

INFLATION AND UNEMPLOYMENT

Inflation: continued (sustained) increase in the general level of prices

Deflation: continued fall in general price level
versus

Inflationary: one-time/non-continual rise in prices

Ex: oil price “shock,” wage increases above productivity growth, or rising raw material prices

- one time shift in supply for these: P_e rises to new level then remains there

Disinflation: slowing rate of overall inflation

Measurement of Inflation/Deflation

- percent change in a price index
- **Core Inflation**: inflation when food and energy prices are excluded. This is *less* volatile than overall inflation

CPI: Consumer Price Index - released monthly
To get average price level - *doesn't* use simple average

Ex: if two goods with prices P_1 and P_2 , CPI is not $(P_1 + P_2)/2$ - this assumes equal “weights”

- if Good 1 more important than Good 2, to give greater weight to Good 1, use *Quantity* as weight

- when weight price with quantity get expenditure:

P_1Q_1 = expenditure on Good 1

P_2Q_2 = expenditure on Good 2

Total Expenditure: $P_1Q_1 + P_2Q_2$

Solve problem by using Q's as weights, but:

- whose spending patterns do these reflect?
- which time period for Q's, current or base period?

Develop price index to compare purchasing power through time \Rightarrow need a basis for comparison

- base period or base year

Answer to these for the CPI:

Who? All urban persons (CPI-U) or urban wage earners and clerical workers (CPI-W)

When? Base period quantities only

\Rightarrow **Fixed Weight Index** (a serious problem for it)

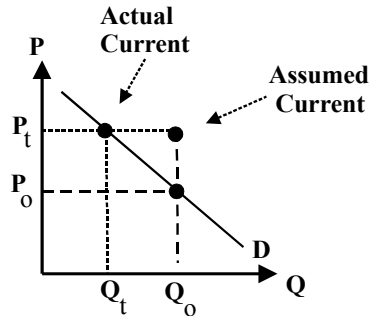
What is the base period? Until recently, 1982-1984

Now, updated to **1993-1995** (dated, though!)

- as spending patterns have changed, this has *not* entirely been reflected in the CPI

What does the CPI assume about demand?

- using constant (fixed) weights, assumes Q's don't change, even when prices do



D_{cpi} - vertical (i.e., perfectly inelastic)

- does not allow for commodity substitution (this is called **substitution bias**)

CPI MAJOR CATEGORIES:

FOOD AND BEVERAGES (breakfast cereal, milk, coffee, chicken, wine, full service meals and snacks);

HOUSING (rent of primary residence, owners' equivalent rent, fuel oil, bedroom furniture);

APPAREL (men's shirts and sweaters, women's dresses, jewelry);

TRANSPORTATION (new vehicles, airline fares, gasoline, motor vehicle insurance);

MEDICAL CARE (prescription drugs and medical supplies, physicians' services, eyeglasses and eye care, hospital services);

RECREATION (televisions, cable television, pets and pet products, sports equipment, admissions);

EDUCATION AND COMMUNICATION (college tuition, postage, telephone services, computer software and accessories);

OTHER GOODS AND SERVICES (tobacco and smoking products, haircuts and other personal services, funeral expenses).

Interpretation of CPI Values

If CPI = 105 \Rightarrow what cost \$100 in base period now costs \$105 (Value is always 100 in base period)

Media: this indicates a 5% inflation rate

- true, BUT *for base year Q's only*

CPI - problematic measure of inflation

(1) When inflation is rising, the CPI tends to *OVER*state inflation

CPI is used as Cost of Living Aadjustment (COLA) for Social Security and collective bargaining wages

- its overstatement of inflation potentially adds billions of \$ in government spending each year

Result: government: update the CPI base period

- Future COLA's for Social Security - less
- Smaller future growth in government spending

(2) CPI - not able to control adequately for quality improvements

(3) CPI - does not handle the introduction of *new* products (ex: prescription drugs) since old Q's

(4) CPI - does not accurately measure inflation for population sub-groups (ex: elderly, poor, non-urban)

