



MACROECONOMICS

GDP

INCOME

ECONOMIC GROWTH

Zharova Liubov

GDP = IS THE MONETARY VALUE OF ALL THE FINISHED GOODS AND SERVICES PRODUCED WITHIN A COUNTRY'S BORDERS IN A SPECIFIC TIME PERIOD

- Includes all domestic production in a boarders
- Monetary measurement of value
- To avoid multiple counting – must include **ONLY new** production (sold to consumers)

-
- Does **NOT** include:
 - intermediate goods (ex: tires for new auto)
 - public transfer payments (welfare payment)
 - private transfer payments (cash gifts)
 - stock market transactions (stocks & bonds)
 - secondhand sales (used books, cars, homes)



APPROACHES TO CALCULATE GDP

Expenditure & Income Methods

- Expenditure Method – count all new goods & services that are purchased by: consumers, businesses, government, & net exports ($X - M = X_n$)

$$GDP_{Expenditure} = C + I + G + NX$$

Consumption

Investment

Government purchases of goods and services

Net eXports



	Billions of dollars	Percent of GDP
Personal consumption expenditures (C)		
Consumer durables	1026.5	8.2
Nondurable goods	2564.4	20.5
Services	5154.9	41.3
Gross private domestic investment (I)		
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)		
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)		
Exports	1301.2	10.4
Imports	2027.7	16.2
Total (equals GDP) (Y)		
<i>Note:</i> Numbers may not add to totals shown owing to rounding.		
<i>Source:</i> Bureau of Economic Analysis Web site, www.bea.gov , Table 1.1.5, May 31, 2006.		



	Billions of dollars	Percent of GDP
Personal consumption expenditures (C)	8745.7	
Consumer durables	1026.5	8.2
Nondurable goods	2564.4	20.5
Services	5154.9	41.3
Gross private domestic investment (I)		
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Consumer durables	1026.5	8.2
Nondurable goods	2564.4	20.5
Services	5154.9	41.3
Gross private domestic investment (I)	2105.0	
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
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Federal	877.7	7.0
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Nondefense	290.6	2.3
State and local	1485.2	11.9
Net exports (NX)		
Exports	1301.2	10.4
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Total (equals GDP) (Y)		

Note: Numbers may not add to totals shown owing to rounding.
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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	
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	
Exports	1301.2	10.4
Imports	2027.7	16.2
Total (equals GDP) (Y)		

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.



	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.



GDP Components – United States (\$ Billions)

Line		2009 I	2009 II	2009 III	2009 IV	2010 I
1	Gross domestic product					
2	Personal consumption expenditures					
3	Goods	3,197.7	3,193.8	3,292.3	3,337.1	3,406.6
4	Durable goods	1,025.2	1,011.5	1,051.3	1,052.0	1,072.8
5	Nondurable goods	2,172.4	2,182.2	2,241.0	2,285.1	2,333.8
6	Services	6,790.0	6,805.6	6,840.6	6,899.3	6,955.8
7	Gross private domestic investment					
8	Fixed investment	1,817.2	1,737.7	1,712.6	1,731.4	1,726.9
9	Nonresidential	1,442.6	1,391.8	1,353.9	1,366.9	1,371.3
10	Structures	533.1	494.8	457.9	434.1	417.5
11	Equipment and software	909.5	897.0	895.9	932.8	953.9
12	Residential	374.6	345.9	358.8	364.5	355.5
13	Change in private inventories	-127.4	-176.2	-156.5	-23.6	36.9
14	Net exports of goods and services					
15	Exports	1,509.3	1,493.7	1,573.8	1,680.1	1,729.3
16	Goods	989.5	978.1	1,045.2	1,140.6	1,180.0
17	Services	519.8	515.6	528.5	539.6	549.3
18	Imports	1,887.9	1,832.8	1,976.0	2,129.7	2,228.7
19	Goods	1,508.2	1,461.1	1,592.8	1,739.4	1,827.8
20	Services	379.6	371.7	383.1	390.3	400.9
21	Government consumption expenditures and gross investment					
22	Federal	1,106.7	1,138.3	1,164.3	1,170.1	1,186.4
23	National defense	750.7	776.2	795.8	793.5	805.6
24	Nondefense	356.0	362.1	368.5	376.7	380.7
25	State and local	1,772.3	1,791.2	1,791.1	1,789.0	1,788.3

GDP Components – United States (\$ Billions)

