1/26/09
Intermediate Macro
Gertler

National Income Accounting

Basic Accounting Indentity:

$$Output = Expenditure = Income$$

Can measure output using either expenditures or income.

Expenditure Approach:

$$Y = \sum_{i=1}^{n} (\frac{P_i}{P}) Y_i$$

Y = Output= Gross Domestic Product
P_i = Price of Final Good i
P= Price index

Nominal (PY) Versus Real:

$$PY = \sum_{i=1}^{n} P_i Y_i$$

Price Index:

$$P = \sum_{i=1}^{n} (\frac{Y_i}{Y}) P_i$$

Expenditure Approach by Components

$$Y = C + I + G + XM$$

C = total real consumption expenditures

= goods plus services plus consumer durables

I = investment
residential (housing) and non-residentil (software and equipment, structures, investment)

G= government expenditures on goods and service
(does not include transfer (e.g. social security, unemployment insurance.)

X= exports of goods and services

M = imports

XM = export minus imports

Table 2.1

Expenditure Approach to Measuring GDP in the United States, 2005

	Billions of dollars	Percent of GDP
Personal consumption expenditures (*C*)	8745.7	70.0
Consumer durables	1026.5	8.2
Nondurable goods	2564.4	20.5
Services	5154.9	41.3
Gross private domestic investment (*I*)	2105.0	16.9
Business fixed investment	1329.8	10.6
Nonresidential structures	335.1	2.7
Equipment and software	994.7	8.0
Residential investment	756.3	6.1
Inventory investment	18.9	0.2
Government purchases of goods and services (*G*)	2362.9	18.9
Federal	877.7	7.0
National defense	587.1	4.7
Nondefense	290.6	2.3
State and local	1485.2	11.9
Net exports (*NX*)	−726.5	−5.8
Exports	1301.2	10.4
Imports	2027.7	16.2
Total (equals GDP) (*Y*)	12487.1	100.0

Note: Numbers may not add to totals shown owing to rounding.
Source: Bureau of Economic Analysis Web site, www.bea.gov, Table 1.1.5, May 31, 2006.

Figure 1: Expenditure Approach to Measuring GDP

Figure 2: Quarterly Output Growth, 1979-1983

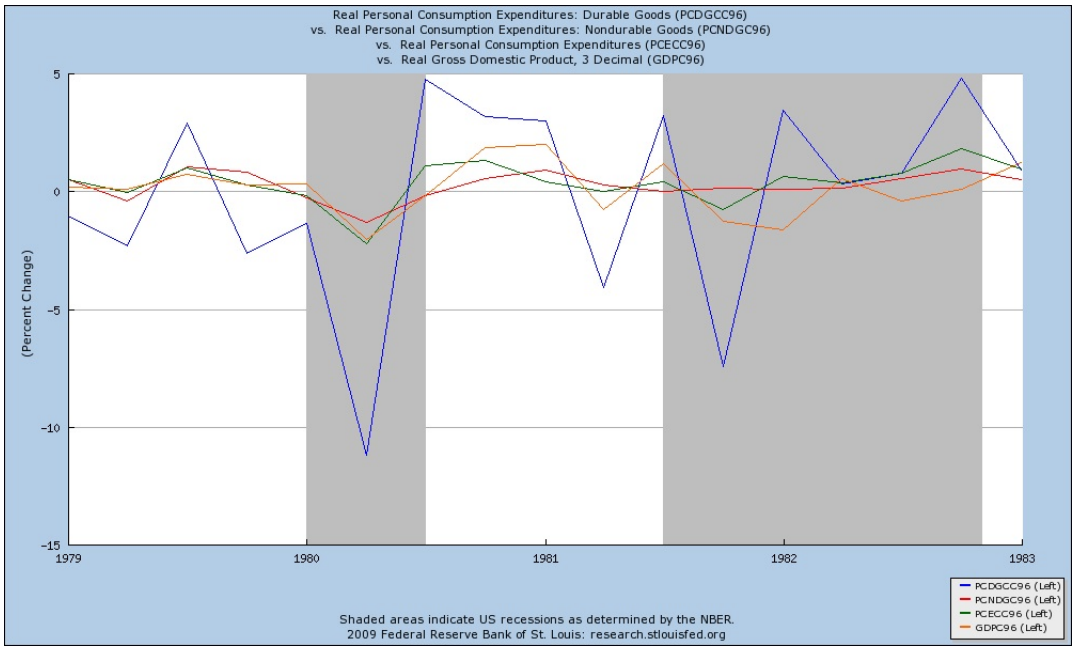

Figure 3: Consumption Expenditures(green) vs GDP (orange): Durables (blue), Nondurables (red)

