Macroeconomics

Output Gaps, Unemployment & Inflation

Measuring Unemployment Rate

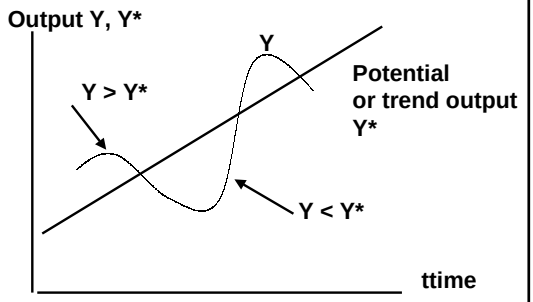
Measuring Inflation

Potential Output & Output Gaps

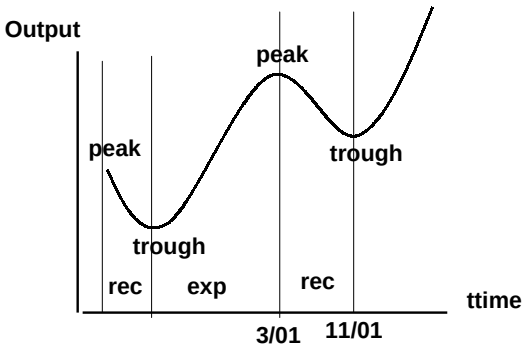
- Potential Output: Output produced when
- economy uses capital and labor at normal
- rates (near full capacity)

- Think of it as the economy has some long
- run rising path of potential output. In the
- short run there are deviations from potential

Potential Output & SR Output Gaps



Recessions (Latest NBER Announcement)



Calling Recessions

- Last week National Bureau of Economic Research announced that the recent recession ended in November 2001 (recession trough). Policy makers rely on NBER to make these judgments.
- Hard call since 1 million jobs have been lost since November 2001 and unemployment rate risen from 5.6%
- to 6.4%
- Committee observes real GDP. It now is 3.3% above pre-recession peak & 4% above trough. Personal income, manufacturing, wholesale, retail sales also above pre-recession peak.

SR Output Gaps: Why They Matter

- Output Gap= Potential Output -Actual Output
  »= Y* - Y
- Y* - Y > 0 positive output gap called recessionary gap
- Y* - Y < 0 negative output gap called expansionary gap

Output Gaps: Why They Matter

- Y* - Y > 0 recessionary gap
- unemployment rate high (above normal)
- economy incurs costs of unemployment
- Y* - Y < 0 expansionary gap
- inflation can be high
- economy incurs costs of inflation
-

Output Gaps: Why They Occur

- Main Reason: Fluctuations in Spending
- Tale of Al's Ice Cream Parlor
- Hot day, demand increases, meet demand at set prices, increase output, use resources at max or higher capacity
- Eventually increase prices, quantity demanded falls , output falls back to potential

Output Gaps: Why They Matter

- Y* - Y > 0 recessionary gap, unemployment more than "normal"
- Natural (or normal) Unemployment
- Structural : outmoded skills, declining industry
- Frictional: due to search process, right match

Okun's Law

- Cyclical Unemployment
- Actual unemployment rate= u
- Natural unemployment rate = u*
- Cyclical unemployment rate = u - u*
- Recessionary Gap: u - u* > 0 (extra high)
- Expansionary Gap: u - u* < 0 (extra low)

Okun's Law

- (Based on Empirical Observation)
- Output Gap = Y* - Y
- Cyclical unemployment rate = u - u*
- Every 1 % rise in cyclical unemployment
- associated with rise in output gap that is 2% of potential output

Okun's Law

- **Every 1 % rise in cyclical unemployment associated with rise in output gap that is 2% of potential output**
- **eg. Y*=100B**
- **u-u* = 1.5%** , then
- Y*-Y = 3% x Y* = 0.03x100B=**3B, rec gap**
- **u-u* = -2.5%** , then
- Y*- Y=5%xY* = -0.05x100B**=-5B, exp gap**

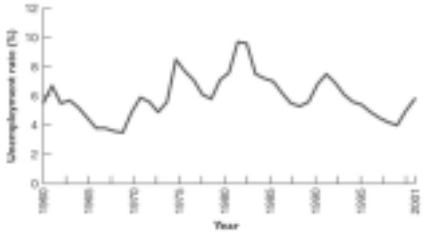
Economic Costs of Gaps

- Recessionary Gap: extra high unemployment, lost output
- Lost Output: eg from earlier example, output gap=3B. Suppose population is 1M. Means loss of $3000 each.
- Additional costs: costs of unemployment
-
- Expansionary Gap: "extra high inflation" (as opposed to steady, expected inflation)
- costs of inflation (unexpected inflation, ie unexpectedly high inflation)

