

Chapter 7: Index Numbers

Extra questions

1. Construct an index series from this data, using Year 1 as the base year:

Yr	1	2	3	4	5	6
Price	25	28	31	33	35	40

2. Link the following two index series:

Year	1	2	3	4	5	6
Old index	156	168	173			
New Index			100	104	108	113

- (a) with the new series continuing the old one
 (b) with the old series re-based to Year 3 = 100

3. A firm wants you to report on costs and the prices it charges for the last 10 years. You have obtained the following data:

Year	1	2	3	4	5	6	7	8	9	10
Costs	186	193	199	204	209	215				
Prices	145	155	160	165	168	170	172	173	172	170

- (a) Construct a graph of the two series with Year 1 as the base year
 (b) Construct a bar chart of the percentage year to year changes for each series

4. Calculate aggregated all items indices from the following data:

Year	1		2		3		4	
Item	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity
A	5	120	5.8	130	6.3	150	8.4	180
B	6	80	7	85	8	90	9	90
C	10	40	10.6	35	10.5	30	10.4	26
D	25	5	30	8	30	6	28	8

The indices you should calculate are:

- (a) Laspeyres Price index
 (b) Paasche Price index
 (c) Laspeyres Quantity index
 (d) Paasche Quantity index
 (e) A Value index.

Extra answers

1. We need to make Year 1 = 100 and do this by dividing by 25 (itself) and multiplying by 100. We then divide each of the other figures by 25 (the value in the base year) and multiply by 100. This gives:

Index	100	112	124	132	140	160
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2. This question hinges on the two numbers for Year 3 (173 and 100). For the first link, multiply the figures in the new index by (173/100) to get 186.84 and 195.49. For the second part of the question, multiply each figure in the old index by (100/173) to get these results:

Comb (a)	156	168	173	179.92	186.84	195.49
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Comb (b)	90.17341	97.10983	100	104	108	113
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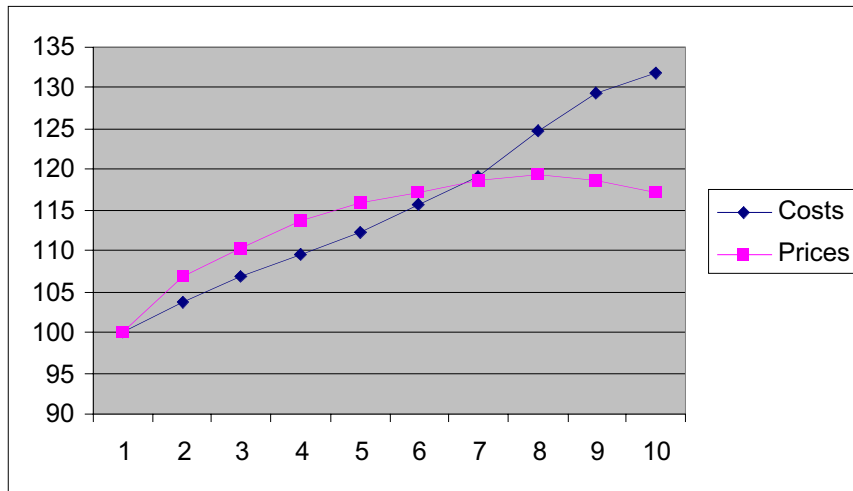
3. (a) There are two steps in re-basing the Costs data, firstly we must link the two parts of the series together, and then re-base to Year 1. This gives:

Costs	186	193	199	204	209	215	221.45	232.2	240.8	245.1
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Costs	100	103.7634	106.9892	109.6774	112.3656	115.5914	119.0591	124.8387	129.4624	131.7742
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Prices	100	106.8966	110.3448	113.7931	115.8621	117.2414	118.6207	119.3103	118.6207	117.2414
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Now we can use Excel to produce the graph:



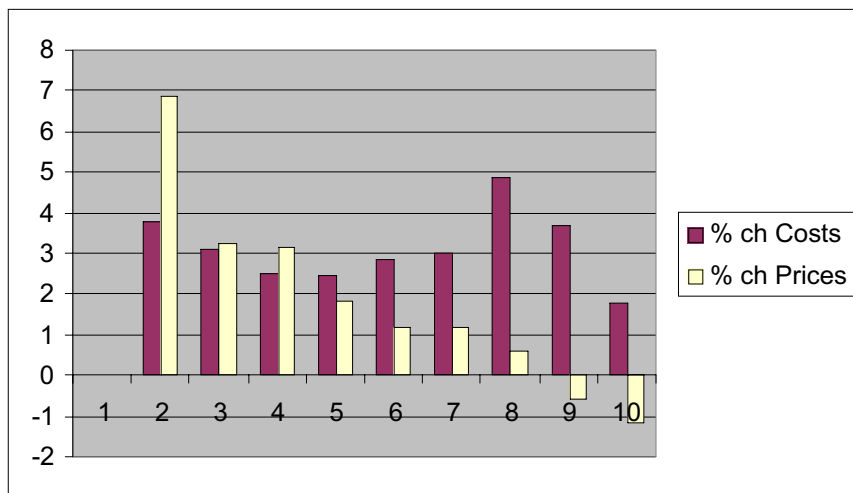
- (b) Year to year percentage changes are found by calculating the numerical difference from one year to the next and then finding that out as a percentage of the first of the two years. For Year 2 for Costs, this gives:

$$\text{Percent Change} = \frac{(193 - 186)}{186} \times 100 = 3.763441$$

Doing this for both series gives:

Year	1	2	3	4	5	6	7	8	9	10
% ch Costs		3.763441	3.108808	2.512563	2.45098	2.870813	3	4.854369	3.703704	1.785714
% ch Prices		6.896552	3.225806	3.125	1.818182	1.190476	1.176471	0.581395	-0.57803	-1.16279

And the bar chart will look like this:



4. This is a very similar question and is provided for practice:

Year	1		2		3		4		
	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	
Item									
A	5	120	5.8	130	6.3	150	8.4	180	
B	6	80	7	85	8	90	9	90	
C	10	40	10.6	35	10.5	30	10.4	26	
D	25	5	30	8	30	6	28	8	
	P0	Q0	P1	Q1	P2	Q2	P3	Q3	
P0Q0	P1Q1	P2Q2	P3Q3	P1Q0	P2Q0	P3Q0	P0Q1	P0Q2	P0Q3
600	754	945	1512	696	756	1008	650	750	900
480	595	720	810	560	640	720	510	540	540
400	371	315	270.4	424	420	416	350	300	260
125	240	180	224	150	150	140	200	150	200
1605	1960	2160	2816.4	1830	1966	2284	1710	1740	1900
			1	2	3	4			
Laspeyres Price Index			100	114.0187	122.4922	142.3053			
Paasche Price Index			100	114.6199	124.1379	148.2316			
Laspeyres Quantity Index			100	106.5421	108.4112	118.3801			
Paasche Quantity Index			100	107.1038	109.8678	123.31			
Value Index			100	122.1184	134.5794	175.4766			