

PRICE INDEX

Asistensi 4 Statistika Ekonomi dan Bisnis

Statistika Ekonomi dan Bisnis – F

Dosen : Dr. Masarina Flukeria, M.P.P.

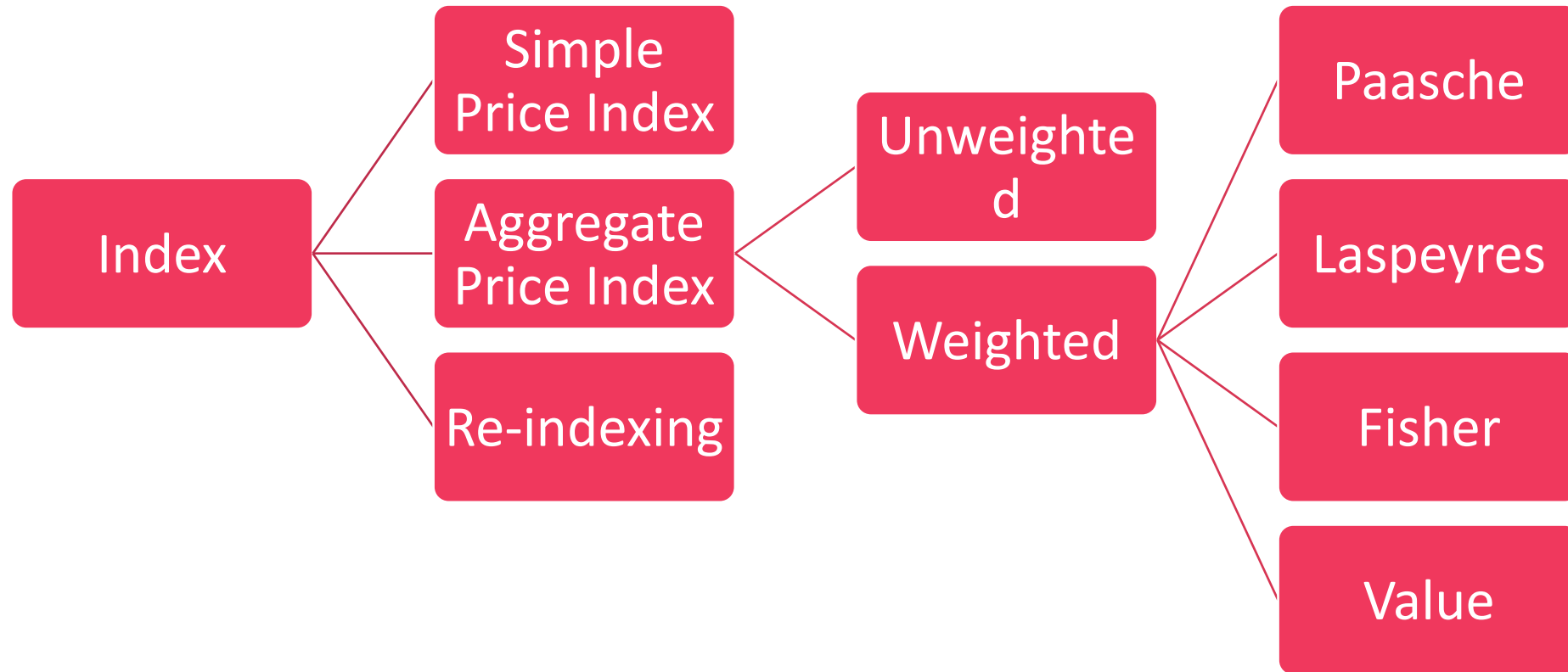
Asisten Dosen: Christoffer Hosea Situmorang

Definisi dan Konsep

Index Numbers :
Numerical value that
reflects a percentage
change in price or quantity
from a base value.

Index numbers are
reported relative to a base
period index (100 by
definition)

Outline



Simple Price Index

For **an item** is the ratio of its price in period t ($t = n$) to the price in the base period ($t = 0$), multiplied by 100

Year		Red Wine	White Wine	6-pack of Beer
2007	Price	\$12.30	\$11.90	\$8.10
	Quantity	1,560	1,410	2,240
2008	Price	\$12.10	\$11.05	\$8.25
	Quantity	1,490	1,390	2,310
2009	Price	\$9.95	\$10.60	\$7.95
	Quantity	1,280	1,010	2,190

- Red wine, 2008: $\frac{\text{Price in 2008}}{\text{Price in 2007}} \times 100 = \frac{12.10}{12.30} \times 100 = 98.37$
- Red wine, 2009: $\frac{\text{Price in 2009}}{\text{Price in 2007}} \times 100 = \frac{9.95}{12.30} \times 100 = 80.89$

Automobile Expenses: Monthly Amounts (\$):					
Year	Lease payment	Fuel	Repair	Total	Index (2001=100)
2001	260	45	40	345	100.0
2002	280	60	40	380	110.1
2003	305	55	45	405	117.4
2004	310	50	50	410	118.8



$$I_{2004} = \frac{\sum p_{2004}}{\sum p_{2001}} (100) = \frac{410}{345} (100) = 118.8$$

- Combined expenses in 2004 were 18.8% higher in 2004 than in 2001

Unweighted Agregate Price Index

Based entirely on the component prices, with out regard to quantities used.