Unemployment

- **Current U.S. Unemployment Situation**
- **2.5 Million jobs lost since March 2001 (peak)**
- **1 Millions Jobs lost since November 2001 (trough)**
- **Unemployment Rate = 6.4%**
- **natural rate = 5.2%**
- **Situation varies by state**

The U.S. Unemployment Rate since 1960



Measuring Unemployment

- Working Age Population: Age 16 and over
- Labor Force: employed or unemployed among working age population, exclude full-time student, retirees, military
- Participation Rate = LF ÷ Wkg Age Pop

Measuring Unemployment

- Among age 16 and over in survey
- Unemployed = did not work past week & actively sought work some time in past 4 wk
- Employed = worked full/partime in past wk
-
- Unemployment Rate = Unemployed ÷ LF

Unemployment

- 1) Larry (age 26) was fired 2 months ago, looked for job for 7 weeks, gave up 1 week ago.
- 2) Barry (age 45) was fired 5 weeks ago. Has not looked for a job. Did consulting work during the past week.
- 3) Data at www.bls.gov (1000s)
- **Civilian Labor Force= 147,096**
- **Employed = 137,738**
- **Unemployed = 9,358**
- **Not in Labor Force = 73,918**
- **PR = UR =**

Unemployment

- Imperfect Measure:
- does not count those who are discouraged (so understates true rate)
- counts those who work part-time (so overstates "employment" and understates true unemployment rate)
- Costs of Unemployment
- psychological damage and social stigma
- underutilized resource, so output could be more

Measuring Inflation

- **Use Price Index**
- **Many price indexes available: CPI , PPI, CPI (excl food/energy), WPI**
- **We consider most commonly used: CPI**
- **CPI = Consumer Price Index**

Consumer Price Index

- Bureau of Labor Statistics (BLS)
  - Base year
  - Base-year basket of goods and services
  - Measure prices in current & base-year basket

$$CPI = \frac{\text{Cost of base - year basket of goods and services in current year}}{\text{Cost of base - year basket of goods and services in base year}}$$

CPI Measures Change in Cost of Living

Hypothetical CPI

Item	Cost (2000)	Cost (1995)
Rent, two-bedroom apartment	$630	$500
Hamburgers (60 at $2.00 each)	150	120
Movie tickets (10 at $6.00 each)	70	60
Total expenditure	$850	$680

- **Base year basket of goods = 2BR apt, 60 burgers, 10 tickets**
- **CPI (2000) = $850/$680 = 1.25**
- **CPI (1995) = 1.00 (ALWAYS IN BASE YEAR)**

- **Cost of living increased by 25% from 1995 to 2000**

Inflation

- Price Index (like CPI)
  - Measures the average *level* of prices relative to prices in the base year
- Inflation Rate
  - Rate of change in average price level over time
  - Deflation = negative inflation rate

Calculating Inflation Rates 1930-31 & 1973-74

Year	CPI
1930	0.167
1931	0.152
...	...
1973	0.444
1974	0.493

$$\text{Inflation rate: 1930 - '31} = \frac{0.152 - 0.167}{0.167} = -0.090 \times 100 = -9.0\%$$

$$\text{Inflation rate: 1973 - '74} = \frac{0.493 - 0.444}{0.444} = 0.110 \times 100 = 11.0\%$$

Adjusting for Inflation

Why: to make comparisons over time
to set level of salary/payment adjustments

- How: Deflate Nominal Quantity
  - Divide nominal quantity by price index to express the quantity in real terms
  - eg. Income, wage,

Adjusting for Inflation

- Example: Top Baseball Players
  - 1930 Babe Ruth's salary = $80,000
  - 1998 Mark McGwire's salary = $8.3 million
  - CPI (1982 - 84 = 100)
    - CPI 1930 = 0.167
    - CPI 1998 = 1.64
    - Real Salary:
    - BR $ 80,000 / 0.167 = $479,000
    - MM $ 8,300,000 / 1.64 = $5,060,000
    - Nominal Terms: about 100 times more
    - Real Terms: Only about 10 times more!!