Line		2009 I	2009 II	2009 III	2009 IV	2010 I
1	Gross domestic product	14,178.0	14,151.2	14,242.1	14,453.8	14,601.4
2	Personal consumption expenditures	9,987.7	9,999.3	10,132.9	10,236.4	10,362.3
3	Goods	3,197.7	3,193.8	3,292.3	3,337.1	3,406.6
4	Durable goods	1,025.2	1,011.5	1,051.3	1,052.0	1,072.8
5	Nondurable goods	2,172.4	2,182.2	2,241.0	2,285.1	2,333.8
6	Services	6,790.0	6,805.6	6,840.6	6,899.3	6,955.8
7	Gross private domestic investment	1,689.9	1,561.5	1,556.1	1,707.8	1,763.8
8	Fixed investment	1,817.2	1,737.7	1,712.6	1,731.4	1,726.9
9	Nonresidential	1,442.6	1,391.8	1,353.9	1,366.9	1,371.3
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13	Change in private inventories	-127.4	-176.2	-156.5	-23.6	36.9
14	Net exports of goods and services	-378.5	-339.1	-402.2	-449.5	-499.4
15	Exports	1,509.3	1,493.7	1,573.8	1,680.1	1,729.3
16	Goods	989.5	978.1	1,045.2	1,140.6	1,180.0
17	Services	519.8	515.6	528.5	539.6	549.3
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21	Government consumption expenditures and gross investment	2,879.0	2,929.4	2,955.4	2,959.2	2,974.7
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23	National defense	750.7	776.2	795.8	793.5	805.6
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25	State and local	1,772.3	1,791.2	1,791.1	1,789.0	1,788.3

EXPENDITURE APPROACH FOR 1 PRODUCT ECONOMY

Roaster

Wages \$15,000

Taxes \$5,000

Revenue \$35,000

beans sold to public \$10,000

beans sold to coffee bar \$25,000

Coffee bar

Wages \$10,000

Taxes \$2,000

Beans bought from roaster \$25,000

Revenue from coffee sold to public \$40,000

Total expenditure = Consumption Expenditures = Beans purchased by public + Coffee purchased by public = \$10,000 + \$40,000 = **\$50,000**

final goods.



EXPENDITURE APPROACH FOR 1 PRODUCT ECONOMY

Winegrower

Wages \$20,000

Taxes \$7,000

Revenue \$50,000

sold to public \$20,000

sold to wine-maker \$30,000

Wine-maker

Wages \$18,000

Taxes \$8,000

Total expenditure = Consumption Expenditures = Grapes purchased

by public + Wine purchased by public = 20 000 + 40 000 = **60 000**

Revenue from wine sold to public \$40,000

final goods.



PRODUCT APPROACH

- GDP is the sum of the value added created in all the sectors of the economy.
- Value added is sales minus materials, intermediate inputs and energy costs.
- The value of a final good is equal to the value added at each stage of production.
- Expenditure method = Production Method



PRODUCT APPROACH FOR 1 PRODUCT ECONOMY

Roaster

Wages \$15,000

Taxes \$5,000

Revenue \$35,000

beans sold to public \$10,000

beans sold to coffee bar \$25,000

Coffee bar

Value Added – revenue earned by selling products minus the amount paid for

intermediate goods

Wages \$10,000

Taxes \$2,900

Beans bought from roaster \$25,000

Revenue from coffee sold to public \$40,000

Roaster value added = \$35,000 in revenue - \$0 spent on intermediate goods = \$35,000

Coffeebar value added = \$40,000 in revenue - \$25,000 spent on intermediate goods (beans) = \$15,000

Total value added = **\$50,000**



EXPENDITURE APPROACH FOR 1 PRODUCT ECONOMY

Winegrower

Wages \$20,000

Taxes \$7,000

Revenue \$50,000

sold to public \$20,000

sold to wine-maker \$30,000

Wine-maker

Wages \$18,000

Winegrower value added = 50 000 in revenue – 0 spent on

intermediate goods = 50 000

Taxes \$8,000

Grapes from winegrower = \$30,000

Wine-maker value added = 40 000 in revenue – 30 000 spent on

intermediate goods (beans) = 10 000

Revenue from wine sold to public \$40,000

Total value added = 50 000 + 10 000 = **60 000**



INCOME METHOD

- Income Method – count all earnings received by those who produce the goods & services
- Workers, owners of property, interest earned on savings, profit earned by business owners (proprietors, partners & corporation stockholders)

