Lecture 3

- The Price Level
- Real vs. Nominal Quantities
- The Quantity Theory of Money

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➢ Paper (Fiat) money valuable only because it will buy stuff.

➢ How is its purchasing power measured and determined?

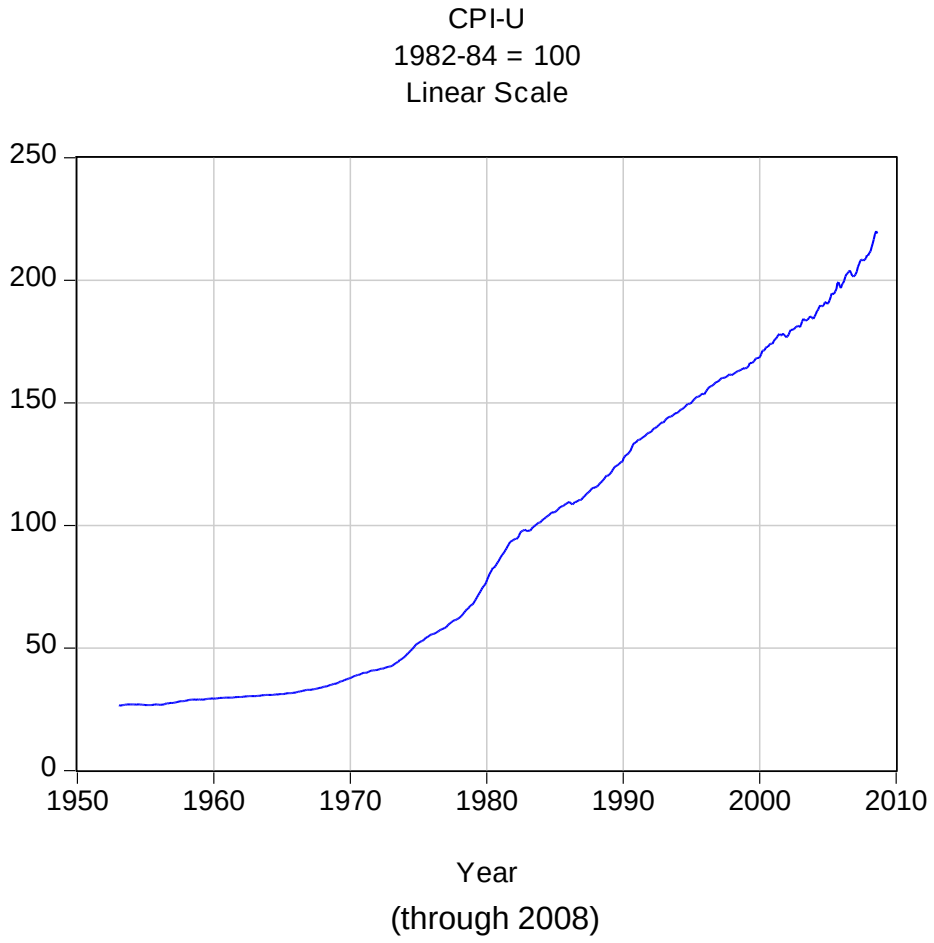
The Price Level

CPI-U

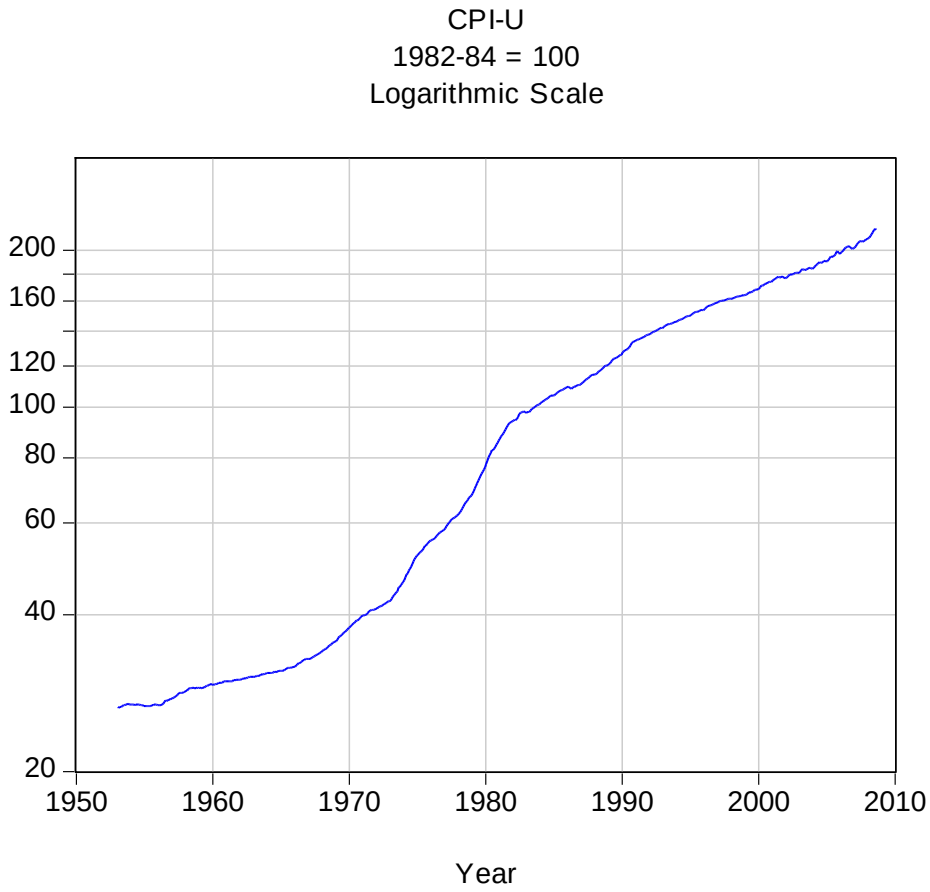
Consumer Price Index for All Urban Consumers

	Base year	
	1982-4 = 100	1967 = 100
8/11	226.5	678.6
8/10	218.3	654.0
8/09	215.8	646.5
1982-4	100.0	299.5
1967	(33.4)	100.0

- CPI computed monthly by Bureau of Labor Statistics (BLS) in US Dept. of Labor (stats.bls.gov)
- Is final on release, has 1 month computation lag.



Growth rates hard to visualize with linear scale
Logarithmic scale better for this purpose.



(through 2008)

With logarithmic scale, slope indicates growth rate.
CPI grew faster 1968-82 than before or after.

Inflation = rate of growth of price level.

P_t = Price level in year t

P_{t-1} = Price level in year t-1

$$\pi = \frac{\Delta P}{P} = \frac{P_t - P_{t-1}}{P_{t-1}}$$ = annual inflation rate

Δ (Delta) indicates change in variable.

Deflation = negative inflation

= rate of decline of price level.

Less common than inflation.

8/10 – 8/11 (1982-4 = 100):

$$\pi = \frac{226.5 - 218.3}{218.3} = .038 = 3.8\% \text{ annual inflation}$$

8/09 – 8/10:

$$\pi = \frac{218.3 - 215.8}{215.8} = .012 = 1.2\% \text{ annual inflation}$$

Same π with any Base Year (within rounding error):