Adjusting for Inflation

- Indexing
  - Rule to increase nominal quantity each period by some percentage increase in a specified price index
  - Enables stable purchasing power

Adjusting for Inflation

Example: indexed labor contract , Year 1 wage = $12/hr

CPI Year 1 = 1.00 & CPI Year 2 = 1.05

Method 1: Contract specifies real wage to increase 2 percent each year

Year 2 Real Wage = 1.02 x Year 1 Real Wage

w / 1.05 = (12 / 1) x 1.02 = 12.24,

w = 1.05 x 12.24 = 12.85 is Year 2 wage

Method 2: Contract specifies wage to increase by 2% of CPI

Year 2 wage = 1.02 x 1.05 x 12 = 12.85

Adjusting for Inflation

- Every few years there is a well-publicized battle in Congress over whether the minimum wage should be raised.
- Why do these heated debates recur so regularly?

CPI: Imperfect Measure of Inflation

- Quality adjustment Bias
- Substitution Bias
- Boskin Commission: CPI overstates inflation by 1 to 2 percent/year
- 1) Excessive increase in indexed payments
- 2) Understates true rise in standard of living
- (from overstating rise in cost of living)

Costs of Inflation

- Noise in price system
- Unexpected Redistribution of Wealth
  - borrower & lender
  - employer & employee
- Long run planning difficult (retirees, firms)
- Distorts tax system : nominal income tax brackets

Avoiding Costs of Inflation: Lenders & Borrowers

Lenders set nominal rates so as to avoid unexpected costs of inflation

They decide on an acceptable real rate r

Set nominal interest rate so that

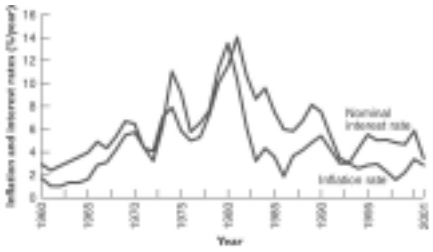
real rate = nominal rate - inflation rate

$r = i - \pi$

Avoiding Costs of Inflation

- Fisher-Effect: Tendency for nominal interest rates to be high when inflation is high and low when inflation is low
- Lenders try to set nominal interest rates are being set to try to avoid unexpected redistribution of wealth

Inflation and Interest Rates in the United States, 1960 - 2001



Avoiding Costs of Inflation

- Cousin Martha lends $1000 to Pudge for 1 year
- Agree real interest = 2%
- Expect annual inflation rate = 10%
- What interest rate does Martha ask for?

Summary

Short run output gaps occur due to fluctuations in demand. Recessionary gaps are costly due to high unemployment and lost output. Expansionary gaps can be costly due to high inflation

Measurement of unemployment and inflation rates help to monitor state of macroeconomy

Indexing of labor contracts and transfer payments and making decisions with real interest rates helps to overcome costs of inflation

National Savings, Investment, International Capital Inflows

Standards of living rise with APL

Physical capital increases APL

Financial Institutions mobilize saving so that firms can purchase physical capital

Well-functioning Financial System

Key to Rising Standard of Living (growth)

1) High rates of national saving
2) National savings allocated to most productive investments

Efficient financial system Improves the allocation of savings

1) Provides information
2) Helps savers share the risk

Savings & Investment

Saving = Current income minus spending on current needs

Saving Rate = Saving divided by income

Investment = creation of new capital goods and housing

Savings & Investment

Investment Spending Decision

Compare benefit or value of marginal product to the cost of the investment

Savings Decision

Life-cycle, Precautionary, Bequest motives, Demonstration effect, Self-control. See notes.

Saving, Investment, and Financial Markets

Supply of Savings (S)

Quantity supplied (of saved funds) is positively related to the real interest rate (*r*)

Demand for Saving (I)

Quantity demanded (for investment) is negatively related to *r.*

National Saving

Real income or expenditures (*Y*)

$Y = C + I + G + NX$

For now, take $NX = 0$

$Y = C + I + G$

Saving = *Y* - spending on current needs

National Saving: Current Needs

I = spending on capital goods and residential housing

Assume *C* and *G* are current need expenditures

C includes durable goods which may be current and future needs

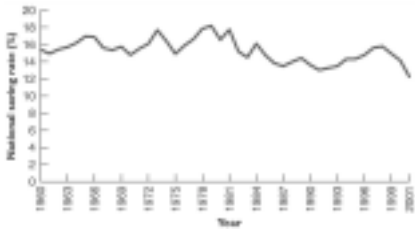
G may also include current and future needs

National Saving

National Saving (S) = Y - C - G

National Saving Rate = S ÷ Y

U.S. National Saving Rate 1960 - 2001



National Saving: Private & Public

S = Y - C - G

T (net taxes) = tax - (transfer + interest)