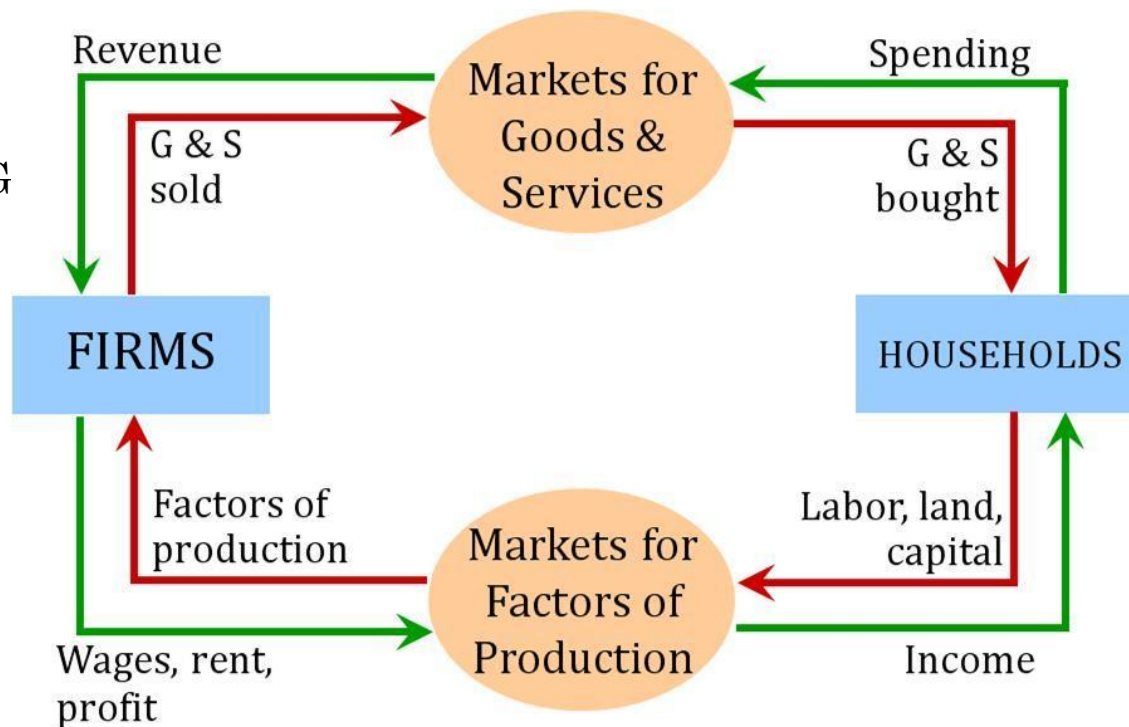
*Requires some accounting adjustments => Expenditures =
Income (must balance)*

*National income => all citizens supplied resources (here &
abroad)*

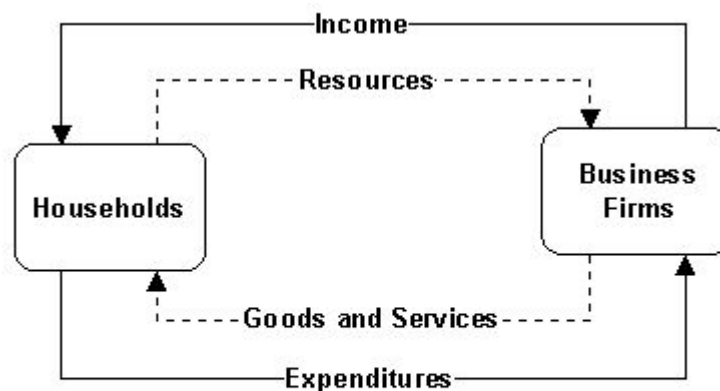
National Income + **statistical discrepancy** =
Net National Product



- Consumption (C)
- Investment (I)
- Government purchases (G)
- Exports (X)
- Imports (M)
- Taxes (T)
- Saving (S)



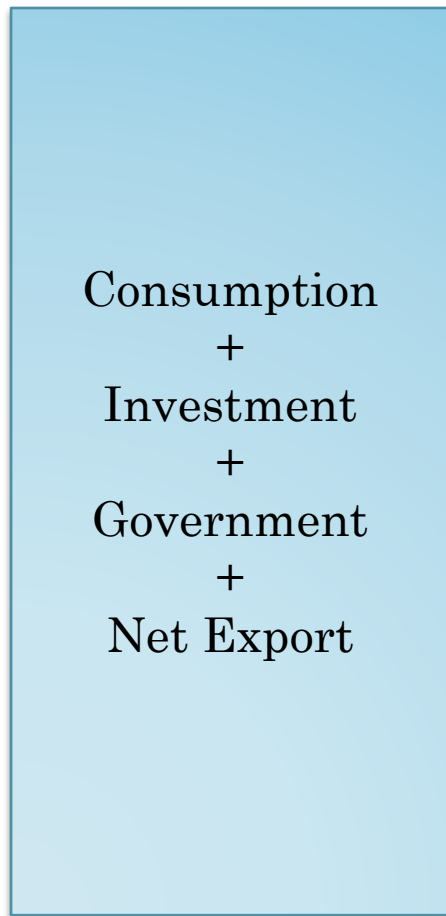
$$\square (I - S) + (G - T) + (X - M) = 0$$



Solid Lines - Flow of Money
Dashed Lines - Flow of Goods and Services

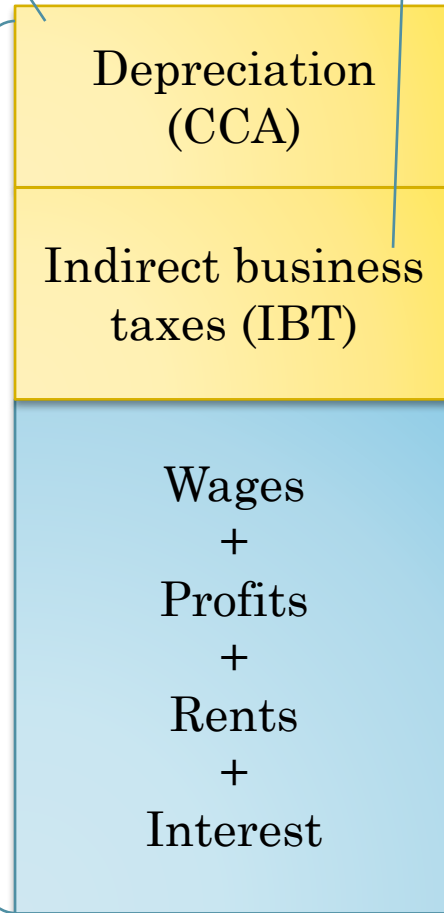
Compensation of Fixed Capital = Depreciation (costs of capital over its lifetime)