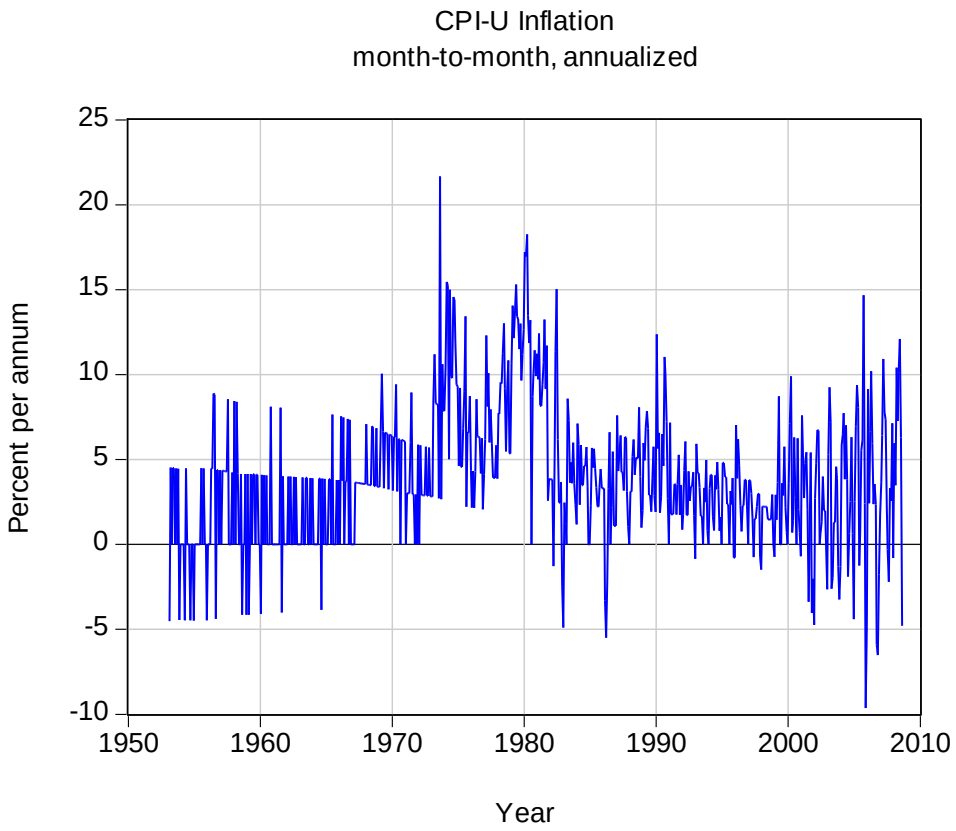
8/10 – 8/11 (1967 = 100):

$$\pi = \frac{678.6 - 654.0}{654.0} = .038 = 3.8\% \text{ annual inflation}$$

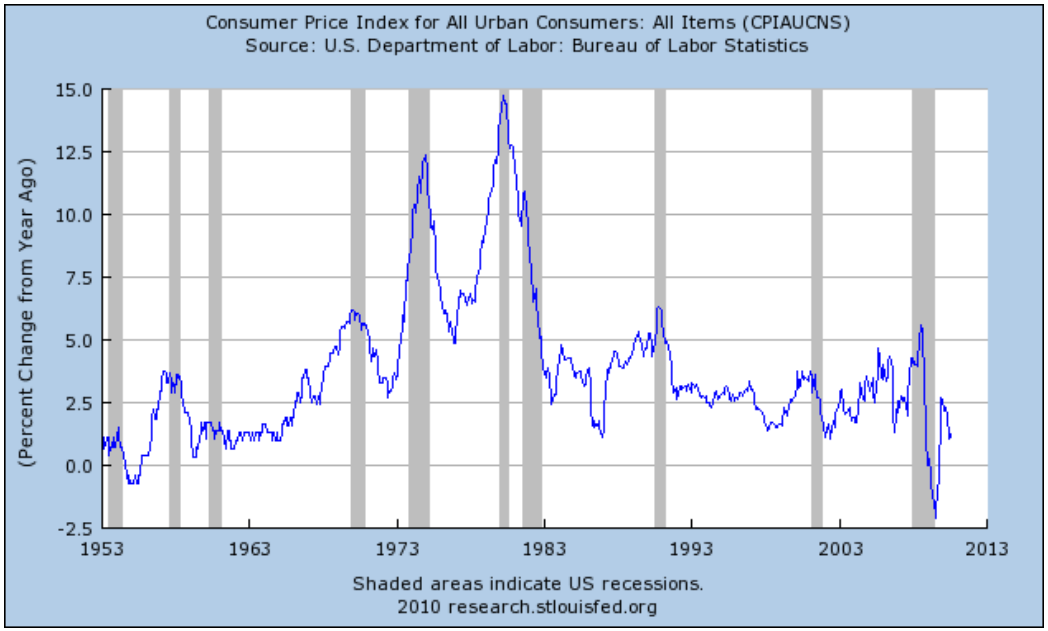
8/09 – 8/10:

$$\pi = \frac{654.0 - 646.5}{646.5} = .012 = 1.2\% \text{ annual inflation}$$

Month-to-month π is mostly noise, rounding error:



Year-over-year inflation is more meaningful, shows considerable persistence from yr to yr:



Inflation was in double digits, 1973-74, 1979-81.

