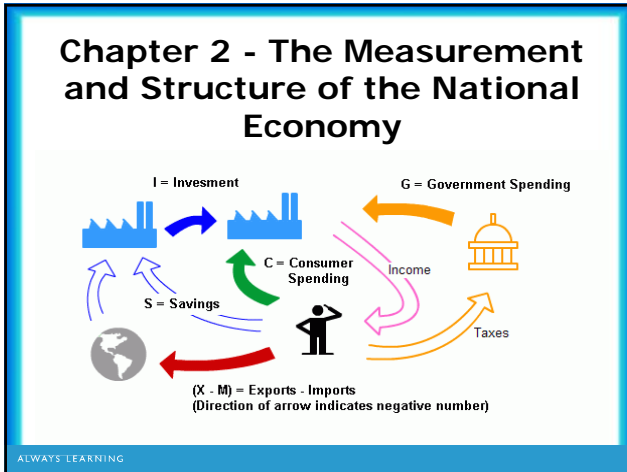


Chapter 2 Lecture - The Measurement and Structure of the National Economy



Stocks and Flows

- The distinction between a stock and a flow is very important.
- A stock is a position at a moment of time, for example, the stock of inventories in the economy at year end 2014. (Balance sheets report stocks.)
- A flow is the rate of change in a stock, for example, the change in the stock of inventories in the economy in 2014. (Profit and loss statements report flows.)
- If the bath tub is filling up, the stock is rising.

The diagram shows a blue bathtub with a faucet on the left. Water is flowing out of the faucet into the tub. The water level in the tub is labeled as the 'Stock', and the water entering from the faucet is labeled as the 'Flow'.

2-2

National Income Accounting

- National income accounts: an accounting framework used in measuring current economic activity
- Three alternative approaches give the same measurements
 - Product approach: the amount of output produced
 - Income approach: the incomes generated by production
 - Expenditure approach: the amount of spending by purchasers

2-3

National Income Accounting

- Why are the three approaches equivalent?
 - They must be, by definition
 - Any output produced (product approach) is purchased by someone (expenditure approach) and results in income to someone (income approach)
 - The fundamental identity of national income accounting:

Total production = total income = total expenditure

All methods should result give similar answers when adjusted for market prices versus factor costs.

2-4

Chapter 2 Lecture - The Measurement and Structure of the National Economy

Value added = value of output minus value of inputs purchased from other producers

Total spending on domestically produced final goods and services = \$21,500

	American Ore, Inc.	American Steel, Inc.	American Motors, Inc.	Total factor income
Value of sales	\$4,200 (ore)	\$9,000 (steel)	\$21,500 (car)	
Intermediate goods	0	4,200 (iron ore)	9,000 (steel)	
Wages	2,000	3,700	10,000	\$15,700
Interest payments	1,000	600	1,000	2,600
Rent	200	300	500	1,000
Profit	1,000	200	1,000	2,200
Total expenditure by firm	4,200	9,000	21,500	
Value added per firm = Value of sales - cost of intermediate goods	4,200	4,800	12,500	

Total payments to factors = \$21,500

Sum of value added = \$21,500

Activity	Cost of Inputs	Price of Output	Value Added
Growing Oranges	\$0	\$1	\$1
Making Orange Juice	\$1	\$1.50	\$0.50
Distributing Juice to Stores (Wholesale)	\$1.50	\$2.25	\$0.75
Selling Juice to Consumer (Retail)	\$2.25	\$3.50	\$1.25

2-5

Gross Domestic Product Once Again

- The product approach to measuring GDP
 - GDP (gross domestic product) is the market value of final goods and services newly produced within a nation during a fixed period of time
- Market value: allows adding together unlike items by valuing them at their market prices
 - Problem: misses nonmarket items such as homemaking, the value of environmental quality, and natural resource depletion
 - There is some adjustment to reflect the underground economy
 - Government services (that aren't sold in markets) are valued at their cost of production
 - Newly produced: counts only things produced in the given period; excludes things produced earlier

2-6

Gross Domestic Product

- Final goods and services
 - Don't count intermediate goods and services (those used up in the production of other goods and services in the same period that they themselves were produced)
 - Final goods & services are those that are not intermediate
 - Capital goods (goods used to produce other goods) are final goods since they aren't used up in the same period that they are produced