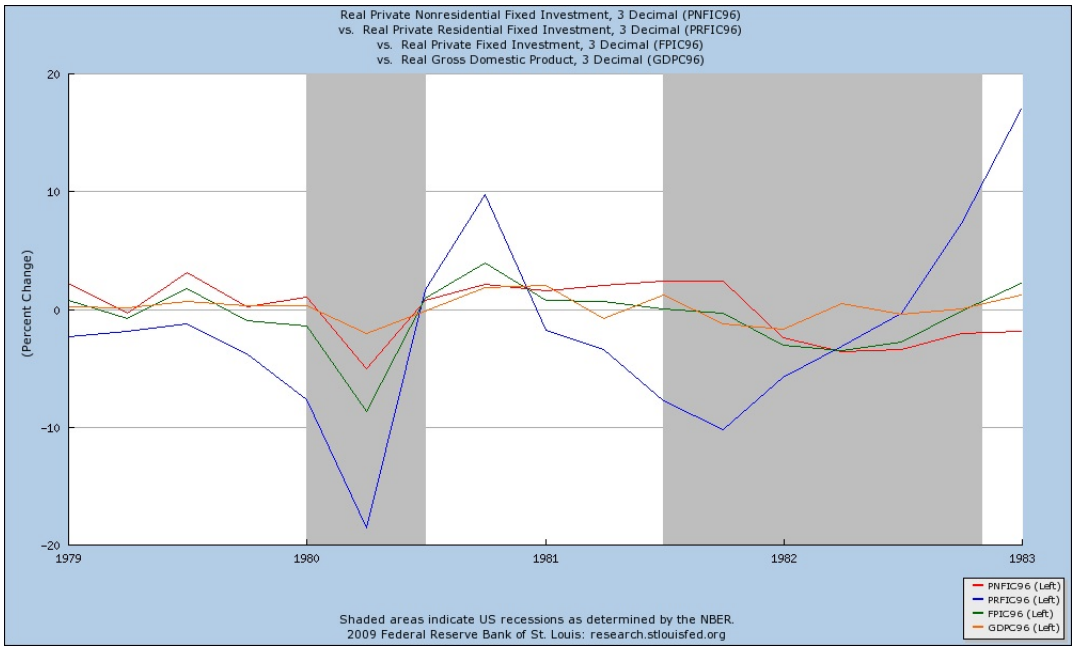

Figure 4: Investment (green) vs GDP (orange): Residential (blue), Nonresidential (red). 1979-1983

INCOME APPROACH:

MOVING FROM OUTPUT TO INCOME

$$GNP = GDP + NFP$$

GNP= Gross National Product

NFP = Net Factor Payments from Abroad

$$NNP = GNP - DEP$$

NNP = Net National Product

DEP = depreciation of capital (plant and equipment)

Net National Product equals the Net income flow available to the income

(Thus GNP equals the Gross Income flow.)

Table 2.2

Income Approach to Measuring GDP in the United States, 2005

	Billions of dollars	Percent of GDP
Compensation of employees	7113	57.0
Proprietor's income	939	7.5
Rental income of persons	73	0.6
Corporate profits	1352	10.8
Net interest	498	4.0
Taxes on production and imports	848	6.8
Business current transfer payments	80	0.6
Current surplus of government enterprises	−11	−0.1
Total (equals National Income)	10892	87.2
Plus Statistical discrepancy	55	0.4
Equals Net National Product (NNP)	10947	87.7
Plus Consumption of fixed capital	1574	12.6
Equals Gross National Product (GNP)	12521	100.3
Less Factor income received from rest of world	508	4.1
Plus Payments of factor income to rest of world	474	3.8
Equals Gross Domestic Product (GDP)	12487	100.0

Note: Numbers may not add to totals shown owing to rounding.
Source: Bureau of Economic Analysis Web site, www.bea.gov, Tables 1.7.5 and 1.12, May 31, 2006.