Sales, excise, property, customs duties, license fees, etc



Expenditure approach

GDP in market prices



Income approach

W - employee compensation (wages)
P - profits received by proprietors & corporation owners (income taxes, dividends, & undistributed profits (retained earnings))
R - rent received for use of property
I - Interest received for use of money

National income



	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)		
<i>Plus</i> Statistical discrepancy	55	0.4
<i>Equals</i> Net National Product (NNP)		
<i>Plus</i> Consumption of fixed capital	1574	12.6
<i>Equals</i> Gross National Product (GNP)		
<i>Less</i> Factor income received from rest of world	508	4.1
<i>Plus</i> Payments of factor income to rest of world	474	3.8
<i>Equals</i> Gross Domestic Product (GDP)		

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.

NFIA = Factor income earned from abroad by residents - Factor income of non-residents in domestic territory

	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
<i>Plus</i> Statistical discrepancy	55	0.4
<i>Equals</i> Net National Product (NNP)	10947	87.7
<i>Plus</i> Consumption of fixed capital	1574	12.6
<i>Equals</i> Gross National Product (GNP)	12521	100.3
<i>Less</i> Factor income received from rest of world	508	4.1
<i>Plus</i> Payments of factor income to rest of world	474	3.8
<i>Equals</i> Gross Domestic Product (GDP)	12487	100.0

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INCOME APPROACH FOR 1 PRODUCT ECONOMY

Roaster

Wages \$15,000

Taxes \$5,000

Revenue \$35,000

beans sold to public \$10,000

beans sold to coffee bar \$25,000

Note: profit = revenue - expenses

Coffee bar

Total wages: \$15,000 + \$10,000 = \$25,000

Wages \$10,000

Total taxes: \$5,000 + \$2,000 = \$7,000

Taxes \$2,000

Beans bought from roaster \$25,000

Roaster profit = Revenue - Expenses = \$35,000 - (\$15,000 in wages + \$5,000 in taxes) = \$15,000.

Revenue from coffee sold to public \$40,000

Revenue from coffee sold to public \$40,000

Coffeebar profit = Revenue - Expenses = \$40,000 - (\$10,000 in wages + \$2,000 in taxes + \$25,000 in beans) = \$3,000

Total profit = \$15,000 + \$3,000 = \$18,000.

Total income = Total Wages + Total Taxes + Total Profits = \$25,000 + \$7,000 + \$18,000 = **\$50,000**



INCOME APPROACH FOR 1 PRODUCT ECONOMY

Winegrower

Wages \$20,000

Taxes \$7,000

Revenue \$50,000

sold to public \$20,000

sold to wine-maker \$30,000

Wine-maker

Wages \$18,000
Total wages = 20 000+18 000 = 38 000

Taxes \$8,000
Total taxes = 7 000+8 000 = 15 000

Grapes from winegrower \$30,000

Revenue from wine sold to public \$40,000
Profit (winegrower) = 50 000 - (20 000+7 000) = 23 000

Profit (wine-maker) = 40 000 - (18 000+8 000+30 000) = -16 000

Total revenue = 23 000 - 16 000 = 7 000

Total income = 38 000+15 000+7 000 = **60 000**



GDP – BY SUM OF SPENDING, FACTOR INCOMES OR OUTPUT

GDP (Expenditure) (known as aggregate demand)

- Consumption
- Government spending
- Investment spending
- Exports
- - Imports

GDP (factor incomes)

- Income from people in jobs and self-employment
- Profits of private sector of businesses
- Rent income from the ownership of land

GDP (Product) (value of output)

- Value added from each of the main economic sectors
- These sectors are:
 - Primary
 - Secondary
 - Tertiary
 - Quaternary

Summary National Income and Product Accounts, 2012

[Billions of dollars]

Account 1. Domestic Income and Product Account

Line			Line		
1	Compensation of employees, paid.....	8,618.5	15	Personal consumption expenditures (3-3)	11,050.6
2	Wages and salaries	6,938.9	16	Goods.....	3,739.1
3	Domestic (3-12).....	6,924.0	17	Durable goods	1,191.9
4	Rest of the world (5-15).....	14.9	18	Nondurable goods	2,547.2
5	Supplements to wages and salaries (3-14)	1,679.6	19	Services	7,311.5
6	Taxes on production and imports (4-15).....	1,132.1	20	Gross private domestic investment.....	2,511.7
7	Less: Subsidies (4-8)	58.0	21	Fixed investment (6-2)	2,449.9
8	Net operating surplus.....	4,131.7	22	Nonresidential.....	2,007.7
9	Private enterprises (2-19).....	4,151.0	23	Structures.....	448.0
10	Current surplus of government enterprises (4-28)	-19.3	24	Equipment.....	937.9
11	Consumption of fixed capital (6-14).....	2,534.2	25	Intellectual property products.....	621.7
			26	Residential	442.2
12	Gross domestic income	16,358.5	27	Change in private inventories (6-4)	61.8
			28	Net exports of goods and services	-565.7
13	Statistical discrepancy (6-20).....	-203.3	29	Exports (5-1)	2,198.2
			30	Imports (5-13).....	2,763.8
			31	Government consumption expenditures and gross investment (4-1 plus 6-3).....	3,158.6
			32	Federal	1,292.5
			33	National defense.....	817.8
			34	Nondefense	474.7
			35	State and local	1,866.1
14	Gross domestic product	16,155.3	36	Gross domestic product	16,155.3