Application

Health Care Inflation Measurement

- based on CPI component for Health Care

Belief: medical inflation exceeds overall inflation

BUT - it overlooks quality changes (large) and new prescription drugs

\Rightarrow more complicated issue than it appears

FORMULAS

CPI and components used to calculate real values

$$\text{Real } \underline{X} = (\text{Nominal } \underline{X} / \text{Price Index}) \times 100$$

\underline{X} = dollar denominated variable (ex: income)

$$\text{Growth in } \underline{X} = (\Delta \underline{X} / \underline{X}) \times 100$$

- use to calculate real growth or inflation rates
- denominator always uses earlier of two values

Change of Base Year: divide original CPI values by (single) value for new desired base year then multiply by 100

APPLICATIONS

Calculating Inflation Rates and Real Earnings

	CPI (1982-84=100)	Avg Wkly Earn* (\$)
1998	163.0	\$442.19
1999	166.6	\$456.78
2000	172.2	\$474.03

*US average weekly earnings of production workers

Inflation Rates:

$$1999: ((166.6 - 163.0)/163.0) \times 100 = \underline{2.2\%}$$

$$2000: ((172.2 - 166.6)/166.6) \times 100 = \underline{3.4\%}$$

Real Income:

$$1999: (\$456.78/166.6) \times 100 = \underline{\$274.18}$$

$$2000: (\$474.03/172.2) \times 100 = \underline{\$275.28}$$

$$\underline{2000 Growth}: ((275.28-274.18)/274.18) \times 100 = \underline{+0.4\%}$$

Since base is year very old, we get “strange” real values. To make this more intuitive, change base year to first year in table (1998) (note: in base year, nominal X = real X, making comparisons easier)

(1) Change Base Year

	CPI (1982-84=100)	CPI (1998 = 100)
1998	<u>163.0</u>	$= (163.0/163.0) \times 100 = \mathbf{100.0}$
1999	166.6	$= (166.6/163.0) \times 100 = \mathbf{102.2}$
2000	172.2	$= (172.2/163.0) \times 100 = \mathbf{105.6}$

(2) Recalculate Real Income using 1998 base year

	CPI (1998=100)	Avg Wkly Earn (\$)
1998	100.0	\$442.19
1999	102.2	\$456.78
2000	105.6	\$474.03

$$\mathbf{1998}: (\$442.19/100.0) \times 100 = \underline{\$442.19}$$

$$\mathbf{1999}: (\$456.78/102.2) \times 100 = \underline{\$446.97}$$

$$\mathbf{2000}: (\$474.03/105.6) \times 100 = \underline{\$448.89}$$

$$\underline{\mathbf{2000 Growth}}: ((275.28-274.18)/274.18) \times 100 = \underline{+0.4\%}$$

- In 1998, the base year, nominal and real income are identical, which makes changes easier to see since starting from actual value in 1998
- Real income growth does *not* change with a different base year

Q: The CPI for 1980 is 82.4. If your allowance in 1980 was \$1/week, how should it have been in 2000 to keep purchasing power constant? (hint: use data in table above)

Q: The minimum wage has remained unchanged at its current level for several years. Why are firms now having great difficulty finding persons to work at this wage rate?

A: While the *nominal* minimum wage has not changed, labor supply decisions take the cost of living into account. The *real* minimum wage is thus relevant for labor supply. Even though the minimum wage has not changed, inflation has, causing the real minimum wage to decline each year.

$\% \Delta \text{Real Min Wage} \approx \% \Delta \text{Nominal Min Wage} - \text{Inflation}$
 $\Rightarrow \% \Delta \text{Real Min Wage} = - \text{Rate of Inflation}$

Rule: If a nominal value remains constant through time, its real value falls each year by the rate of inflation

So, if you don't get a pay raise, you are NOT as well off as before. Your real income has declined by the rate of inflation over that period.

Q: How can I determine my real income (or hourly wage) through time?

A: Get the information through time on your income (or wage) and the CPI for the corresponding period (can get this online from the Bureau of Labor Statistics web site: <http://stats.bls.gov/cpi/home.htm>). Use the formula given earlier:

Real Income = (Nominal Income/CPI) x 100

$\% \Delta \text{Real Income}$ = ($\Delta \text{Real Income} / \text{Real Income}$) x 100
(you can also use the approximation from earlier)

- If your real income is stagnant or declining through time, you might want to consider changing your job, moving to another part of the country, or changing occupations.