S = Y - C - G + T - T
S = (Y - T - C) + (T - G)
Private saving = $S_{private}$ = Y - T - C
Public saving = S_{public} = T - G

National Saving: Private & Public

S = (Y - T - C) + (T - G)
S = $S_{private}$ + S_{public}

$S_{private}$ =Y - T - C

Household (personal) saving
Business saving

S_{public} = T - G

Includes Federal, State , Local

Public Saving: Budget Deficit & Surplus

Government Budget Deficit
excess of spending over tax revenue **(G - T)**

Government Budget Surplus
excess of tax revenue over spending **(T - G)**
budget surplus = public saving

Public Saving: 1995 & 2000

$S_{public} = T - G$

2000

Federal:	218.5 = 2,046.8 - 1,828.3
State & local:	32.8 = 1,222.6 - 1,189.8
S_{public} =	**251.3 = 3,269.4 - 2,018.1**

1995

Federal:	-174.4 = 1,460.3 - 1,634.7
State & local:	111.7 = 997.7 - 886.0
S_{public} =	**-62.7 = 2,458.0 - 2520.7**

What do you expect for 2003?

The Three Components of National Saving, 1960- 2001

Investment Decision

Costs

Real interest rate r (opportunity cost)

Price of capital goods

Benefits

Value of marginal product

Influenced by the relative price of the good or service produced by the capital

Saving, Investment, and Financial Markets

Supply of Savings (S)

Quantity supplied (of saved funds) is positively related to the real interest rate (*r*)

Demand for Saving (I)

Quantity demanded (for investment) is negatively related to *r.*

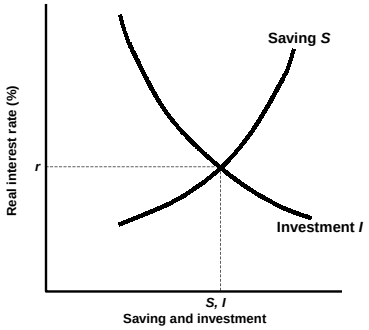
Market for Savings Funds

Market determines equilibrium **r.**

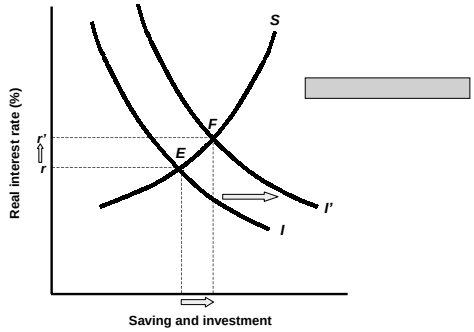
If *r* above equilibrium, get surplus of savings

If *r* below equilibrium, get shortage of savings.

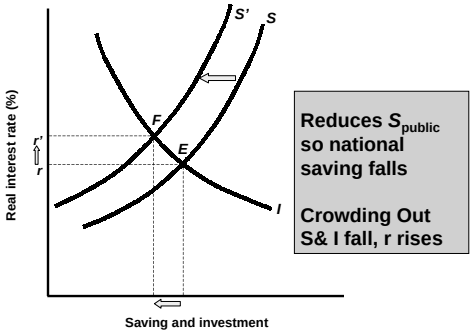
The Supply and Demand For Savings



Effect of a New Technology



Effects of An Increase in the Government Budget Deficit



International Capital Flows

A country with greater investment opportunities than savings can fill the savings gap by borrowing from abroad.

International capital flows allow countries to run trade imbalances.

International Capital Flows

International Capital Flows
- Purchases or sales of real and financial assets across international borders

Capital Inflows
- Purchases of domestic assets by foreign households and firms

Capital Outflows
- Purchases of foreign assets by domestic households and firms

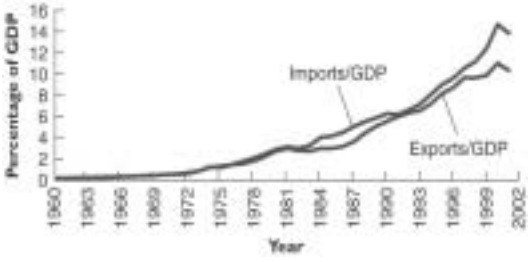
International Capital Flows

Trade Balance (or net exports)
- The value of a country's exports less the value of its imports in a particular time period

Trade Surplus : exports exceed imports

Trade Deficit: imports exceed exports,

The U.S. Trade Balance 1960 - 2001



Trade has become increasingly important
Since the 1970s, the U.S. has run trade deficits

