

$$RGDP = \frac{NGDP}{P}$$

Measurements

- P : GDP deflator | • fixed price
• chain index

- $RGDP$: Real GDP | • fixed price
• chained

- index number construction

- theoretically best

- Chained price
price and output
indices

types

"best"
↓

indices

arithmetic averages		geometric averages	
Simple	weighted	simple	weighted
$\frac{a+b}{2}$	$\frac{\lambda a + (1-\lambda)b}{2}$	$\sqrt{\frac{a \times b}{2}}$	$\sqrt{\lambda a + (1-\lambda)b}$
<u>Irving Fisher</u>		The Theory of Index Numbers	

weights

equal: .5 .5 $\Sigma = 1.0$

unequal λ $(1-\lambda)$ $\Sigma = 1.0$

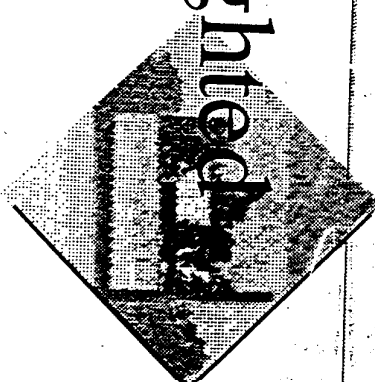
~~Geometric~~

$$\sqrt{9 \times 16} = (3 \times 4) = \underline{12.0}$$

Simple average

$$\frac{9+16}{2} = 12.5$$

• Calculating a Chain-Weighted Output Index



- taking a geometric average
- calculating

$$\sqrt{\frac{B}{A} * D}$$

A: ?
B: ?
D: ?
E: ?

(1)

$i = 1, \dots, n$ commodities in the basket

		P_i	
		base year P_{i0}	current year P_{it}
Q_i	base year Q_{i0}	$\sum Q_{i0} P_{i0}$ (A)	$\sum Q_{i0} P_{it}$ (D)
	current year Q_{it}	$\sum Q_{it} P_{i0}$ (B)	$\sum Q_{it} P_{it}$ (E)

output indices : $\frac{(B)}{(A)}$ $\frac{(E)}{(D)}$

ideal (chain weighted) output index

$$= \sqrt{\frac{B}{A} * \frac{E}{D}}$$

(A)

Item	1992 quantities	1992 prices	1993 quantities valued at 1992 prices	1993 prices	1992 quantities valued at 1993 prices
Oranges	50	\$1.00	\$50	\$2.00	\$100
Video games	5	\$10.00	\$50	\$8.00	\$40

$A = \$100$ $D = \$140$

1993 quantities
valued at 1992
prices 1993 quantities
valued at 1993
prices

Item	1993 quantities	1992 prices	1993 prices	1993 quantities valued at 1992 prices	1993 quantities valued at 1993 prices
Oranges	45	\$1.00	\$45	\$2.00	\$90
Video games	7	\$10.00	\$70	\$8.00	\$56

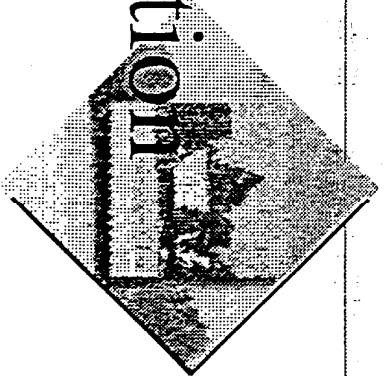
$B = \$115$ $E = \$146$

Output index $C = B/A = 1.150$ $F = E/D = 1.043$

Chain-weighted output index (geometric mean of C and F) $= \sqrt{1.150 \times 1.043} = 1.095$

Growth rate in 1993 using chain-weighted output index 9.5 percent

The Price Level and Inflation



→ • The GDP Deflator can now be calculated.

$$\text{GDP deflator} = \frac{\$146}{\$109.5} \times 100 = 133.33$$

$$P = \frac{Y}{Z}$$

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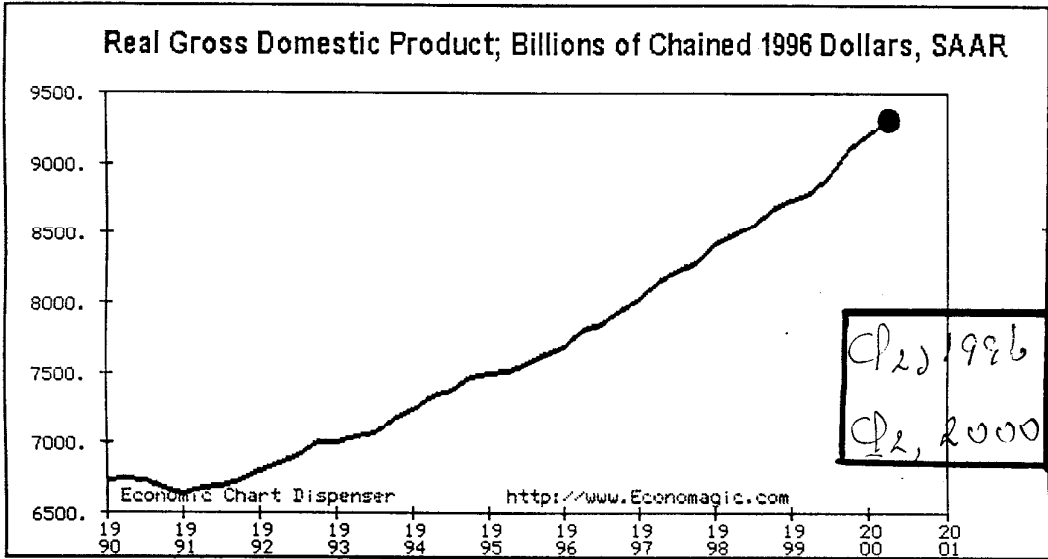
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RGDP		
1996 prices		
fixed chained		
Q2, 1996	7802	7802
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1997 03	8216.564
1997 04	8272.897
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1998 02	8465.570
1998 03	8537.607
1998 04	8654.492
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