The first account displays the expenditure and income approaches to measuring GDP. The **right-hand side** of the account shows the final expenditures by consumers, private business, governments and foreigners. The **left-hand side** of the account shows the incomes that are generated in the production of that output.

GDP (BEA COMMENTARIES)

- The entries on the **right side** of account 1 show the approach used by BEA for deriving GDP: It is measured using the expenditures approach – that is, as the sum of purchases by final users.
- The **left (income) side** – the sum of all the incomes earned and costs incurred in production.
- Specifically, the left side shows GDI as the sum of the income earned by labor, governments and entrepreneurs and the consumption of fixed capital.
- In theory, **GDI should be equal to GDP**. In practice, differences in the source data used to estimate the two measures result in a “statistical discrepancy,” which, in the NIPAs (national income and product accounts), is calculated as GDP less GDI.
- Because the source data used to develop the product-side estimates of the account are based on more comprehensive surveys and censuses, BEA considers them more reliable. Therefore, the statistical discrepancy appears as a component on the income side of the account to equate GDI with GDP.



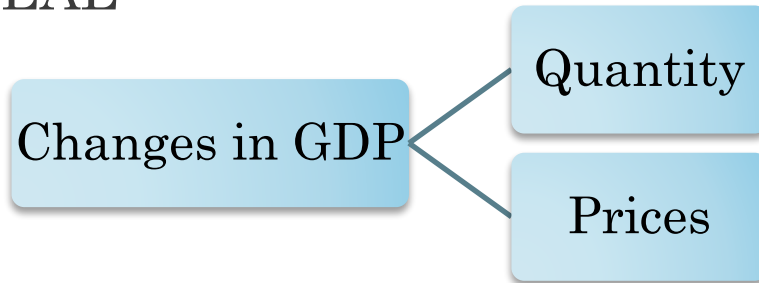
US GDP FROM AGRICULTURE



US GDP FROM PRIVATE SERVICES PRODUCING INDUSTRIES



GDP – NOMINAL VS. REAL

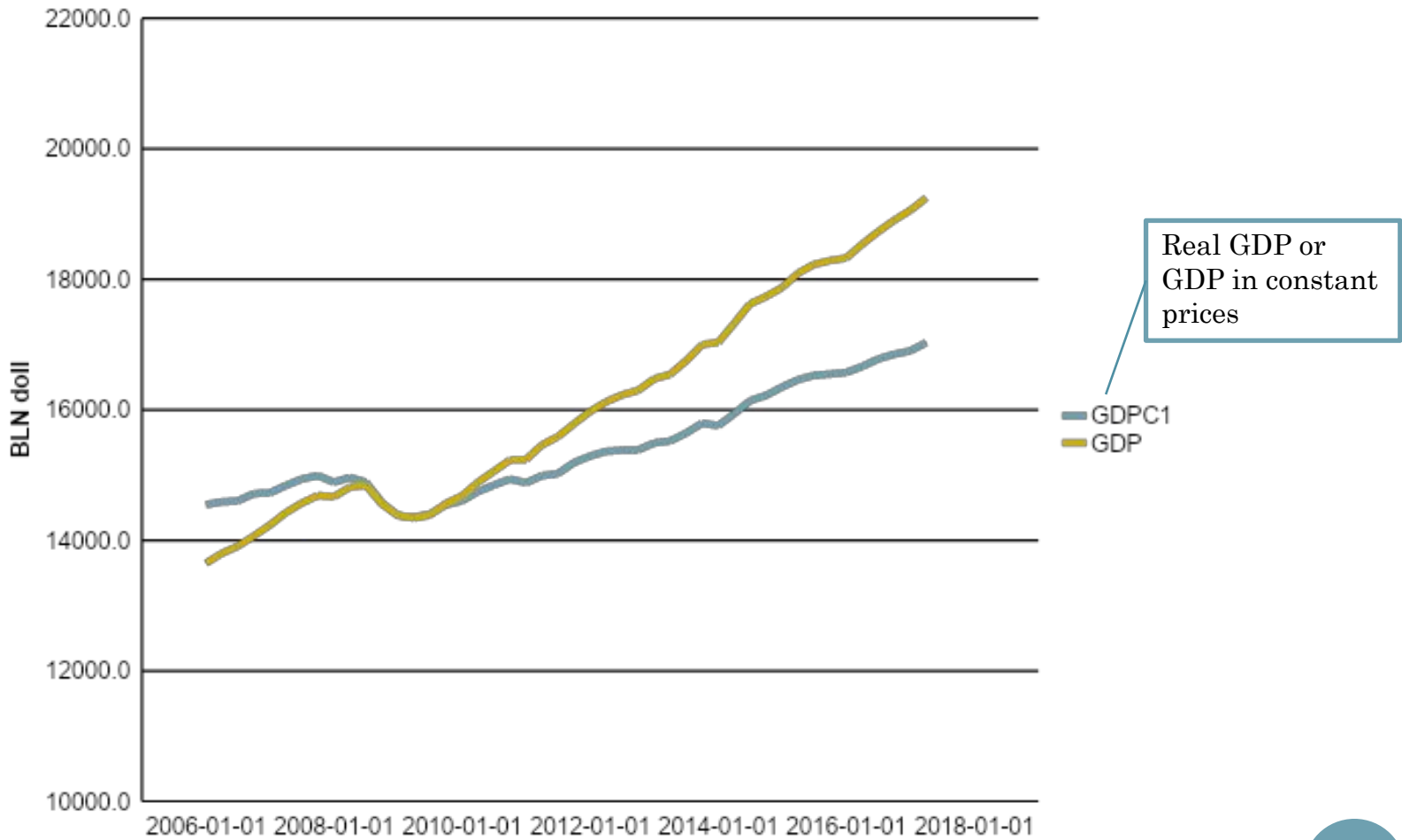


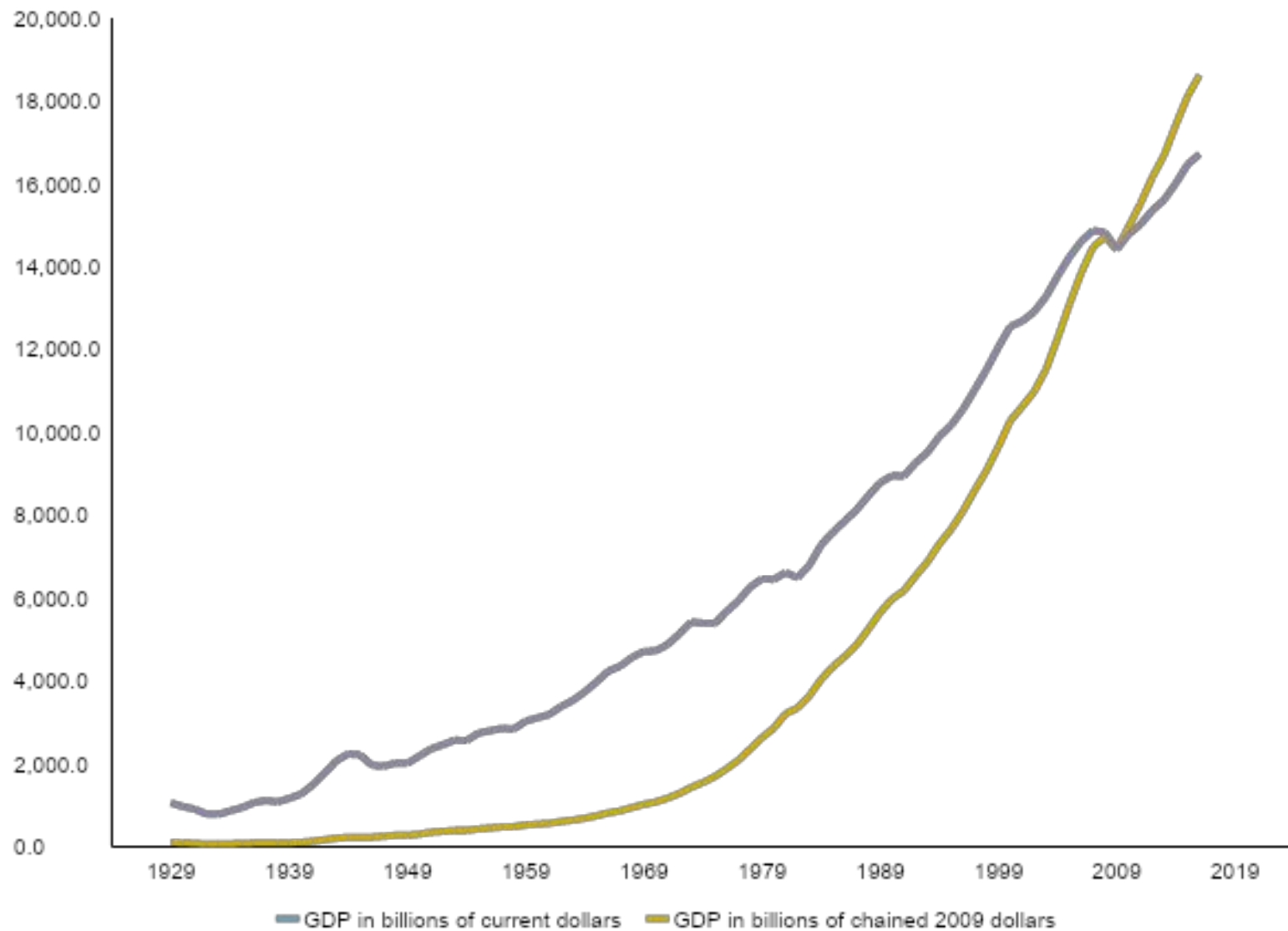
- Nominal = current year prices
- Real = prices adjusted for inflation
 - Nominal > Real (in the most cases)