Figure 5: Income Approach to Meauring GDP

Private Sector vs. Gov't Income

Private Sector Income:

private (gross) disposable income=Y+NFP+TR+INT-T

Y= GDP
NFP= net factor payments from abroad
TR= tansfers (e.g unemployment insurance, social security, etc.)
INT= interest on gov't debt

Government Income:

net gov't income= T-TR-INT

Private Sector Income + Government Income = Y +NFP = Gross National Product

$$\{Y + NFP + TR + INT - T\} + \{T - TR - INT\} = Y + NFP$$

Saving and Investment

Private Saving (S_{pvt}):

$$\begin{aligned} S_{pvt} &= \text{private disposable income - consumption} \\ &= (Y + NFP - T + TR + INT) - C \end{aligned}$$

Government Saving ($S_{gov't}$):

$$\begin{aligned} S_{gov't} &= \text{net government income - government expenditures} \\ &= (T - TR - INT) - G \end{aligned}$$

Government Deficit = -($S_{gov't}$)

the government deficit is financed by government borrowing:

$$\begin{aligned} B^g - B^g_{-1} &= -(S_{gov't}) \\ &= G + INT + TR - T \end{aligned}$$

everything else equal, more government debt adds to the deficit

$$INT = rB^g_{-1}$$

$\Rightarrow$

$$B^g - B^g_{-1} = G + rB^g_{-1} + TR - T$$

eventually either expenditures or taxes must adjust

Saving and Investment (con't)

National Saving = Private Saving + Government Saving

$$\begin{aligned} S &= S_{pvt} + S_{gov't} \\ &= \{(Y + NFP - T + TR + INT) - C\} + \{(T - TR - INT) - G\} \\ &= Y + NFP - C - G \end{aligned}$$

Uses of National Saving

$$\begin{aligned} S &= C + I + G + XM + NFP - C - G \\ &= I + XM + NFP \\ &= I + CA \end{aligned}$$

CA= current account = XM+NFP = net change in foreign assets

Uses of Private Saving:

$$S_{pvt} + S_{gov't} = I + CA$$

$\Rightarrow$

$$S_{pvt} = I + CA \ + (-S_{gov't})$$

Thus, holding constant S_{pvt}, a rise in the gov't budget decificit must reduce $I + CA$.

HOWEVER, WE CAN'T NECESSARILY ASSUME THAT S_{pvt} WILL STAY CONSTANT.

WE NEED AN ECONOMIC MODEL TO ANALYZE THIS

Saving Versus Wealth

$$S = I + CA$$

$$NW = QK + NFA$$

NW = National Wealth
QK= Value of capital Stock (Q equals Price, K is quantity)
NFA = Net foreign asset position.

$$NW - NW_{-1} = S + (Q - Q_{-1})K$$

$(Q - Q_{-1})K$ = capital gains

Note that capital gains have had an important effect on national wealth over the past decade