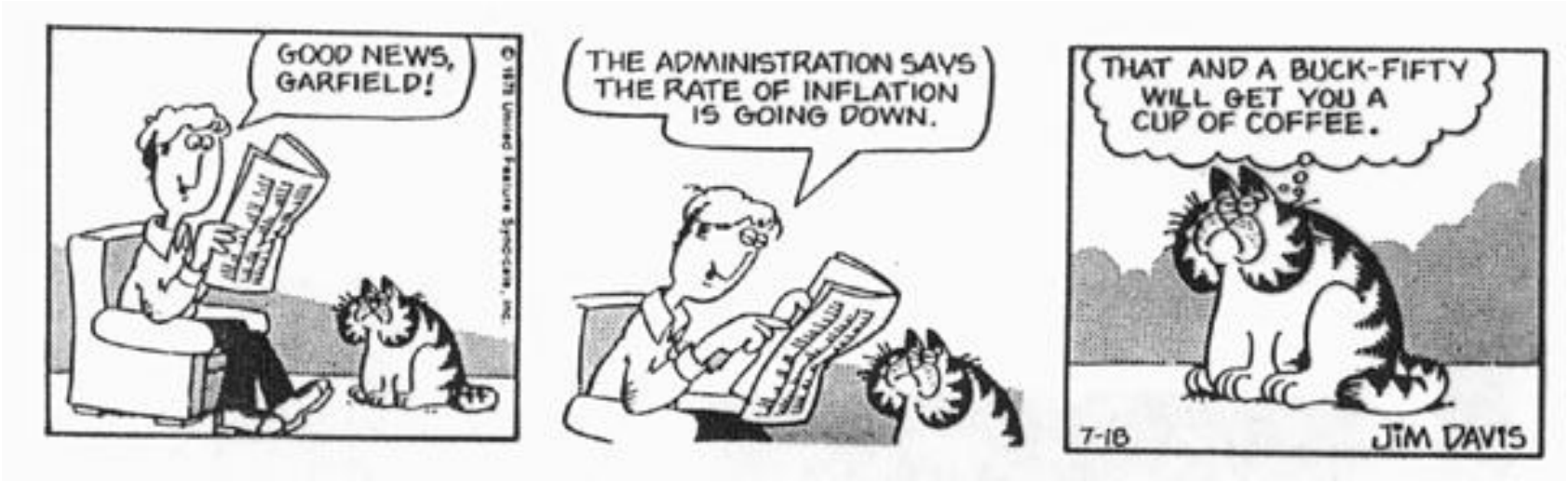
- Why?
- Could this ever recur?

Inflation was negative, 2008-9.

- Is this a big problem?
- Is it likely to continue?

GARFIELD 1978

GARFIELD 1978



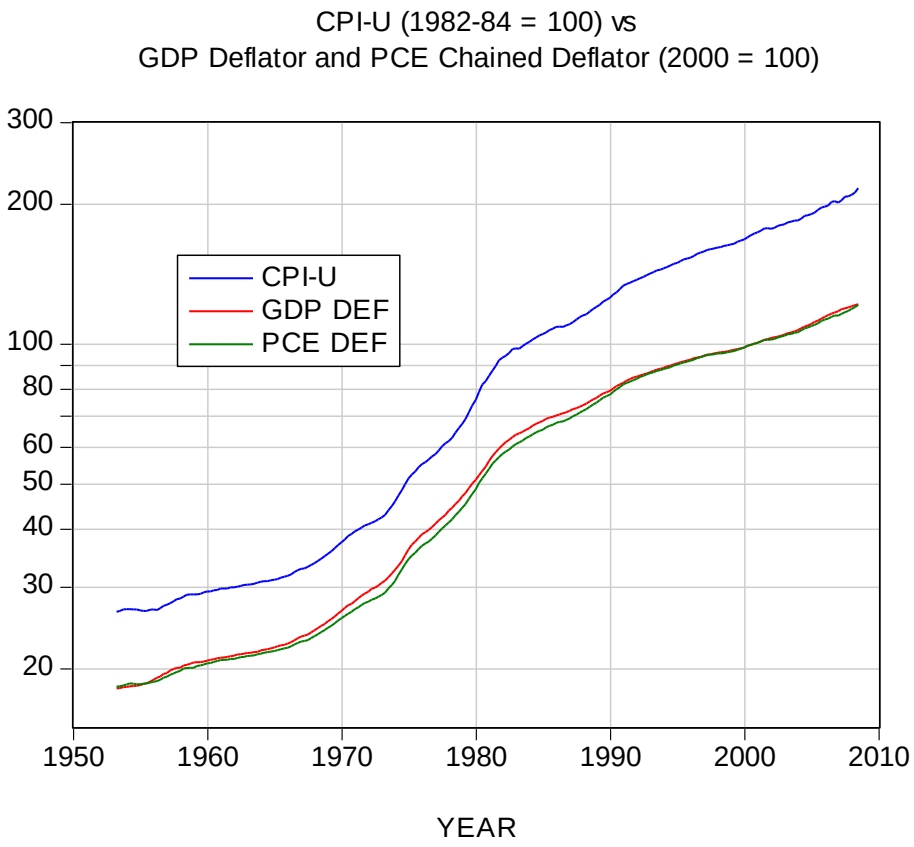
Boskin Congressional Commission Report, 1996

