59.9	146.1	20%	20%
30-Sep-78	48.4	48.6	118.6	-16%	-19%
30-Sep-79	53.7	50.3	122.7	11%	3%
30-Sep-80	69.3	64.3	156.8	29%	28%
30-Sep-81	37.7	34.5	84.2	-46%	-46%
30-Sep-82	43.9	41.5	101.1	16%	20%
30-Sep-83	47.2	45.8	111.7	8%	10%
30-Sep-84	65.0	60.8	148.1	38%	33%
30-Sep-85	68.1	66.8	162.8	5%	10%
30-Sep-86	84.0	81.6	199.0	23%	22%
30-Sep-87	101.8	99.3	241.9	21%	22%
30-Sep-88	103.1	103.0	251.1	1%	4%
30-Sep-89	104.1	103.9	253.2	1%	1%
30-Sep-90	98.0	96.6	235.5	-6%	-7%
30-Sep-91	75.3	75.7	184.4	-23%	-22%
30-Sep-92	80.0	79.9	194.8	6%	6%
30-Sep-93	84.9	83.9	204.4	6%	5%
30-Sep-94	98.2	97.2	236.9	16%	16%
30-Sep-95	112.9	113.0	275.4	15%	16%
30-Sep-96	100.0	100.0	243.7	-11%	-11%
30-Sep-97	94.5	94.1	229.4	-5%	-6%
30-Sep-98	64.1	63.8	155.5	-32%	-32%
30-Sep-99	46.2	45.7	111.5	-28%	-28%
30-Sep-00	48.8	48.8	119.1	6%	7%
30-Sep-01	49.9	49.4	120.4	2%	1%
30-Sep-02	36.6	37.5	91.5	-27%	-24%
30-Sep-03	30.3	29.6	72.3	-17%	-21%
30-Sep-04	35.4	36.1	88.0	16%	22%
30-Sep-05	36.2	37.5	91.4	2%	4%
30-Sep-06	42.5	41.0	100.0	17%	9%
30-Sep-07	58.1	60.1	146.4	37%	46%

The National Statistics publication also shows the index in real terms, dividing by the GDP deflator. The same GDP deflator is used for all series, so the comparison remains the same. For completeness, Table 7 shows the index in real terms, at 1996 or 2006 prices as appropriate.

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Table 7: Comparison of current and new indices

Year to:	Average Price		Laspeyres (Sept 1996)		Fisher (5 yearly)	
	Nominal Terms (£)	Real Terms (£2006)	Nominal Terms September 1996=100	Real Terms (1996 Prices) September 1996=100	Nominal Terms September 2006=100	Real Terms (2006 Prices) September 2006=100
31-Mar-83	7.06	16.97	44.6	83.7	105.1	252.6
30-Sep-83	7.34	17.15	47.2	86.1	111.7	261.0
31-Mar-84	8.94	20.53	56.3	100.8	130.0	298.4
30-Sep-84	10.37	23.19	65.0	113.4	148.1	331.2
31-Mar-85	10.26	22.37	66.7	113.4	154.5	336.8
30-Sep-85	10.36	22.00	68.1	112.9	162.8	345.7
31-Mar-86	11.26	23.10	75.4	120.7	177.5	364.3
30-Sep-86	12.19	24.83	84.0	133.5	199.0	405.4
31-Mar-87	12.62	25.27	88.7	138.7	210.8	422.4
30-Sep-87	14.59	28.44	101.8	154.8	241.9	471.6
31-Mar-88	15.36	29.13	102.7	152.0	248.2	470.8
30-Sep-88	15.29	28.17	103.1	148.2	251.1	462.5
31-Mar-89	15.80	28.03	109.1	150.9	262.7	465.9
30-Sep-89	15.57	26.63	104.1	139.0	253.2	433.2
31-Mar-90	15.14	25.03	99.4	128.2	239.2	395.5
30-Sep-90	15.48	24.59	98.0	121.4	235.5	374.1
31-Mar-91	13.75	21.09	87.3	104.5	212.2	325.5
30-Sep-91	11.06	16.46	75.3	87.4	184.4	274.4
31-Mar-92	11.22	16.21	76.4	86.2	186.3	269.3
30-Sep-92	11.99	16.99	80.0	88.4	194.8	276.0
31-Mar-93	12.33	17.26	82.2	89.8	198.4	277.8
30-Sep-93	12.68	17.54	84.9	91.6	204.4	282.8
31-Mar-94	13.87	18.94	91.5	97.5	221.3	302.2
30-Sep-94	15.25	20.69	98.2	104.0	236.9	321.4
31-Mar-95	17.28	23.24	110.8	116.3	268.1	360.6
30-Sep-95	17.74	23.48	112.9	116.6	275.4	364.5
31-Mar-96	16.59	21.65	104.6	106.5	255.8	333.8
30-Sep-96	15.97	20.47	100.0	100.0	243.7	312.4
31-Mar-97	15.92	20.09	96.8	95.3	235.6	297.4
30-Sep-97	15.52	19.34	94.5	91.9	229.4	285.9
31-Mar-98	13.35	16.37	82.3	78.8	199.4	244.5
30-Sep-98	10.32	12.48	64.1	60.5	155.5	188.1
31-Mar-99	8.44	10.09	51.1	47.7	124.1	148.5
30-Sep-99	7.65	9.04	46.2	42.6	111.5	131.8
31-Mar-00	8.13	9.53	49.7	45.5	121.6	142.6
30-Sep-00	8.02	9.35	48.8	44.4	119.1	138.8
31-Mar-01	7.54	8.71	45.4	41.0	110.2	127.3
30-Sep-01	8.32	9.51	49.9	44.6	120.4	137.7
31-Mar-02	7.34	8.29	43.2	38.1	105.4	119.0
30-Sep-02	6.38	7.08	36.6	31.7	91.5	101.5
31-Mar-03	5.69	6.22	33.6	28.7	81.3	89.0
30-Sep-03	5.08	5.47	30.3	25.5	72.3	77.9
31-Mar-04	5.60	5.96	32.6	27.1	79.6	84.7
30-Sep-04	6.19	6.51	35.4	29.0	88.0	92.5
31-Mar-05	6.13	6.35	34.5	27.9	86.9	90.0
30-Sep-05	6.58	6.74	36.2	29.0	91.4	93.6
31-Mar-06	7.25	7.35	39.9	31.6	100.0	101.4
30-Sep-06	7.13	7.13	42.5	33.1	100.0	100.0
31-Mar-07	7.97	7.86	45.4	35.0	109.9	108.4
30-Sep-07	10.79	10.47	58.1	44.0	146.4	142.1
31-Mar-08	12.48	11.94	66.4	49.6	166.7	159.4

Next Steps

The new index will be published from November 2008. A transition period will run for 5 years in which the current index will be published alongside the new index (as shown in Table 7), to aid users in moving to the new index.

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