International Capital Flows

Net Capital Flows

Difference between purchases of domestic assets by foreigners and the purchase of foreign assets by domestic residents

International Capital Flows

Capital Flows and the Balance of Trade

NX = trade balance (net exports)
KI = net capital inflows
NX + *KI* = 0

KI > 0 Net Capital Inflow
KI < 0 Net Capital Outflow

NX + KI = 0

U.S. resident buys a $20,000 Japanese automobile

The Japanese car manufacturer receives $20,000 and can buy $20,000 of U.S. goods

U.S. exports = imports
NX = 20,000 - 20000 = 0 and KI = 0
NX + KI = 0

International Capital Flows

The Japanese car manufacturer has $20,000 and can buy U.S. assets (land, bond, etc.)

NX = -$20,000
Capital inflow = *KI* = $20,000
NX (-$20,000) + *KI* ($20,000) = 0

Note: Japanese Manufacturer could have bought other country's good or asset, get same result

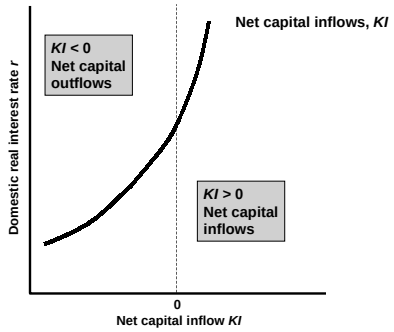
International Capital Flows Determinants

Real interest rate

High domestic real interest rates will cause net capital inflows.

Low domestic real interest rates will cause net capital outflows.

Net Capital Inflows and The Real Interest Rate

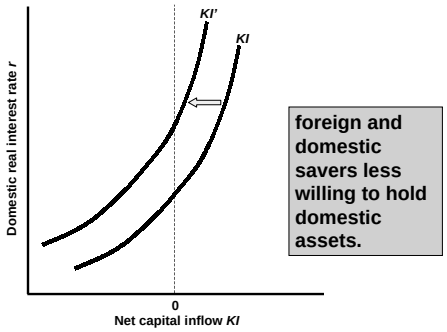


International Capital Flows

Risk

For a given real interest rate, an increase in riskiness in domestic assets will reduce net capital inflows and vice versa

An Increase In Risk Reduces Net Capital Inflows



Saving, Investment, and Capital Inflows
S + KI = I

Y = C + I + G + NX

Subtract C + G + NX from both sides

Y - C - G - NX = I

National saving (S) = Y - C - G

NX + KI = 0; so, KI = -NX

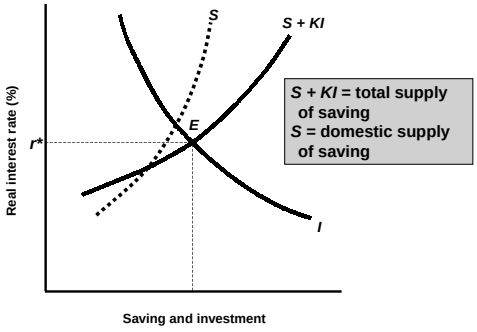
Substitute S for Y - C - G & KI for -NX

S + KI = I

S + KI = I

The pool of saving available for domestic investment includes national savings and the funds from savers abroad.

The Saving-Investment Diagram For An Open Economy



S & I & KI

A country that attracts foreign capital will have lower real interest and higher investment.

Countries with a stable political environment and well defined property rights will attract more foreign capital.

Saving Rate and the Trade Deficit

A low rate of national saving is the primary cause of trade deficits.

Saving Rate and the Trade Deficit

Y = C + I + G + NX

Subtracting C + I + G from both sides

Y - C - I - G = NX
S = Y - C - G
S - I = NX

S - I = NX

Low national saving: high C & G

High rates of spending: NX low
- Increase imports.
- Decrease exports.

(Likewise, high S means NX high)

Low national saving will also increase capital inflows.
- High spending creates investment opportunities
- Shortage of domestic saving will occur
- Real interest rates will rise
- Capital inflows will occur

International Capital Flows

Why is the U.S. trade deficit so large?

Is the U.S. trade deficit a problem?

National Saving, Investment, and the Trade Balance in the U.S., 1960 - 2001

Summary

National savings (sum of business, consumers & government) is necessary for capital formation

Savings can be supplemented by international capital flows

However, in the latter case the country is ultimately obligated to pay return to foreigners