- Says CPI-U overstated "true" inflation by about 1.1%/yr (0.8 – 1.6%)
  - 0.6% due to new products, eg
    - computers
    - cell phones
    - DVD players
  - 0.4% due to substitution away from goods whose prices have increased.
    - eg gas $\uparrow \rightarrow$ less driving, better fuel economy
  - 0.1% due to shopping locations
    - eg Wal-Mart
- Some improvements made, but Fed now prefers PCE Deflator to CPI-U

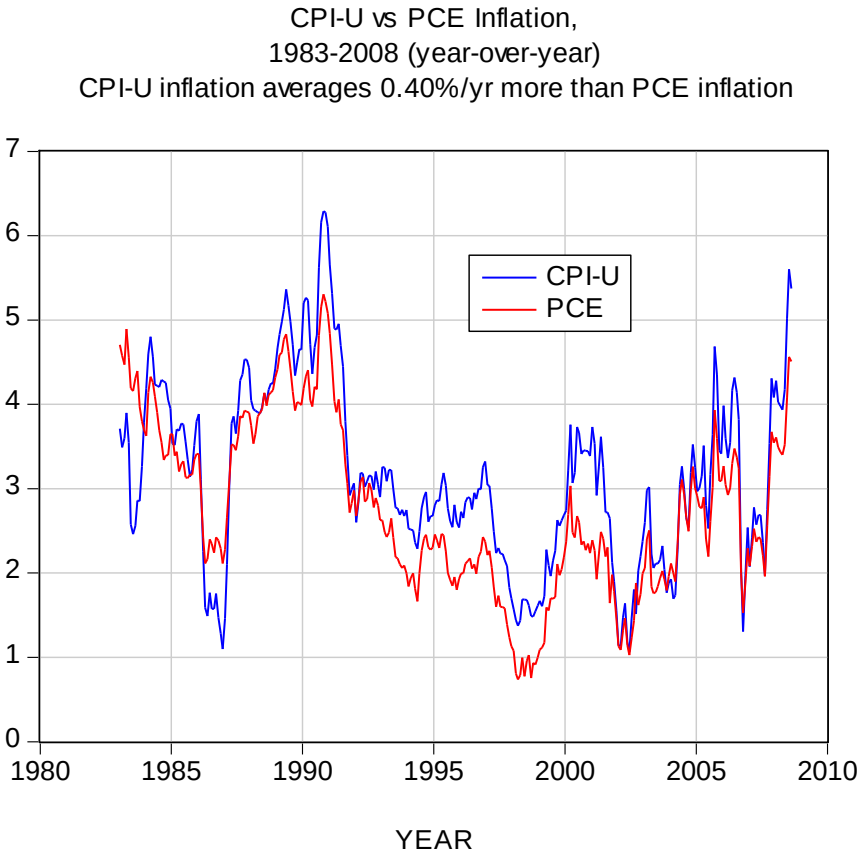
Other Price Indices (Commerce Dept.)

- GDP Deflator
  - Gross Domestic Product
  - Base Year = 2005 currently
    - was 2000, 1996, 1987, etc.
  - Quarterly, revised after first release.
- PCE Deflator
  - Personal Consumption Expendtitures
  - Base Year same as GDP Deflator
  - Monthly, revised after first release
- Producer Price Indices (PPIs)
  - Wholesale Prices
  - Base Year = 1982 currently
  - Monthly, released before CPI, but noisy.