2-7

Gross Domestic Product

- GNP vs. GDP
 - GNP (gross national product) = output produced by domestically owned factors of production
 - GDP = output produced within a nation
 - GDP = GNP - NFP
 - NFP = net factor payments from abroad
 - = payments to domestically owned factors located abroad minus payments to foreign factors located domestically

2-8

Chapter 2 Lecture - The Measurement and Structure of the National Economy

Gross Domestic Product

- GNP vs. GDP
 - Example: Engineering revenues for a road built by a U.S. company in Saudi Arabia is part of U.S. GNP (built by a U.S. factor of production), not U.S. GDP, and is part of Saudi GDP (built in Saudi Arabia), not Saudi GNP
 - Difference between GNP and GDP is small for the United States, about 0.2%, but higher for countries that have many citizens working abroad

2-9

Gross Domestic Product

- The expenditure approach to measuring GDP
 - Measures total spending on final goods and services produced within a nation during a specified period of time
 - Four main categories of spending: consumption (C), investment (I), government purchases of goods and services (G), and net exports (NX)
 - $Y = C + I + G + NX$ the income-expenditure identity

2-10

Gross Domestic Product

- The expenditure approach to measuring GDP
 - Consumption: spending by domestic households on final goods and services (including those produced abroad)
 - About 2/3 of U.S. GDP
 - Three categories
 - Consumer durables (examples: cars, TV sets, furniture, major appliances)
 - Nondurable goods (examples: food, clothing, fuel)
 - Services (examples: education, health care, financial services, transportation)

2-11

Personal Consumption

- Consumer Durables
 - Durable has a life of over 3 years: cars, furniture, etc
- Consumer Non-Durables
 - Goods with a life of less than three years: food, utilities, clothing
- Services
 - Housing, healthcare, recreation, education

2-12

Chapter 2 Lecture - The Measurement and Structure of the National Economy

Gross Domestic Product

- The expenditure approach to measuring GDP
 - Investment: spending for new capital goods (fixed investment) plus inventory investment
 - About 1/6 of U.S. GDP
 - Business (or nonresidential) fixed investment: spending by businesses on structures and equipment and software
 - Residential fixed investment: spending on the construction of houses and apartment buildings
 - Inventory investment: increases in firms' inventory holdings

2-13

Investment: Adding to the Capital Stock

- Flows and Stocks
 - A stock is a quantity: capital, inventories and wealth are stock variables
 - A flow is an addition to or a subtraction from a stock: Investment and income are flow variables
- Investment in National Stocks
 - Residential Investment (homes)
 - Non-residential Investment (business investments in structures and equipment)
 - Changes in Inventories (changes get registered)

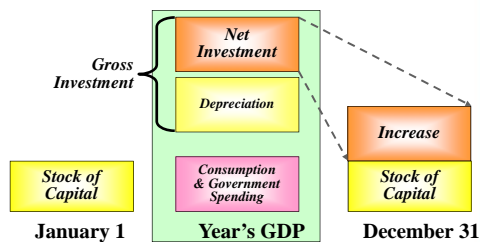
2-14

Net Investment

Gross Investment

– Depreciation or Capital Consumption Allowance

= Net Investment



2-15

Gross Domestic Product

- The expenditure approach to measuring GDP
 - Government purchases of goods and services: spending by the government on goods or services
 - About 1/5 of U.S. GDP
 - Most by state and local governments, not federal government
 - Government Expenditures reflect direct consumption, *not transfers*
 - Defense, Government investments in roads and other infrastructure, government services such as Department of Motor Vehicles. Police and Congress are all expenditures.