Q: How can I determine what my real income would be in different locations around the country?

A: Use the Real Income formula above but for CPI, get the CPI for the area closest to the location(s) of interest from the BLS web site:

<http://data.bls.gov/cgi-bin/surveymost?cu>

OR, use the **salary calculator** listed in online syllabus.

Real Interest Rates

Recall (from IQ test) that the nominal interest rate for saving or borrowing is *not* the best number to consider when making saving or investing decisions. The real interest rate is preferable.

Nominal Interest Rate = percent change in the number of \$ involved

Real Interest Rate = percent change in *purchasing power* involved

$$\text{Real Interest Rate} = \text{Nominal Interest Rate} - \text{Inflation}$$

For saving: want high real interest rates

Borrowing: want low real rates

Savers: if the nominal interest rate (r) you receive is less than inflation, you are getting a *negative* real interest rate – you lose purchasing power by saving! Actually it's worse than that – you pay tax on nominal interest income.

If your tax rate is $t\%$ (ex: 15%), you get to keep $(1 - t)$ of every dollar of income received (here 85¢ of each \$1)

$$\text{After-tax nominal interest rate} = r(1 - t)$$

Ex: if $r = 2\%$ and $t = .15 \Rightarrow 2(.85) = \underline{1.7\% \text{ after-tax}}$

$$\text{Real After-Tax Interest Rate} = r(1 - t) - \text{Rate of Inflation}$$

Here: if $r = 2\%$, $t = .15$, and Inflation = 3%, the Real after-tax interest rate is -1.3%. Ouch!!

When interest rates are low, banks will offer negative real interest rates for all but long durations (3-5 year saving certificates).

Sucker game: lock into the long duration now, when rates are low. Later, when rates move higher, you are stuck with the low rates (withdrawal has stiff \$ penalties).

Rules:

- (1) When you expect interest rates to rise, go “short” in duration for savings
- (2) When interest rates are expected to fall, lock in the high rates for long duration savings

Borrowers:

Low real interest rates are a benefit – you don't pay back as much purchasing power as when rates are higher

Ex: 5 year auto loans @ 0% \Rightarrow real loan rate is minus the rate of inflation (use formula above without taxes)

OIL PRICES

High and rapidly rising oil prices can, and have, caused recessions here. In October of 1990, West Texas Intermediate Crude reached \$35.92 per barrel. Even today, this threshold, \$35/barrel, has become a “flash point” for macroeconomic worries.

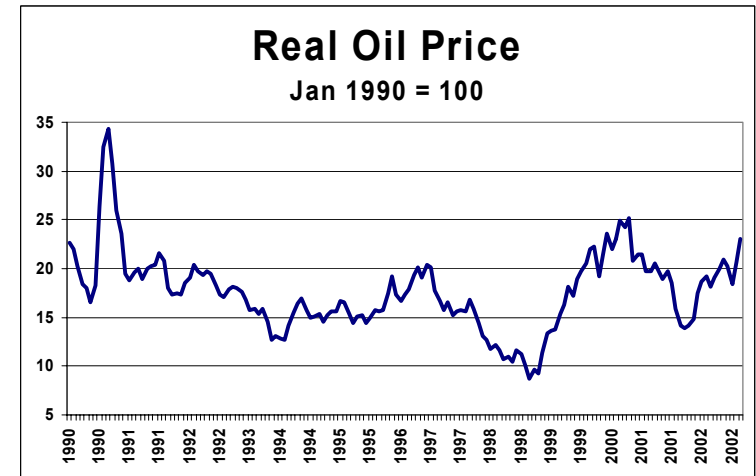
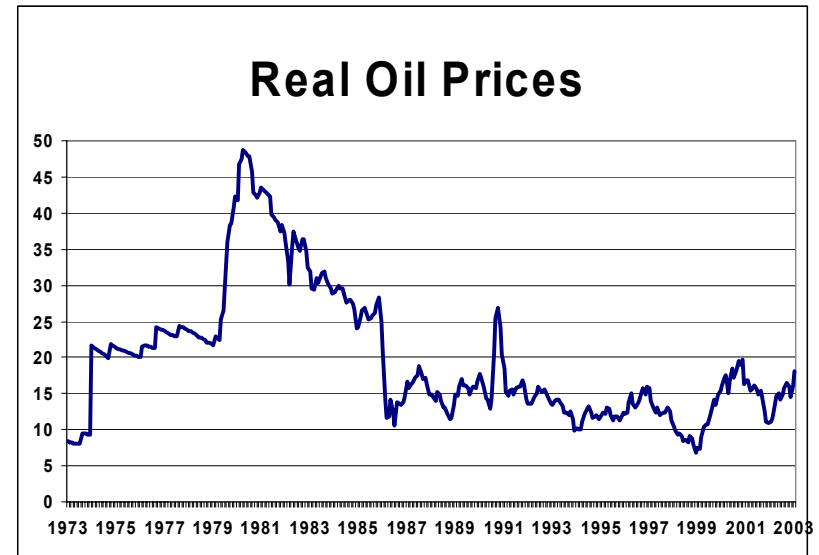
Q: Is this value (\$35) still valid as a “flash point?”