GDP, PCE Deflators very similar to one another.
Both tell similar story to CPI-U

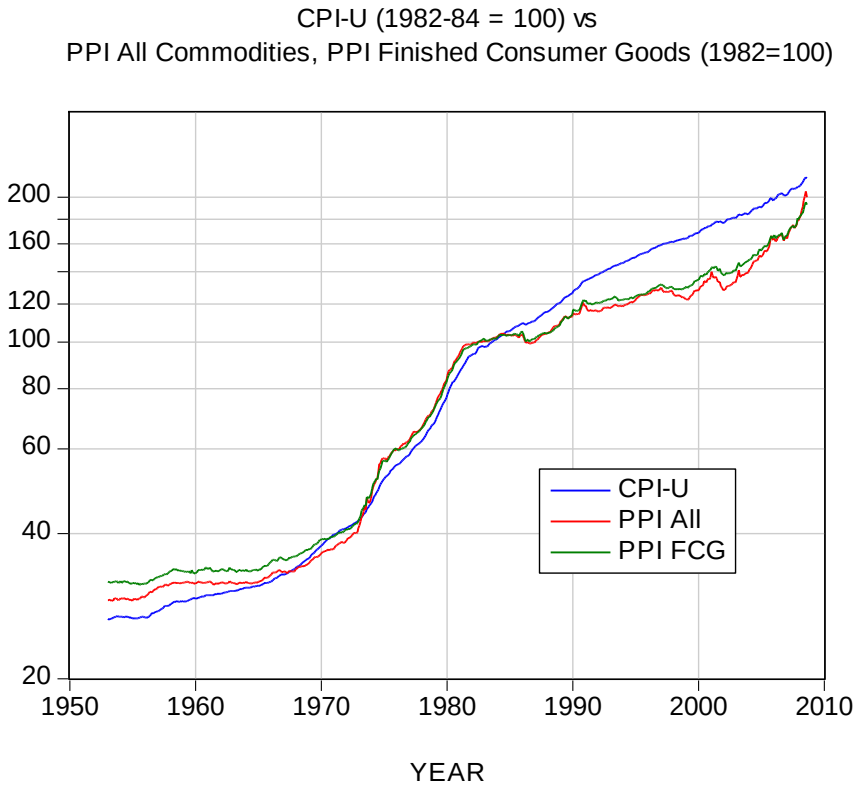


• CPI-U inflation averages **0.40%/yr more** than PCE inflation, otherwise similar, since 1983 CPI upgrade.
• Final CPI-U available on first release, **PCE must wait months or years for final version**.



$\Rightarrow$ good estimate of final PCE π is CPI π, minus 0.40%!

- PPI inflation noisy, may differ substantially from CPI-U, PCE inflation.
- PPI for Finished Consumer goods doesn't include services or retail markups that are in CPI.



Real vs. Nominal Quantities

Nominal – Current (year t) $

Real – Base year (year t_0) $

P_t = Price Index

Y_t = Nominal Income (upper case)

$y_t = Y_t \cdot P_0 / P_t$ = Real Income (lower case)

(in year t_0 $)