2-16

Chapter 2 Lecture - The Measurement and Structure of the National Economy

Government

- Transfer payments represent money redistributed from one group of citizens (taxpayers) to another (poor, unemployed, elderly).
- While transfers are included in government budgets as outlays they are not purchases of currently produced goods and services.
 - Not result in production of new goods and services
 - Not included in government purchases or in GDP
- Examples: Social Security, Medicare and Medicaid and Interest payments on national debt

2-17

Gross Domestic Product

- The expenditure approach to measuring GDP
 - Net exports: exports minus imports
 - Exports: goods produced in the country that are purchased by foreigners
 - Imports: goods produced abroad that are purchased by residents in the country
 - Imports are subtracted from GDP, as they represent goods produced abroad, and were included in consumption, investment, and government purchases

2-18

External Accounts

- Imports (M): Product Accounts: Goods and Services
- Exports (X): Product Accounts: Goods and Services
- Net Exports = $NX = X - M$
- If $NX = X - M > 0$ Trade Surplus
- If $NX = X - M < 0$ Trade Deficit
- Here are some examples of exports of services
 - Spending of foreign tourists in USA
 - transportation services
 - insurance / banking services
 - medical services
 - retail services (souvenirs)
 - hotel accommodation services

2-19

Table 2.1 Expenditure Approach to Measuring GDP in the United States, 2011

	Billions of dollars	Percent of GDP
Personal consumption expenditures (C)	10729	71.2
Consumer durables	1146	7.6
Nondurable goods	2478	16.4
Services	7104	47.1
Gross private domestic investment (I)	1855	12.3
Business fixed investment	1480	9.8
Nonresidential structures	405	2.7
Equipment and software	1075	7.1
Residential investment	339	2.2
Inventory investment	37	0.2
Government purchases of goods and services (G)	3060	20.3
Federal	1222	8.1
National defense	821	5.4
Nondefense	401	2.7
State and local	1838	12.2
Net exports (NX)	-568	-3.8
Exports	2094	13.9
Imports	2662	17.7
Total (equals GDP) (Y)	15076	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, July 27, 2012

<http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=3&isuri=1&903=5>

2-20

Chapter 2 Lecture - The Measurement and Structure of the National Economy

Gross Domestic Product

- The income approach to measuring GDP
 - Adds up income generated by production (including profits and taxes paid to the government)
 - National income = compensation of employees (including benefits) + proprietors' income + rental income of persons + corporate profits + net interest + taxes on production and imports + business current transfer payments + current surplus of government enterprises
 - National income + statistical discrepancy = net national product
 - Net national product + depreciation (the value of capital that wears out in the period) = gross national product (GNP)
 - GNP – net factor payments (*NFP*) = GDP

2-21

Gross Domestic Product

- The income approach to measuring GDP
 - Private sector and government sector income
 - Private disposable income = income of the private sector = private sector income earned at home (*Y* or GDP) and abroad (*NFP*) + payments from the government sector (transfers, *TR*, and interest on government debt, *INT*) – taxes paid to government (*T*)

$$= Y + NFP + TR + INT - T$$
 - Government's net income = taxes – transfers – interest payments = $T - TR - INT$
 - Private disposable income + government's net income = $GDP + NFP = GNP$

2-22

Table 2.2 Income Approach to Measuring GDP in the United States, 2011

	Billions of dollars	Percent of GDP
Compensation of employees	8295	65.0
Proprietors' income	1157	7.7
Rental income of persons	410	2.7
Corporate profits	1827	12.1
Net interest	527	3.5
Taxes on production and imports	1036	6.9
Business current transfer payments	133	0.9
Current surplus of government enterprises	-27	-0.2
Total (equals National Income)	13,359	88.6
Plus Statistical discrepancy	32	0.2
Equals Net National Product (NNP)	13,391	88.8
Plus Consumption of fixed capital	1937	12.8
Equals Gross National Product (GNP)	15,328	101.7
Less Factor income received from rest of world	784	5.2
Plus Payments of factor income to rest of world	532	3.5
Equals Gross Domestic Product (GDP)	15,076	100.0

Note: Numbers may not add to totals shown owing to rounding.
Source: Bureau of Economic Analysis Web site, www.bea.gov, Tables 1.75 and 1.12, July 27, 2012

<http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=3&isuri=1&903=58>

2-23

Saving and Wealth

- Wealth
 - Household wealth = a household's assets minus its liabilities
 - National wealth = sum of all households', firms', and governments' wealth within the nation
 - Saving by individuals, businesses, and government determine wealth
- Measures of aggregate saving
 - Saving = current income – current spending
 - Saving rate = saving/current income
 - Private saving = private disposable income – consumption
$$S_{pvt} = (Y + NFP - T + TR + INT) - C$$