A: No. We hit this value in early 2003 without a recession. Why? Because the value of \$35 in 1990 is not the same as it is in 2003. The relevant concept here is the *real* price per barrel of oil.

Q: How can we calculate the real price of oil?

A: Use the Real X formula earlier, where X is the price per barrel of oil.

	October 1990	January 2003
Oil Price	\$35.92	\$32.94
CPI('82-84)	133.4	182.2
Real Price	<u>\$26.93</u>	<u>\$18.08</u>



HIGHEST GROSSING MOVIE OF ALL TIME

The highest grossing film is determined by simply comparing the dollar value of receipts and ranking movies. Not surprisingly, a fairly recent movie always wins!

Problem: Comparing *nominal* movie receipts that occur over a very long span of years is misleading, since purchasing power has been changing. The correct way to do this is to compare *real movie receipts*.

Q: How do we calculate real movie receipts?

A: Use the Real X formula, dividing nominal movie receipts by the relevant CPI for the year of the film.

25 Highest Grossing Movies of All Time

	Year	Movie	Receipts (mil \$)	CPI '82-84	<u>Real</u> Receipts
1	1939	Gone With the Wind*	200	13.9	1,438.85
		Snow White and the			
2	1937	Seven Dwarfs*	189	14.4	1,312.50
3	1977	Star Wars	461	60.6	760.73
4	1975	Jaws	260	53.8	483.27
5	1973	The Exorcist	204	44.4	459.46
6	1982	E.T.	435	96.5	450.78
7	1997	Titanic	601	160.5	374.45
8	1980	The Empire Strikes Back	290	82.4	351.94
9	1983	Return of the Jedi	309	99.6	310.24
10	1978	Grease	182	65.2	279.14
11	1981	Raiders of the Lost Ark	242	90.9	266.23
		Star Wars: The Phantom			
12	1999	Menace	431	166.6	258.70
13	1993	Jurassic Park	357	144.5	247.06
14	1984	Ghostbusters	239	103.9	230.03
15	1984	Beverly Hills Cop	235	103.9	226.18
16	2002	Spider-Man	404	179.9	224.57
17	1994	Forrest Gump	330	148.2	222.67
18	1994	The Lion King	326	148.2	219.97
19	1990	Home Alone	285	130.7	218.06
20	1989	Batman	251	124	202.42
21	1996	Independence Day	309	156.9	196.94
22	1985	Back to the Future	211	107.6	196.10
23	1982	Tootsie	177	96.5	183.42
		The Lord of the Rings:			
24	2002	Twin Towers	328	179.9	182.32
		Harry Potter and the			
25	2001	Sorcerer's Stone	318	177.1	179.56

* For these, the most recent \$ from videos is counted as if in original release year, so these over-state real receipts somewhat