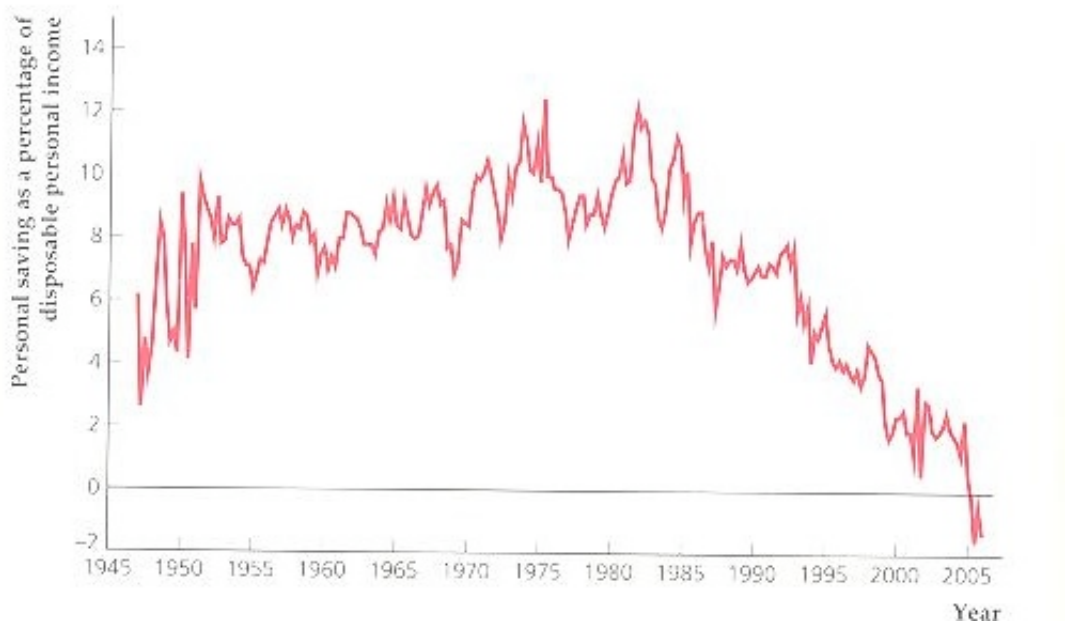

Figure 6: Personal Saving Rate, 1947-2006

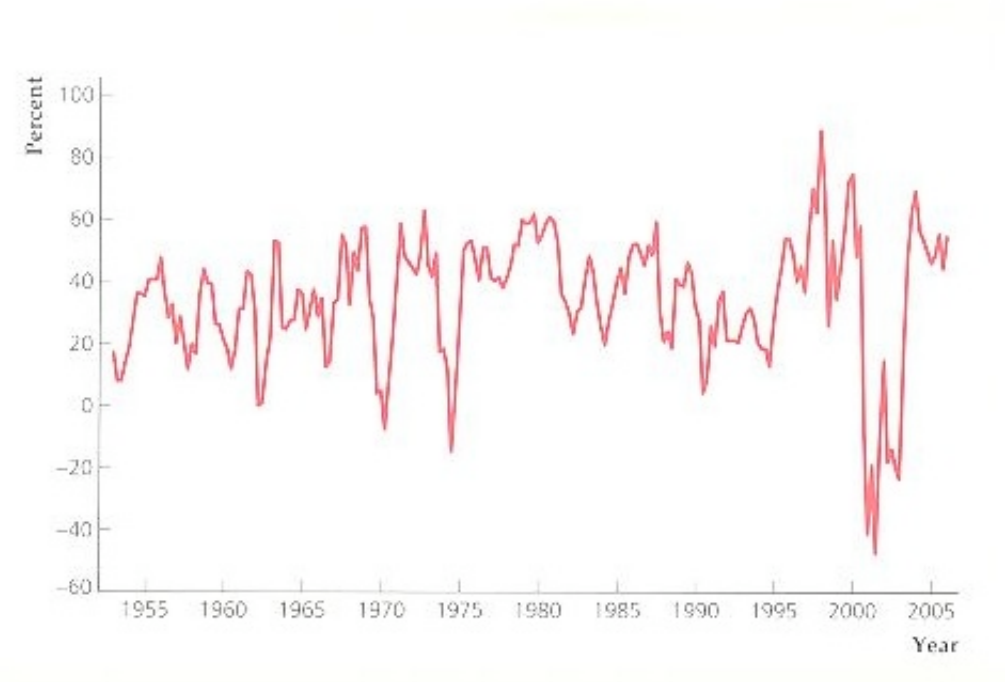

Figure 7: Annual Change in net worth divided by disposable personal income

Computing Real GDP in Practice:

In theory:

$$Y = \sum_{i=1}^{n} (\frac{P_i}{P}) Y_i$$

$$P = \sum_{i=1}^{n} (\frac{Y_i}{Y}) P_i$$

Problem: Comparisions across years difficult is weights ($\frac{Y_i}{Y}$) differ.

In practice:

$$P^d = \{[\sum_{i=1}^{n} (\frac{Y_i}{Y})^b P_i] / [\sum_{i=1}^{n} (\frac{Y_i}{Y})^b P_i^b\} x100$$

P^d=GDP deflator
superscript b refers to a base year.

Real GDP:

$$\begin{aligned} Y &= \text{Nominal GDP/(GDPdeflator/100)} \\ &= (\sum_{i=1}^{n} P_i Y_i) / (P^d/100) \end{aligned}$$