2-24

Chapter 2 Lecture - The Measurement and Structure of the National Economy

Saving and Wealth

- Measures of aggregate saving
 - Government saving = net government income – government purchases of goods and services

$$S_{govt} = (T - TR - INT) - G$$
 - Government saving = government budget surplus = government receipts – government outlays
 - Government receipts = tax revenue (T)
 - Government outlays = government purchases of goods and services (G) + transfers (TR) + interest payments on government debt (INT)
 - Government budget deficit = $-S_{govt}$
 - Simplification: count government investment as government purchases, not investment

2-25

Saving and Wealth

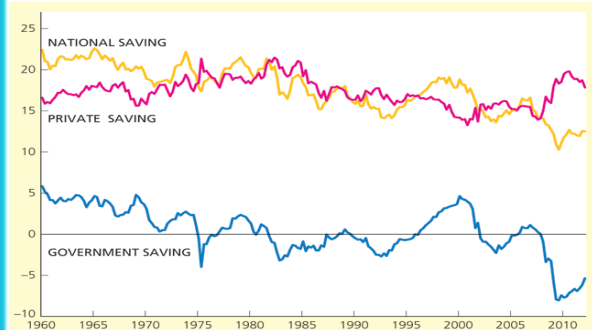
- Measures of aggregate saving
 - National saving
 - National saving = private saving + government saving
 - $$S = S_{pvt} + S_{govt}$$

$$= [Y + NFP - T + TR + INT - C] + [T - TR - INT - G]$$

$$= Y + NFP - C - G = GNP - C - G$$
 - The next figure plots national saving, private saving, and government saving relative to GDP

2-26

Figure 2.1 U.S. saving measures as a percentage of GDP, 1960–2012



<http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=3&isuri=1&903=137>

2-27



Source: U.S. Department of Commerce: Bureau of Economic Analysis
Shaded areas indicate US recessions - 2014 research.stlouisfed.org

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Saving and Wealth

- The uses of private saving
 - $S = I + (NX + NFP)$
 - $S = I + CA$
 - Derived from $S = Y + NFP - C - G$ and
 - $Y = C + I + G + NX$
 - $CA = NX + NFP =$ current account balance
- The uses of private saving
 - $S_{pvt} = I + (-S_{govt}) + CA$
 - (using $S = S_{pvt} + S_{govt}$)
 - The uses-of-saving identity—saving is used in three ways:
 - investment (I)
 - government budget deficit ($-S_{govt}$)
 - current account balance (CA)

2-29

Saving and Wealth

- Relating saving and wealth
 - Stocks and flows
 - Flow variables: measured per unit of time (GDP, income, saving, investment)
 - Stock variables: measured at a point in time (quantity of money, value of houses, capital stock)
 - Flow variables often equal rates of change of stock variables
 - Wealth and saving as stock and flow (wealth is a stock, saving is a flow)

2-30

Saving and Wealth

- Relating saving and wealth
 - National wealth: domestic physical assets + net foreign assets
 - Country's domestic physical assets (capital goods and land)
 - Country's net foreign assets = foreign assets (foreign stocks, bonds, and capital goods owned by domestic residents) minus foreign liabilities (domestic stocks, bonds, and capital goods owned by foreigners)
 - Wealth matters because the economic well-being of a country depends on it

2-31

Saving and Wealth

- Relating saving and wealth
 - National wealth: domestic physical assets + net foreign assets
 - Changes in national wealth
 - Change in value of existing assets and liabilities (change in price of financial assets, or depreciation of capital goods)
 - National saving ($S = I + CA$) raises wealth
 - Comparison of U.S. saving and investment with other countries
 - The United States is a low-saving country; Japan is a high-saving country
 - U.S. investment exceeds U.S. saving, so we have a negative current-account balance

2-32

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Summary - Measures of the Aggregate Savings

Measures of Aggregate Saving

Saving measure	Definition and formula
Private saving	Private disposable income less consumption $S_{pvt} = (Y + NFP - T + TR + INT) - C$
Government saving	Government receipts less government outlays $S_{govt} = (T - TR - INT) - G$
National saving	Private saving plus government saving; also GNP ($Y + NFP$) less consumption and government purchases $S = S_{pvt} + S_{govt}$ $= Y + NFP - C - G$