Top 75 Movies of All Time

	Year	Movie	Receipts (mil \$)	CPI '82-84	Real Receipts
1	1939	Gone With the Wind	200	13.9	1,438.85
2	1937	Snow White and the Seven Dwarfs	189	14.4	1,312.50
3	1977	Star Wars	461	60.6	760.73
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25	2001	Harry Potter and the Sorcerer's Stone	318	177.1	179.56
		The Lord of the Rings: Fellowship of			
26	2001	Ring	313	177.1	176.74
27	1999	The Sixth Sense	293	166.6	175.87
28	1984	Indiana Jones and the Temple of Doom	180	103.9	173.24
29	2002	* Star Wars: Attack of the Clones	310	179.9	172.32
30	1990	Ghost	218	130.7	166.79
31	1986	Top Gun	177	109.6	161.50
32	1986	"Croccodile" Dundee	175	109.6	159.67
33	1989	Indiana Jones and the Last Crusade	197	124	158.87
34	1997	Men in Black	250	160.5	155.76
35	1992	Aladdin	217	140.3	154.67
36	1996	Twister	242	156.9	154.24
37	1993	Mrs. Doubtfire	219	144.5	151.56
38	2001	Shrek	268	177.1	151.33
39	2000	How the Grinch Stole Christmas	260	172.2	150.99
40	1991	Terminator 2: Judgement Day	204	136.2	149.78
41	1999	Toy Story 2	246	166.6	147.66
42	1988	Rain Man	172	118.3	145.39
		* Harry Potter and the Chamber of			
43	2002	Secrets	261	179.9	145.08
44	2001	Monsters, Inc.	256	177.1	144.55
45	1997	The Lost World: Jurassic Park	229	160.5	142.68
46	1990	Dances With Wolves	184	130.7	140.78
47	1990	Pretty Woman	178	130.7	136.19

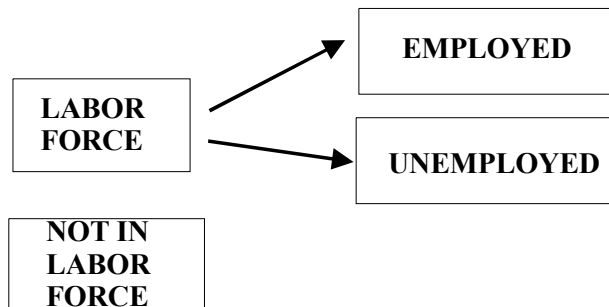
48	2000	Cast Away	234	172.2	135.89
49	2002	* My Big Fat Greek Wedding	241	179.9	133.96
50	1998	Saving Private Ryan	216	163	132.52
51	2001	Rush Hour 2	226	177.1	127.61
52	1993	The Fugitive	184	144.5	127.34
53	2002	Signs	228	179.9	126.74
54	1995	Toy Story	192	152.4	125.98
55	2000	Mission: Impossible 2	215	172.2	124.85
56	1998	Armageddon	202	163	123.93
57	1992	Home Alone 2: Lost in New York	173	140.3	123.31
		Austin Powers: The Spy Who Shagged			
58	1999	Me	205	166.6	123.05
59	1995	Batman Forever	184	152.4	120.73
60	2002	Austin Powers in Goldmember	213	179.9	118.40
61	1996	Mission: Impossible	181	156.9	115.36
62	2001	The Mummy Returns	202	177.1	114.06
63	1995	Apollo 13	173	152.4	113.52
64	1997	Liar Liar	181	160.5	112.77
65	2001	Pearl Harbor	199	177.1	112.37
66	2000	Gladiator	188	172.2	109.18
67	1998	There's Something About Mary	176	163	107.98
68	1997	Air Force One	173	160.5	107.79
69	2000	The Perfect Storm	183	172.2	106.27
70	2000	What Women Want	183	172.2	106.27
71	2002	Men in Black II	190	179.9	105.61
72	2001	Ocean's 11	183	177.1	103.33
73	2001	Jurassic Park III	181	177.1	102.20
74	2001	Planet of the Apes	180	177.1	101.64
75	2002	Ice Age	176	179.9	97.83

UNEMPLOYMENT

People believe the unemployment rate counts all able-bodied persons who are not currently employed - FALSE

Calculated by *monthly phone survey* of 60,000 households by the Bureau of Labor Statistics (www.bls.gov)

Persons categorized as either:



Not in Labor Force: < 16 yrs old or full-time student or not physically able to work OR:

Not Actively Seeking Employment: Discouraged Workers - their number changes along with state of the economy

Unemployment Rate = $(\# \text{Unemployed} / \text{Labor Force}) \times 100$

⇒ unemployed as % of labor force

Labor Force Participation Rate = $(\text{Labor Force} / \text{Population}) \times 100$
(LFPR)

Labor Force has both secular trend *and* cyclical behavior

Secular trend: based on population and age composition - as working-age population grows, labor force grows thru new entrants into labor force

⇒ LFPR rising thru time if no cyclical forces

Cyclical Behavior: labor force changes in direction of overall economy (and economic growth)

⇒ LFPR **pro-cyclical** ⇒ rises in recoveries and falls during recessions

In recession: more difficult to find jobs, so some unemployed persons *STOP LOOKING* for work

⇒ # discouraged workers *rises* ⇒ Labor Force *FALLS* also:

some persons enter the labor force to help family income (added worker effect) ⇒ *higher* labor force

Discouraged worker effect dominates added worker effect

1. *Labor force falls in recessions*

2. Measured unemployment rate *UNDER*states actual unemployment when unemployment is rising

3. **Underemployment** also occurs: some able to work fewer than desired hours or take jobs overqualified for

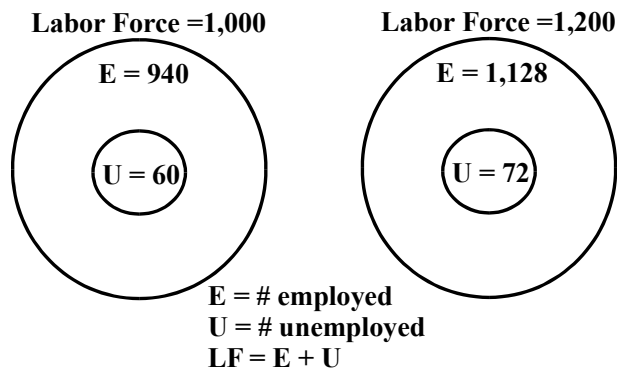
Underemployment and # discouraged workers increase
⇒ measured unemployment rate *UNDER*states extent of unemployment during recessions

APPLICATION:

If the unemployment rate remains unchanged is the number of unemployed constant?

- Generally not true

Assume unemployment rate = 6%



When the labor force grows, given the unemployment rate, both the # of employed *and* unemployed RISE
- # unemployed same only when labor force - unchanged

Thru time: labor force changes thru secular/cyclical forces

TYPES OF UNEMPLOYMENT

FRictional UNEMPLOYMENT

Persons moving between jobs (for better match job with skills), first-time entrants into labor force (ex: just turned 16), persons re-entering the labor force

Re-entrants can be either formerly "discouraged" workers looking for work again, or parents re-entering labor force after child in school

- this includes temporarily laid-off persons

- this type unemployment always exists in dynamic economy

STRUCTURAL UNEMPLOYMENT

As local industries change, the skills "in demand" change

⇒ structure of labor demand, both for products and labor changes

⇒ demand for some skills rises, falls for other skills

- persons whose skills no longer demanded - as much or at all (if skills obsolete) - structurally unemployed

- long-term unemployed

Structurally unemployed need to either: re-locate to where their skills are demanded, or acquire *new* skills that are in demand

CYCLICAL UNEMPLOYMENT

Results from unfavorable economic conditions related to the business cycle (RECESSIONS)

- too little demand to allow as many persons to be employed
- called "demand-deficient" unemployment

Since some frictional & structural unemployment always exists, full employment does *NOT* mean zero unemployment. There is a:
Full Employment Rate of Unemployment, or ***Natural Rate of Unemployment*** (where is no cyclical unemployment). For the US, this is presently 5% - 5.5%

From Production Possibilities (chapter 2):

- *on* the PPC if efficient production and full employment

- **POTENTIAL OUTPUT**

⇒ unemployment rate of 5 - 5.5% and *on* the curve

⇒ *only when unemployment rate exceeds this does an economy move inside its production possibilities curve*

OKUN'S LAW

For every 1% the actual unemployment rate *exceeds* the full employment rate, real GDP falls 2.5% *below* its potential value (distance inside PPC)