Recitation 9

Topics: Price Indices

1 Price Indices

1.1 Definitions

The formula for the Laspeyres price index is given by:

$$\frac{\sum_{i=1}^{n} P_{i,LastPeriod} Q_{i,FirstPeriod}}{\sum_{i=1}^{n} P_{i,FirstPeriod} Q_{i,FirstPeriod}}$$

The formula for the Paasche price index is given by:

$$\frac{\sum_{i=1}^{n} P_{i,LastPeriod} Q_{i,LastPeriod}}{\sum_{i=1}^{n} P_{i,FirstPeriod} Q_{i,LastPeriod}}$$

The difference is that the Laspeyres price index uses the basket of goods that the consumer was buying in the first period. The Paasche price index uses the basket of goods that the consumer was buying in the final period.

Both indices are subject to substitution bias. The weighting of the Laspeyres price index will favour goods that were bought in the first period even if people no longer buy them today. What type of goods are people likely to buy more in the past? Goods that used to be cheap but have become more expensive. Therefore, Laspeyres overweights goods that have become more expensive and thus the susbtitution bias in Laspeyres tends to mean it overestimates the change in prices.

The weighting of the Paasche index will favour goods that were bought in the last period even if people didn't used to buy them in the past. What type of goods are people likely to buy more today? Goods that have become cheaper. Therefore, Paasche overweights goods that have become cheaper and thus the substitution bias in Paasche tends to mean it underestimates the change in prices.

Since Laspeyres underweights the change and Paasche overweights the change, one way to get a measure of the change in prices is to combine the two indices. We can do this with the Fisher index:

$$\sqrt{Laspeyres * Paasche}$$

1.2 Example

We see that the price of bananas increases and the quantity purchased falls whilst the price of computers decreases and the quantity purchased increases. Laspeyres overweights bananas in its index so we can see that it suggests there has been a large increase in prices. Paasche overweights computers in its index so we can see that it suggests there has been a large decrease in prices.

1.3 New Goods Bias

The introduction of new goods to a price index can also introduce biases, depending on how the good enters the price index. The fundamental problem is that for new goods, there is no reference point for a previous price which makes it hard to compute changes in prices.

Let us look at the example in Profesor Steinsson's lecture notes about lighting bulbs. Fluorescent bulbs appeared in year 2, while Incandescent bulbs existed from the beginning on, but disappear in year 3.

	Incandescent	Fluorescent
Year 1	\$ 10	–
Year 2	\$ 12	\$ 2.4
Year 3	–	\$ 1.8

When using the 'linking' method (which is what the BLS uses), we link the price changes of incandescent bulbs from year 1 to year 2 to the price change of flourescent bulbs from year 2 to year 3. The change in prices from year 1 to year 2 is then $\frac{12}{10}$, and the change in prices from year 2 to year 3 is $\frac{1.8}{2.4}$. Take year 1 as the base year, so that the price index has value 1 in year 1. In year 3, the price index is

$$P_{Y3} = \underbrace{1}_{Price in year 1} \cdot \underbrace{\frac{12}{10}}_{Change from Y1 to Y2} \cdot \underbrace{\frac{1.8}{2.4}}_{Change from Y2 to Y3} = .9$$

Hence, according to the BLS's linking method, there has been a 10% deflation in the prices of light bulbs. This is far lower than the 82% deflation that would have been implied by the direct calculation of price changes from the first to the last period:

$$\frac{1.8}{10} = 0.18$$