2-33

Real GDP, Price Indexes, and Inflation

- Real GDP
 - Nominal variables are those in dollar terms
 - Problem: Do changes in nominal values reflect changes in prices or quantities?
 - Real variables: adjust for price changes; reflect only quantity changes
 - Nominal GDP is the dollar value of an economy's final output measured at current market prices
- Real GDP is an estimate of the value of an economy's final output, adjusting for changes in the overall price level**

2-34

Real GDP, Price Indexes, and Inflation

- Price Indexes
 - A price index measures the average level of prices for some specified set of goods and services, relative to the prices in a specified base year
- GDP deflator = $100 \times \text{nominal GDP} / \text{real GDP}$
 - Note that base year $P = 100$
- Consumer Price Index (CPI)
 - Monthly index of consumer prices; index averages 100 in reference base period (1982 to 1984)
 - Based on basket of goods in expenditure base period (updated periodically)

2-35

GDP Deflator

- The GDP deflator is the ratio of nominal GDP to Real GDP (multiplied by 100).

$$P = \text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

$$P = \frac{\text{GDP}}{Y} \times 100$$

2-36

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Consumer Price Index

- The CPI is the price of a representative market basket of goods relative to the price of that same basket during a benchmark/base year (multiplied by 100).

$$CPI_t = \frac{\text{Cost of Market Basket in year } t}{\text{Cost of Market Basket in Base year}} \times 100$$

2-37

Table 2.3 Production and Price Data

	Year 1	Year 2	Percent change from year 1 to year 2
Product (quantity)			
Computers	5	10	+100%
Bicycles	200	250	+25%
Price			
Computers	\$1200/computer	\$600/computer	-50%
Bicycles	\$200/bicycle	\$240/bicycle	+20%
Value			
Computers	\$6000	\$6000	0
Bicycles	\$40,000	\$60,000	+50%
Total	\$46,000	\$66,000	+43.5%

2-38

Table 2.4 Calculation of Real Output with Alternative Base Years

Calculation of real output with base year = Year 1					
	Current quantities		Base-year prices		
Year 1					
Computers	5	×	\$1200	=	\$6000
Bicycles	200	×	\$200	=	\$40,000
				Total =	\$46,000
Year 2					
Computers	10	×	\$1200	=	\$12,000
Bicycles	250	×	\$200	=	\$50,000
				Total =	\$62,000
Percentage growth of real GDP = $(\$62,000 - \$46,000)/\$46,000 = 34.8\%$					
Calculation of real output with base year = Year 2					
	Current quantities		Base-year prices		
Year 1					
Computers	5	×	\$600	=	\$3000
Bicycles	200	×	\$240	=	\$48,000
				Total =	\$51,000
Year 2					
Computers	10	×	\$600	=	\$6000
Bicycles	250	×	\$240	=	\$60,000
				Total =	\$66,000
Percentage growth of real GDP = $(\$66,000 - \$51,000)/\$51,000 = 29.4\%$					

2-39

Real GDP, Price Indexes, and Inflation

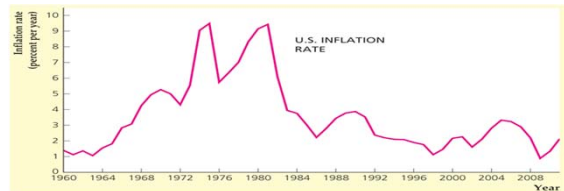
- Price Indexes

– Inflation

- Calculate inflation rate:

$$\pi_{t+1} = (P_{t+1} - P_t) / P_t = \Delta P_{t+1} / P_t$$

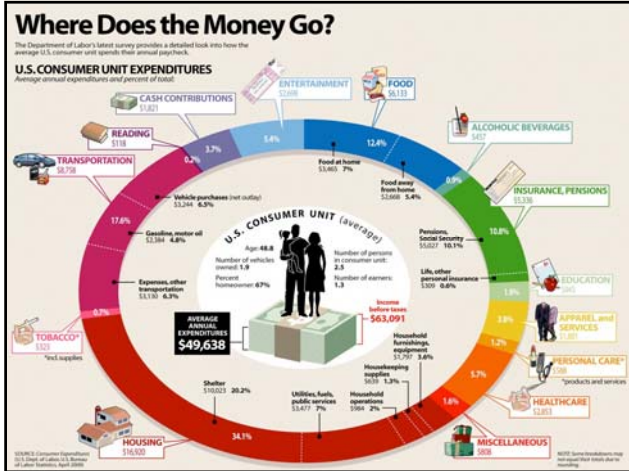
- Figure 2.2 shows the U.S. inflation rate since 1960 for the GDP deflator