 - *Nominal GDP is used when comparing different quarters of output within the same year. When comparing the GDP of two or more years, real GDP is used because, by removing the effects of inflation, the comparison of the different years focuses solely on volume.*



USA GDP NOMINAL AND REAL





EXAMPLE

Based year

Year	Price of cheese	Quantity of Cheese	Price of Wine	Quantity of Wine
2010	\$5	2 Blocks	\$10	4 bottles
2011	\$12	3 Blocks	\$17	3 bottles
2012	\$ 12	4 Blocks	\$20	3 bottles

$$\text{Nominal GDP} = P^{\text{cheese}} * Q^{\text{cheese}} + P^{\text{wine}} * Q^{\text{wine}}$$

$$\text{Nominal GDP}^{2010} = 5 * 2 + 10 * 4 = 50$$

$$\text{Nominal GDP}^{2011} = 12 * 3 + 17 * 3 = 87$$

$$\text{Nominal GDP}^{2012} = 12 * 4 + 20 * 3 = 108$$

$$\text{Real GDP} = P^{\text{cheese}2010} * Q^{\text{cheese}} + P^{\text{wine}2010} * Q^{\text{wine}}$$

$$\text{Real GDP}^{2010} = 5 * 2 + 10 * 4 = 50$$

$$\text{Real GDP}^{2011} = 5 * 3 + 10 * 3 = 45$$

$$\text{Real GDP}^{2012} = 5 * 4 + 10 * 3 = 50$$

$$\text{Real GDP grow} = (\text{Real GDP}^{2011} - \text{Real GDP}^{2010}) / \text{Real GDP}^{2010}$$

$$\text{Real GDP grow}^{2011-2010} = (45 - 50) / 50 = -0.1$$

$$\text{Real GDP grow}^{2011-2012} = (50 - 45) / 50 = 0.1$$

$$\text{Nominal GDP grow}^{2011-2010} = (87 - 50) / 50 = 0.74$$

$$\text{Nominal GDP grow}^{2011-2012} = (108 - 87) / 87 = 0.24$$

US GDP ANNUAL GROWTH RATE



SOURCE: TRADINGECONOMICS.COM | U.S. BUREAU OF ECONOMIC ANALYSIS

$$r = \left[\left(\frac{GDP_t}{GDP_0} \right)^{m/n} - 1 \right] \times 100$$

where

GDP_t is the level of activity in the later period;

GDP_0 is the level of activity in the earlier period;

m is the periodicity of the data (for example, 1 for annual data, 4 for quarterly data, or 12 for monthly data); and

n is the number of periods between the earlier period and the later period (that is $t-0$).



DEFLATOR GDP

- GDP deflator is an index of the price level relative to some base year.
- It is the cost of purchasing the goods that represent GDP relative to the cost of purchasing the exact same goods if they had been sold at the prices prevailing in the base year

CONSUMER PRICE INDEX

- The CPI is a measure that examines the weighted average of prices of a basket of consumer goods and services
- Price index in the base year is always 100



Total amount of money on GDP (raw data)