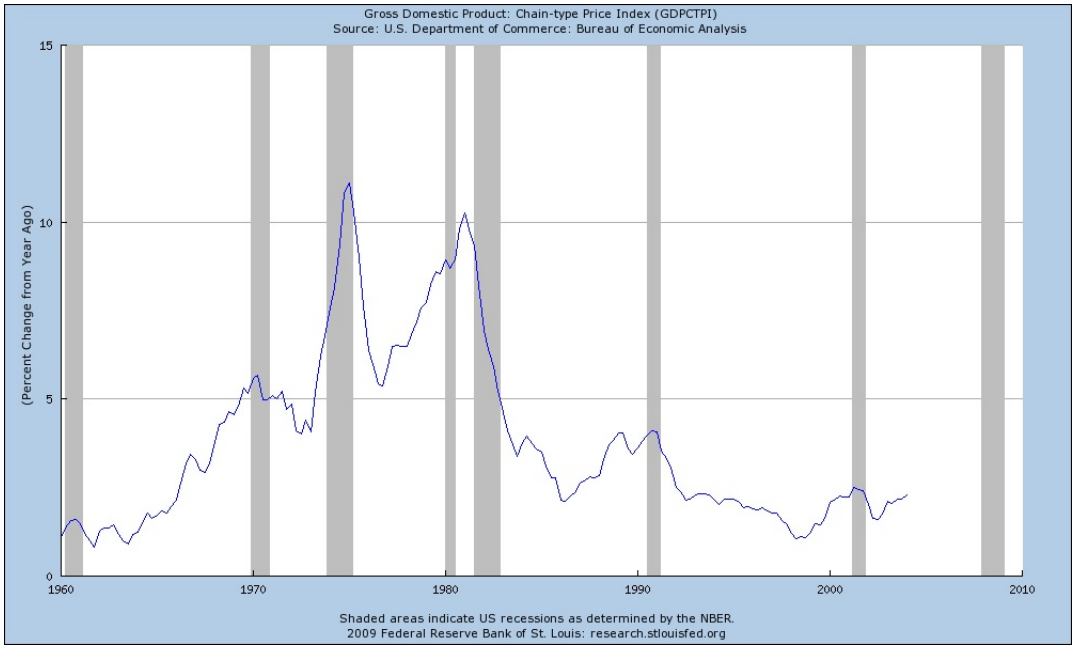

Figure 8: The inflation rate in the US

Nominal Interest Rates, Real Interest Rates and Inflation

Interest Rate: Rate of return promised by a borrower to a lender

Nominal Interest Rate (i) : The rate of return in dollars

Real Interest Rate (r) : The rate of return in purchasing power:

Inflation Rate π_{+1}: percent change in the price level.$= \frac{P_{+1}}{P} - 1$

Fisher Identity (named after Irving Fisher of Yale):

real rate = nominal rate minus inflation

$$\begin{aligned} 1 + r &= (1 + i) \cdot (\frac{P}{P_{+1}}) \\ r &= (1 + i) \cdot (\frac{P}{P_{+1}}) - 1 \\ &\approx i - \pi_{+1} \end{aligned}$$

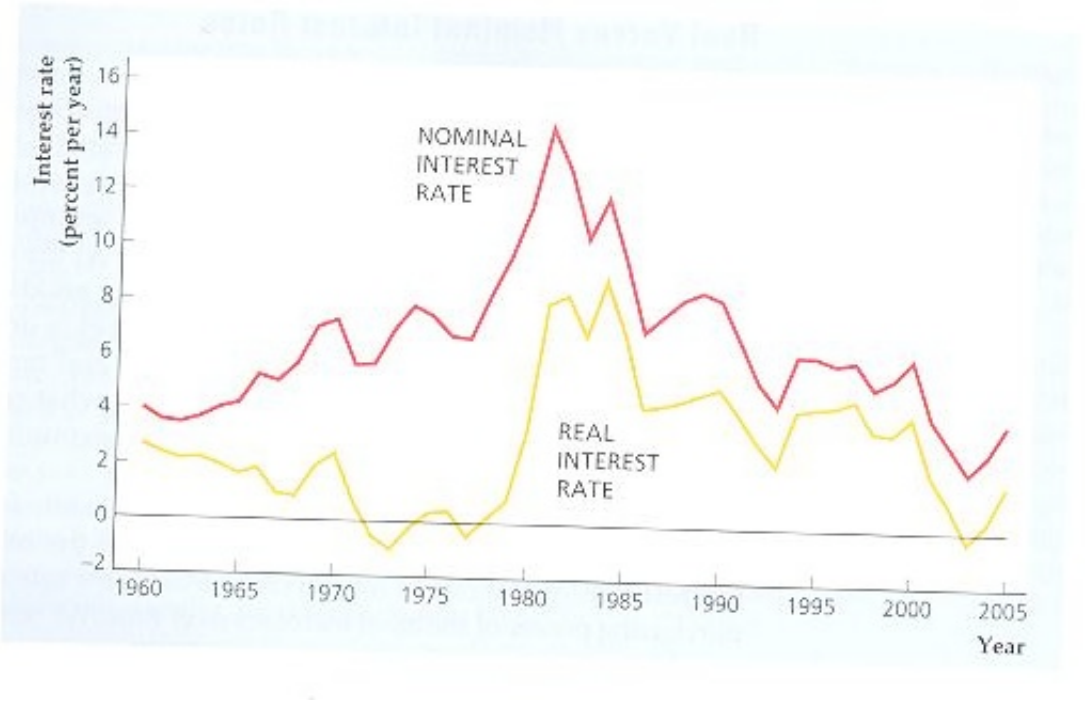

Figure 9: Nominal and Real interest rates in the US