Source: Implicit price deflator for GDP, from FRED database, Federal Reserve Bank of St. Louis, research.stlouisfed.org/fred2/series/GDPCTPI.

2-40

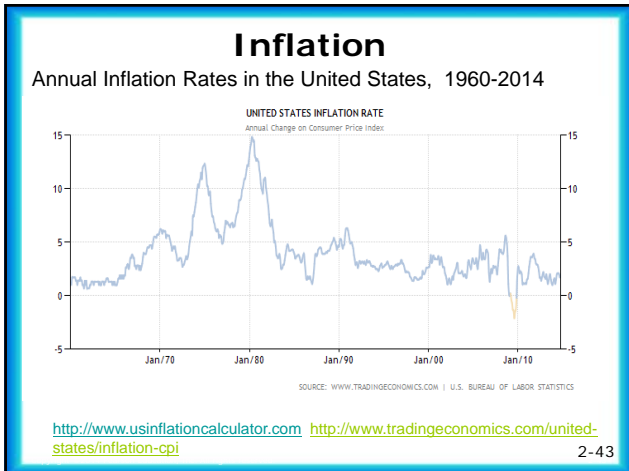
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Factors That May Bias CPI

- New Goods Bias**
 - New goods that were not available in the base year appear and, if they are more expensive than the goods they replace, they put an upward bias into the CPI.
- Quality Change Bias**
 - Quality improvements occur every year. Part of the rise in the price is payment for improved quality and is not inflation.
 - The CPI counts all the price rise as inflation.
- Commodity Substitution Bias**
 - The market basket of goods used in calculating the CPI is fixed and does not take into account consumers' substitutions away from goods whose relative prices increase.
- Outlet Substitution Bias**
 - As the structure of retailing changes, people switch to buying from cheaper sources, but the CPI, as measured, does not take account of this outlet substitution.

2-42

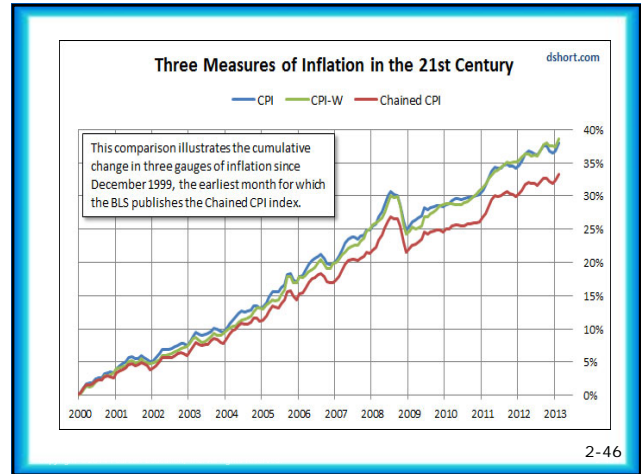
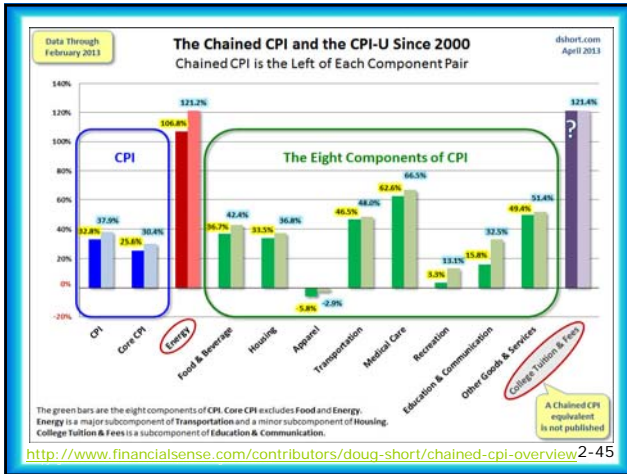