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100\%$$

Corrects the value of Nominal GDP for inflation

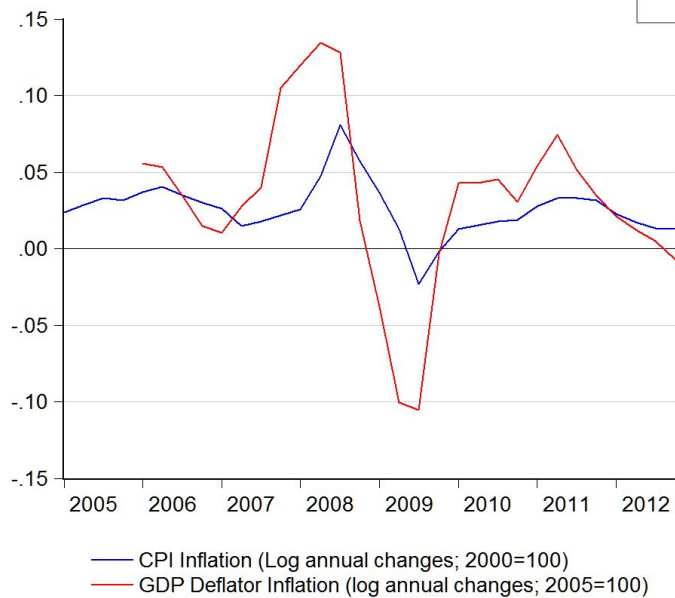
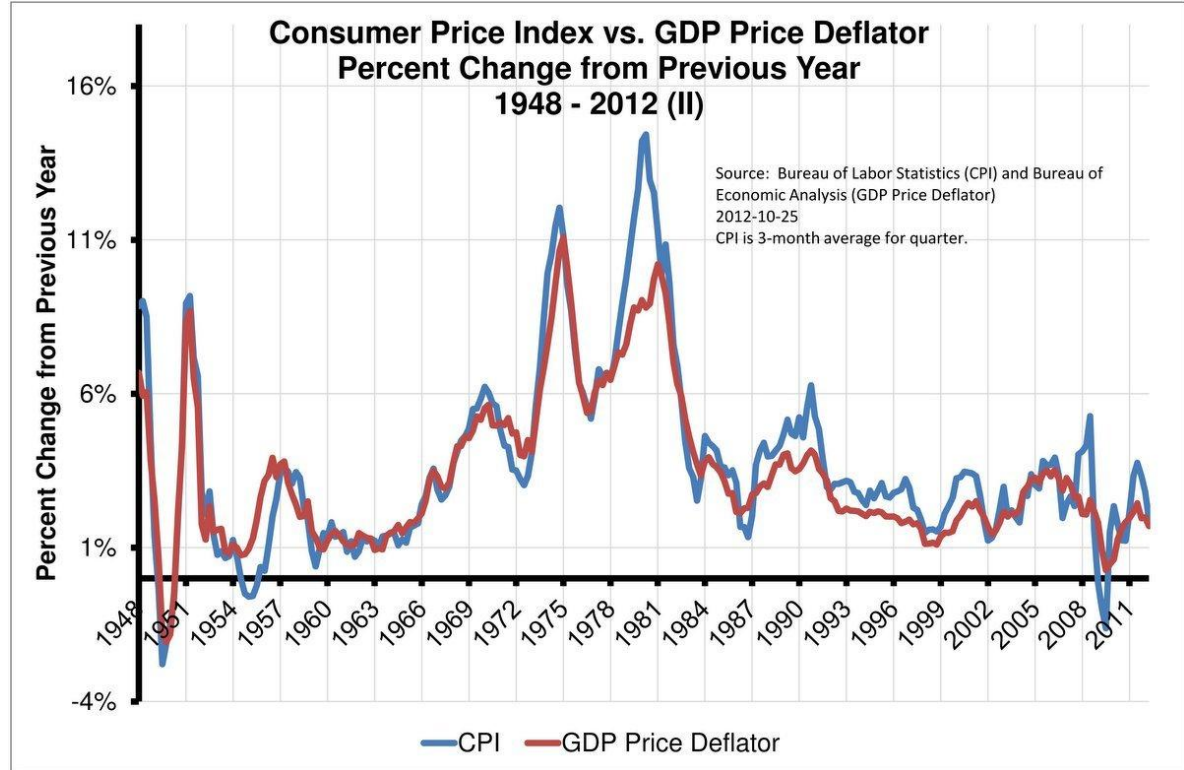
GDP Deflator	CPI
Reflected the prices of all goods and services <i>produced domestically</i>	Reflect the prices of a <i>representative basket</i> of all goods and services <i>bought by the consumers</i>
Compare the price of currently produced goods and services to the price of the same goods and services in the base year	Compares the price of a fixed basket of goods and services to the price of the basket in the base year



WHAT IS THE RELATIONSHIP BETWEEN GDP DEFLATOR & CPI?

- Both GDP deflator and CPI are measures of inflation.
- GDP deflator measures price level but will focus more on all new, domestically produced, final goods and services in an economy
- CPI is the measure of changes in the price level of consumer goods purchased by households over time.
- CPI uses a fixed basket to compare prices in determining inflation progress. GDP deflator uses the price of the currently produced product relative to the price from the base year.





Malaysia



EXAMPLE

	Quantities in Basket	2010 prices (base)	2012 prices
Cheese	1	5	12
Wine	2	10	20

Deflator GDP²⁰¹⁰ = (Nominal GDP²⁰¹⁰/Real GDP²⁰¹⁰) × 100 = (50/50) × 100 = 100

Deflator GDP²⁰¹² = (108/50) × 100 = 216

Inflation = [(Def GDP²⁰¹² - Def GDP²⁰¹⁰) / Def GDP²⁰¹⁰] × 100 = [(216 - 100) / 100] × 100 = 116

The value of this market basket in the base year :

$$5 \times 1 + 10 \times 2 = 25$$

The value of the market basket in the year 2012 :

$$12 \times 1 + 20 \times 2 = 52$$

CPI²⁰¹² = (52/25) × 100 = 208

To convert a nominal value to a real value:

So a Television that cost \$100 in 2012 would cost \$48 ([100/208] × 100 = 48) (CPI) or \$46.3 ([100/216] × 100 = 46.3) (Deflator GDP) in 2010

Real GDP_{2012 in 2010 dollars} = 50 × (100/216) = 23.14



INFLATION

- Define Inflation as the growth rate of prices.
- The greek letter π is often used as a symbol of inflation

Inflation means that prices are growing

Disinflation means that inflation is slowing down but still positive

Deflation means that inflation is negative and prices are actually dropping.

$$1 + \pi_t \equiv \frac{P_t}{P_{t-1}}$$

$$\pi_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

$$\text{Inflation Rate} = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100\%$$