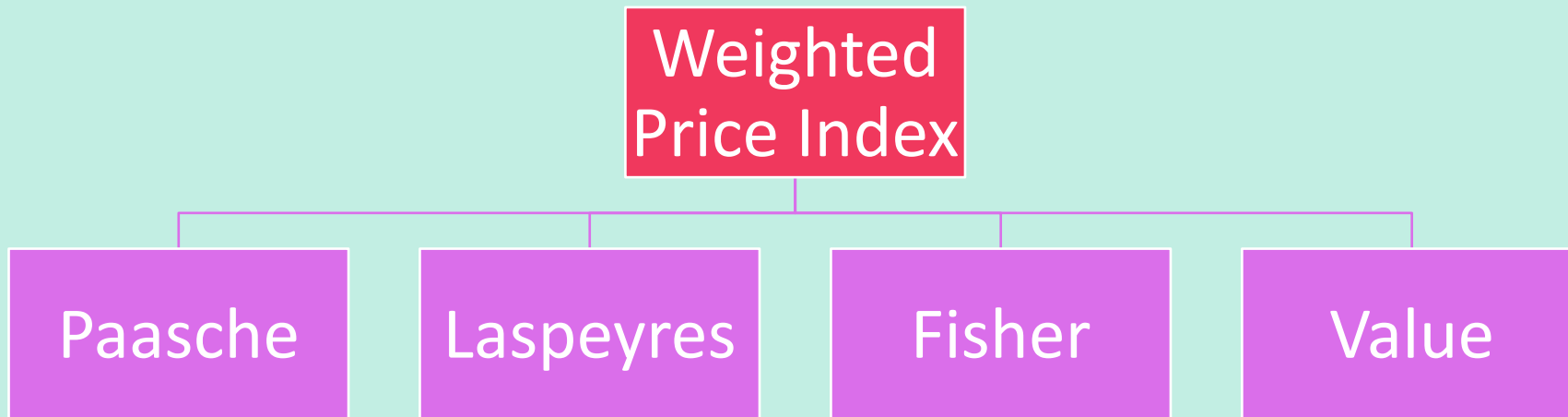
$$I_t = \frac{\sum P_{it}}{\sum P_{i0}} \times 100$$

P_{it} = Price of item i in period t
 P_{i0} = Price of item i in period $t = 0$

Weighted Aggregate Price Index

Does not treat prices of different items **equally**. Rather, a higher weight is given to items that are sold in higher quantities.

Notes: There is **no unique** way of determining the weights. One option is to reweight each year as the quantities change, but often data are unavailable for this method.



Laspeyres Price Index

LASPEYRES PRICE INDEX

$$P = \frac{\sum p_t q_0}{\sum p_0 q_0} \times 100$$

[15-4]

where

P is the price index.

p_t is the current price.

p_0 is the price in the base period.

q_0 is the quantity used in the base period.

Advantages Requires quantity data from only the base period. This allows a more meaningful comparison over time. The changes in the index can be attributed to changes in the price.

Disadvantages Does not reflect changes in buying patterns over time. Also, it may overweight goods whose prices increase.

Paasche Price Index

PAASCHE PRICE INDEX

$$P = \frac{\sum p_t q_t}{\sum p_0 q_t} \times 100$$

[15-5]

Where

p is the price index

p_t is the current price

p_0 is the price of the base period

q_t is the quantity used in the current period

q_0 is the quantity used in the base period

Advantages Because it uses quantities from the current period, it reflects current buying habits.

Disadvantages It requires quantity data for the current year. Because different quantities are used each year, it is impossible to attribute changes in the index to changes in price alone. It tends to overweight the goods whose prices have declined. It requires the prices to be recomputed each year.

Laspeyres vs Paasche: Fisher Index

- Laspeyres and Paasche methods provide **similar results** if the time periods being compared are not too far apart
- Over time, consumers tend to adjust their consumption patterns. As a result, the **Paasche** index will tend to produce a **lower estimate than the Laspeyres index if prices are rising**, and a higher estimate than the Laspeyres index if they are falling.
- Paasche index requires weights to be updated each year, in practice the Laspeyres index is more widely used.
- Fisher's Ideal Index was developed in an attempt to offset these short comings.

$$\text{Fisher's ideal index} = \sqrt{(\text{Laspeyres' index})(\text{Paasche's index})}$$

[15–6]

Value Index

- ❑ Measures changes in both the price and quantities involved.

VALUE INDEX

$$V = \frac{\sum p_t q_t}{\sum p_0 q_0} \times 100$$

where:

P is the price index.

p_t is the current price.

p_0 is the price in the base period.

q_0 is the quantity used in the base period.