Problems with Inflation

- Redistributive Effects
 - Nominal and real income
 - Growth in nominal income vs. inflation rate
 - Anticipated vs. unanticipated inflation
- Who is hurt by inflation?
 - Fixed-income receivers
 - Savers
 - Creditors
- Who is unaffected or not hurt by inflation?
 - Flexible-income receivers
 - Cost-of-living adjustments (COLAs)
 - Debtors

2-44

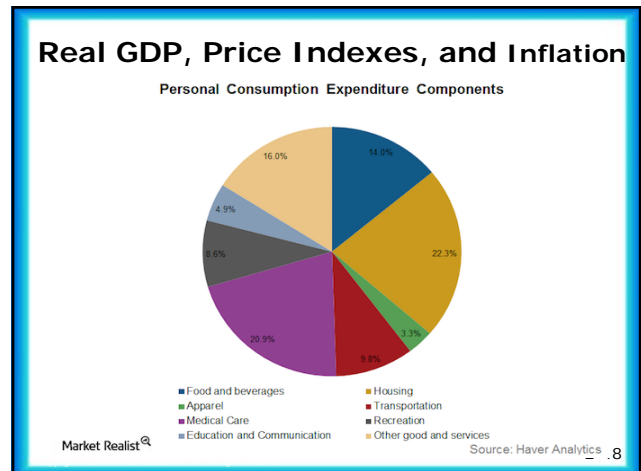
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Real GDP, Price Indexes, and Inflation

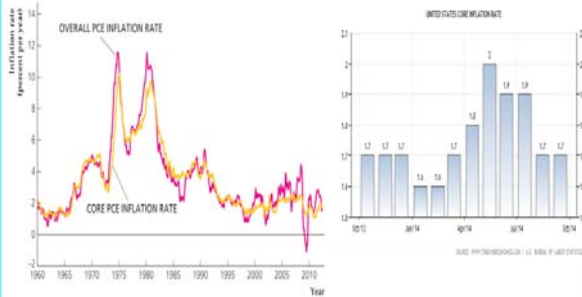
- Application: The Fed's preferred inflation measures
 - The Federal Reserve focuses its attention on the personal consumption expenditures (PCE) price index
 - The Fed forecasts both the overall PCE price index and the core PCE price index
 - The PCE price index is superior to the CPI because it avoids substitution bias and is revised when better data are available
 - Differences between the PCE price index and the CPI include formulas used in their calculation, coverage of different items, and weights given to different items
 - The Fed uses the core PCE price index to measure the underlying trend in inflation
 - But the Fed forecasts both the core and overall PCE price index because the Fed needs to keep its eye on both underlying trends but also the actual inflation rate faced by households

2-47



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- The core inflation rate is the CPI inflation rate excluding the volatile elements (of food and fuel).
- The core inflation rate attempts to reveal the underlying inflation trend.



Source: Federal Reserve Bank of St. Louis FRED database at research.stlouisfed.org/fred2/series/PCEPI and PCEPILFE.

2-49

The Uses and Limitations of Real GDP

• Limitations of Real GDP

- Real GDP measures the value of goods and services that are bought in markets.
- Some of the factors that influence the standard of living and that are not part of GDP are
 - Household production
 - Underground economic activity
 - Health and life expectancy
 - Leisure time
 - Environmental quality
 - Political freedom and social justice