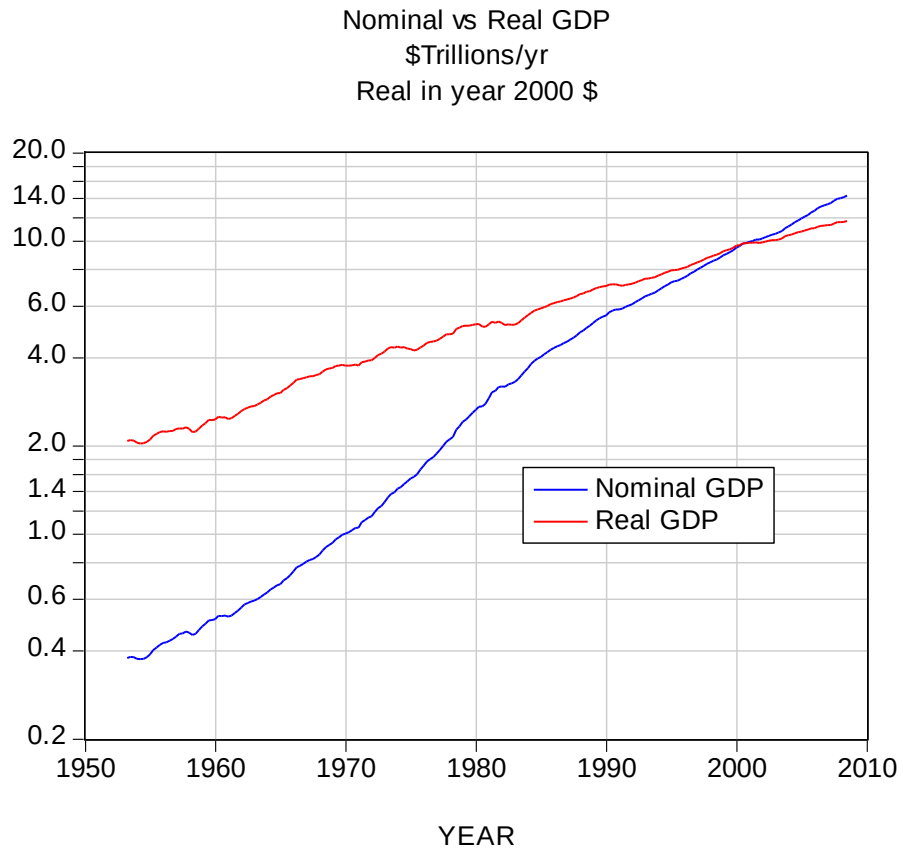
To simplify, we often take $P_0 = 1.00$. Then,

