Two years, two goods. Example of price indexes

 P_1^H Price of hats in first year Q_1^H Quantity of hats in first year P_1^C Price of cigarettes in first year Q_1^C Quantity of cigarettes in first year Second year values are subscripted "2".

Cost (revenue) using current prices

First year $= P_1^H \times Q_1^H + P_1^C \times Q_1^C$ Second year $= P_2^H \times Q_2^H + P_2^C \times Q_2^C$

Price index using quantities from first year

Two steps

1) Calculate cost (revenue) using current prices but using first year's quantities for both years

First year $= P_1^H \times Q_1^H + P_1^C \times Q_1^C$

Second year = $P_2^H \times Q_1^H + P_2^C \times Q_1^C$

2) Pick a base year. Then divide each cost (revenue) number by the value in the base year.

a) Using first year as base year

Price index number

First year $= (P_1^H \times Q_1^H + P_1^C \times Q_1^C) / (P_1^H \times Q_1^H + P_1^C \times Q_1^C) = 1$ Second year $= (P_2^H \times Q_1^H + P_2^C \times Q_1^C) / (P_1^H \times Q_1^H + P_1^C \times Q_1^C)$

Notice: index number is equal to 1 in the base year, the first year.

b) Using second year as base year

Price index number

First year =
$$(P_1^H \times Q_1^H + P_1^C \times Q_1^C) / (P_2^H \times Q_1^H + P_2^C \times Q_1^C)$$

Second year $= (P_2^H \times Q_1^H + P_2^C \times Q_1^C) / (P_2^H \times Q_1^H + P_2^C \times Q_1^C) = 1$

Notice: index number is equal to 1 in the second year, the base year.

Price index using quantities from second year

Two steps

1) Calculate cost (revenue) using current prices but using second year's quantities for both years

First year $= P_1^H \times Q_2^H + P_1^C \times Q_2^C$ Second year $= P_2^H \times Q_2^H + P_2^C \times Q_2^C$

2) Pick a base year. Then divide each cost (revenue) number by the value in the base year.

a) Using first year as base year

Price index number

First year
$$= (P_1^H \times Q_2^H + P_1^C \times Q_2^C) / (P_1^H \times Q_2^H + P_1^C \times Q_2^C) = 1$$

Second year
$$= (P_2^H \times Q_2^H + P_2^C \times Q_2^C) / (P_1^H \times Q_2^H + P_1^C \times Q_2^C)$$

Notice: index number is equal to 1 in the base year, the first year.

b) Using second year as base year

Price index number

First year	$= (P_1^H \times Q_2^H + P_1^C \times Q_2^C) / (P_2^H \times Q_2^H + P_2^C \times Q_2^C)$
Second year	$= (P_2^H \times Q_2^H + P_2^C \times Q_2^C) / (P_2^H \times Q_2^H + P_2^C \times Q_2^C) = 1$

Notice: index number is equal to 1 in the second year, the base year.

Averaging the two price indexes using a geometric average

 $I_1^{1st Yr Qs}$ Value of index made from first year quantities, in the first year $I_2^{1st Yr Qs}$ Value of index made from first year quantities, in the second year

 $I_1^{2nd YrQs}$ Value of index made from second year quantities, in the first year $I_2^{2nd YrQs}$ Value of index made from second year quantities, in the second year

Combined price index number

 $=\sqrt{I_1^{1st\,Yr\,Qs}\times I_1^{2nd\,Yr\,Qs}}$

First year

Second year = $\sqrt{I_2^{1stYrQs} \times I_2^{2ndYrQs}}$

Note: in the base year, the value of both of the component price indexes will be one. So the value of the combined price index number will also be one in the base year.