2-50

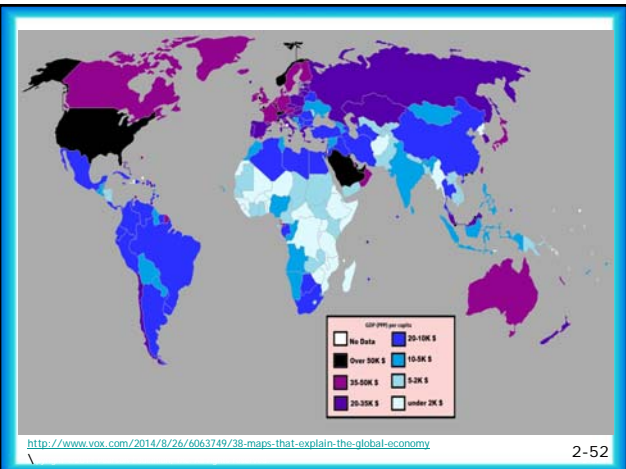
What GDP Does and Does Not Capture

- Can you think of other activities not captured by GDP that ought to be included?
- Genuine Progress Indicator (GPI)*
 - Adjust GDP for welfare-reducing activities such as resource depletion; environmental damage; crime; and quality of life.
- GDP can also be a poor measure of the living standards in various nations.
- To get around the problem, economists use *purchasing power parity (PPP)*, which adjusts for different relative prices among nations before making comparisons.

<http://www.green.maryland.gov/mdgpi>

<http://knoema.com/atlas/ranks/GDP-per-capita-PPP-based>

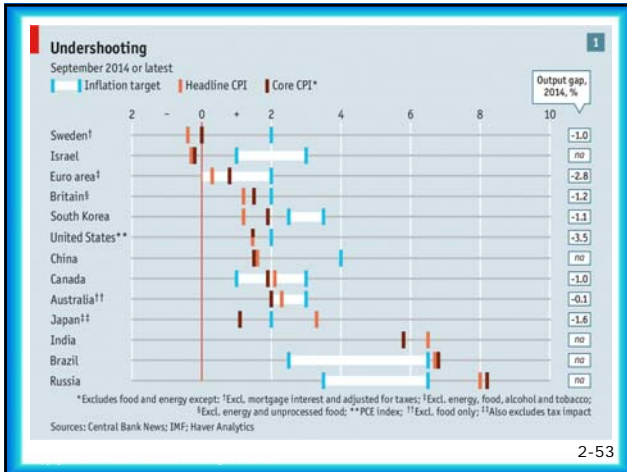
2-51



<http://www.vox.com/2014/8/26/6063749/38-maps-that-explain-the-global-economy>

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Interest Rates

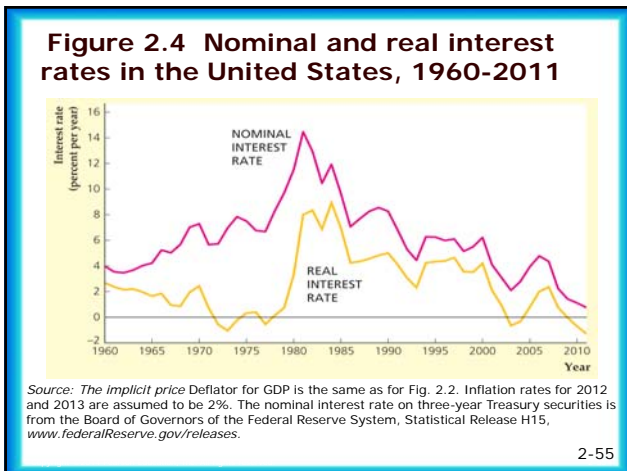
- Real vs. nominal interest rates
 - Interest rate: a rate of return promised by a borrower to a lender
 - r = Real interest rate: rate at which the real value of an asset increases over time
 - i = Nominal interest rate: rate at which the nominal value of an asset increases over time
 - Real interest rate = $i - \pi$ π = inflation rate

The expected real interest rate
 $r = i - \pi^e$ If $\pi = \pi^e$, inflation rate = expected inflation rate

The Fisher equation $i = r + \pi^e$

Exactly: $(1 + r) = \frac{(1 + i)}{1 + \pi}$ $(1 + i) = (1 + r)(1 + \pi)$

2-54



Real versus Nominal Rates (Finance)

- r^* = Real risk-free rate. T-bond rate if no inflation; 1% to 4%.
- r or i = Any nominal rate.
- r_{RF} = Rate on Treasury securities.

$r = r^* + IP + DRP + LP + MRP$

Here:

- r = Required rate of return on a debt security.
- r^* = Real risk-free rate.
- IP = Inflation premium.
- DRP = Default risk premium.
- LP = Liquidity premium.
- MRP = Maturity risk premium.

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