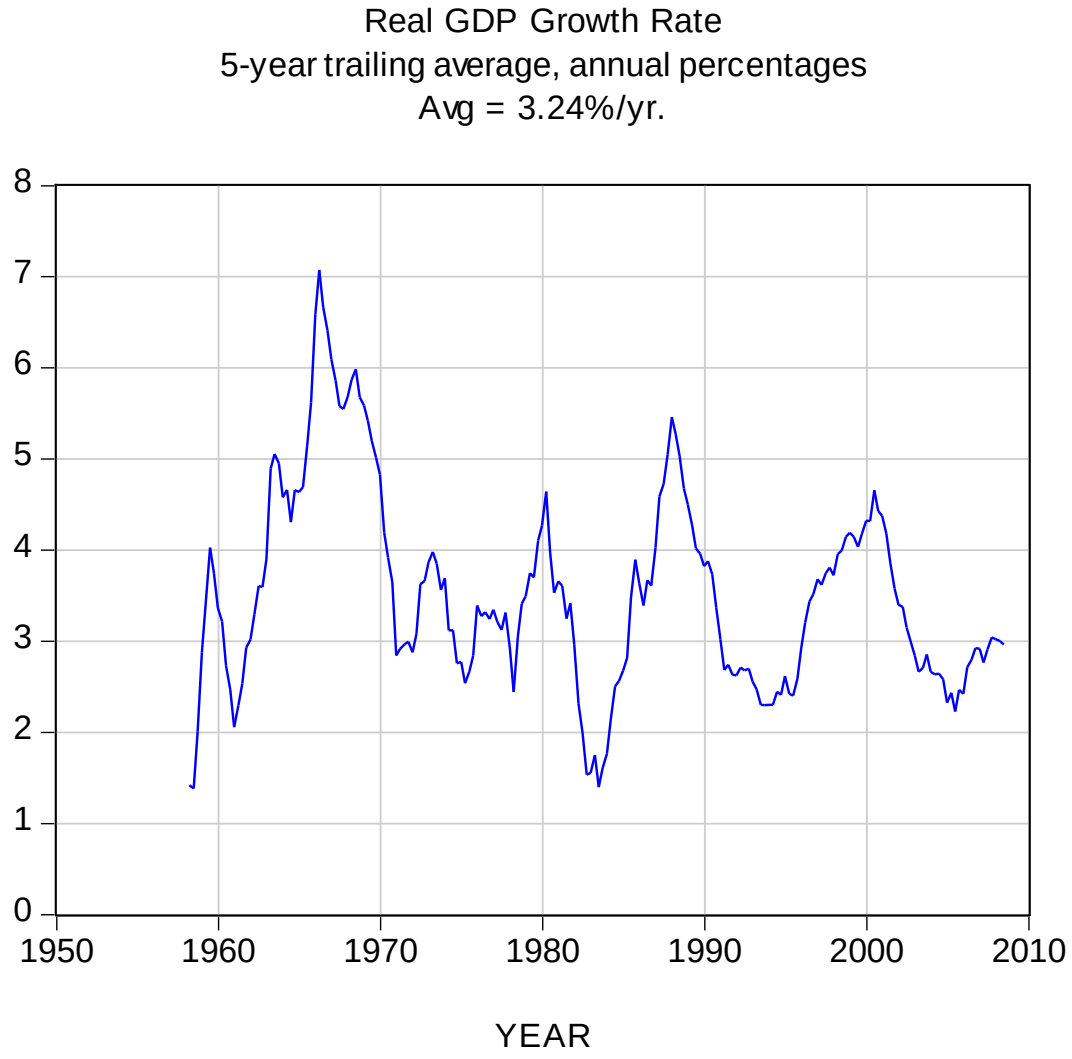
$y_t = Y_t / P_t$ or $y = Y / P$

Similarly, if M_t = Nominal Money Stock (upper case),

$m_t = M_t / P_t = M / P$ = Real Money Stock (lower case).

Most of growth in nominal income has just been inflation.
Real income usually grows fairly steadily at 2 – 4% / yr.




Real GDP Growth Rate
5-year trailing average, annual percentages
Avg = 3.24%/yr.
8
7
6
5
4
3
2
1
0
1950
1960
1970
1980
1990
2000
2010
YEAR

The Quantity Theory of Money
(M&I Ch. 2)

- M^S = Nominal M Stock
  - supplied by govt, banks
- m^D = Real M Demand
  - determined by
    - real volume of transactions using M
    - average time M held
- P* = Equilibrium P-level at which S = D:

  $M^S / P^* = m^D$ or $M^S = P^* m^D$

  $\Rightarrow$ $P^* = M^S / m^D$ QTOM
- QTOM asserts

  $P \rightarrow P^*$ in Long Run.

Implications of QTOM

$$P \rightarrow P^* = M^S / m^D$$

- If m^D constant,

  $M^S \uparrow \rightarrow P \uparrow$, $M^S \downarrow \rightarrow P \downarrow$
- If M^S constant,

  $m^D \uparrow \rightarrow P \downarrow$, $m^D \downarrow \rightarrow P \uparrow$
- If M^S, m^D $\uparrow$ or $\downarrow$ in same proportion,

  P constant.

The Ripple Effect

- Placing rock in pond raises level uniformly.
- Dropping rock in pond causes splash, ripples
  - but eventually level rises uniformly.
- M ↑ disturbs relative prices at first.
  - sellers whose P's rise before their cost of living goes up gain from π.
  - sellers whose P's rise after their cost of living goes up lose from π.

  $\Rightarrow$ Inflation induces transfer from "last in line" to "first in line"

This is one of 3 income transfers that may be caused by inflation. (more later)

Walras' Law

Budget Constraints imply

Agg D = Agg S, even at non-equil. P's.

so $D_{goods} + m^D = S_{goods} + M^S / P$,

$M^S / P - m^D = D_{goods} - S_{goods}$, or

XS S of M = XS D for Goods (XS = excess)

Implications of Walras' Law:

XS S of M = XS D for Goods

1. $\mathbf{M^S / P > m^D}$ $(P < P^* = M^S / m^D)$

   $\Rightarrow D_{goods} > S_{goods}$

   $\Rightarrow$ **P** $\uparrow$ on average until $P = P^*$

2. $\mathbf{M^S / P < m^D}$ $(P > P^* = M^S / m^D)$

   $\Rightarrow S_{goods} > D_{goods}$

   $\Rightarrow$ **P** $\downarrow$ on average until $P = P^*$

Either way, $P \rightarrow P^*$ in Long Run, per QTOM

- HW 2 due Fri 5 PM.
- Next:
  - Interest rates: nominal vs. real
  - M&B 6, 8, 19 pp. 1-3,
  - M&I 4.1, 7.1