Re-Indexing

■
$$\text{Updated Index} = \frac{\text{Old Index Value}}{\text{Old Index Value of New Base}} \times 100$$

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Price	1.51	1.46	1.36	1.59	1.88	2.30	2.59	2.80	3.27
Price Index (Base = 2000)	100	96.69	90.07	105.30	124.50	152.32	171.52	185.43	216.56
Price Index (Base = 2005)	65.65	63.48	59.13	69.13	81.74	100.00	112.61	121.74	142.17

Nominal Versus Real Values

Example :

- During the same period, the revenue of Tom's employer grew from \$13 to \$18 million. The PPI in these two years was 132.70 and 189.60. Let's compute the firm's nominal and real revenue growth.
- Nominal growth: $\frac{18-13}{13} = 0.38$ or 38%
- Adjusted 2000 revenue: $\frac{13}{132.70} \times 100 = 9.80$
Adjusted 2008 revenue: $\frac{18}{189.60} \times 100 = 9.49$
- Real growth: $\frac{9.49-9.80}{9.80} = -0.03$ or -3%

Nominal versus Real Value

An unadjusted time series is said to be represented in nominal terms. On that has been deflated is said to be represented in real terms.

$$Real\ Value = \frac{Nominal\ Value}{Price\ Index} \times 100$$

After conversion, the observations in the time series will all reflect money amounts representing purchasing power in the index's base year.

Inflation Rate and Additional Formula

- Percentage change in a price index over time

$$i_t = \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}}.$$

REAL INCOME

$$\text{Real income} = \frac{\text{Money income}}{\text{CPI}} \times 100$$

[15-8]

USING AN INDEX AS A DEFLATOR

$$\text{Deflated sales} = \frac{\text{Actual sales}}{\text{An appropriate index}} \times 100$$

[15-9]

USING AN INDEX TO FIND PURCHASING POWER

$$\text{Purchasing power of dollar} = \frac{\$1}{\text{CPI}} \times 100$$

[15-10]

Latihan Soal

UTS Ganjil 2021/2022

SOAL 2 (20 poin)

Dalam memantau laju inflasi nasional, pemerintah mencermati pergerakan harga eceran beberapa bahan pangan pokok terutama di pasar tradisional. Badan Pusat Statistik (BPS) telah melakukan survei dan pendataan beberapa bahan pangan pokok secara rutin selama 3 tahun terakhir dengan rincian sebagai berikut.

Harga dan Kuantitas Beberapa Bahan Pangan Pokok (dalam Rp dan Kg)

Tahun	Variabel	Beras	Minyak Goreng	Telur Ayam
2018	Harga	9.700	15.300	20.000
	Kuantitas	116	24	6
2019	Harga	9.850	17.000	22.000
	Kuantitas	118	22	8
2020	Harga	10.700	18.000	23.000
	Kuantitas	210	21	10

Terdapat informasi bahwa rata-rata gaji pekerja bulanan pada tahun 2018 – 2020 adalah sebagai berikut.

Tahun	Gaji (dalam Rp juta)
2018	2,44
2019	2,53
2020	2,83

Pertanyaan:

- (3) Asumsikan BPS menghitung indeks tertimbang menggunakan metode Laspeyres dan Paasche. Jelaskan apa perbedaan metode antara kedua jenis indeks tersebut. Metode mana yang lebih baik untuk digunakan? Jelaskan mengapa.
- (5) Hitunglah Indeks Harga Konsumen (IHK) secara agregat menggunakan metode Laspeyres dengan tahun 2018 sebagai tahun dasar (2018=100).
- (5) Hitunglah tingkat inflasi berdasarkan IHK pada point c.
- (5) Berapakah perkembangan upah riil pada tahun 2018-2020?
- (2) Susunlah perkiraan IHK 2018-2020 jika tahun dasarnya adalah 2019 (2019=100).

Latihan Soal

UTS Ganjil 2020/2021

SOAL 2

Berikut adalah data IHK, inflasi dan gaji bulanan selama periode 2014-2018 dengan beberapa informasi yang dihilangkan:

Tahun	IHK (2012 = 100)	Gaji Bulanan (Juta Rupiah)	Inflasi (%)
2014	116	6,00	7
2015	...	6,30	8
2016	...	6,50	9
2017	140	6,90	...
2018	148	7,10	...
2019	158	7,40	...

Pertanyaan:

- Lengkapilah tabel di atas untuk dapat menjawab pertanyaan-pertanyaan berikutnya.
- Dengan formula yang benar, berapakah inflasi tahunan rata-rata selama 6 tahun terakhir?
- Susunlah perkembangan upah riil selama enam tahun (2014-2019) berdasarkan harga-harga pada 2017?
- Susunlah perkiraan indeks harga konsumen 2014-2019, seandainya waktu dasarnya adalah 2018.

Thank you!

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