

Measuring Economic Aggregates and the Circular Flow of Income

The Product of a Nation

The Circular Flow of Income and
Expenditure

Limitations of National Income Accounting

Accounting for Price Changes

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The Product of a Nation

- How do we measure the economy's performance?
- Francois Quesnay (1758)
 - First to measure economic activity as a *flow*,
 - The *circular flow of output and income* through different sectors of the economy
- *National income accounting system*

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National Income Accounts

- *Gross domestic product*
 - Measures the market value of all final goods and services produced during a year by resources
 - located in the United States,
 - regardless of who owns them
- National income accounts
 - One person's spending is another person's income
 - Double entry bookkeeping system
 - Aggregate output is recorded on one side
 - income created by that spending on the other side

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How to Measure GDP

- GDP can be measured
 - by total spending on U.S. production or
 - by total income received from production
- Expenditure approach
 - Adds up the aggregate expenditure on all final goods and services produced during that year
- Income approach
 - Adds up the aggregate income earned during the year

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How to Measure GDP

- ⊕ **GDP includes only final goods and services**
 - ▣ Sold to the final, or ultimate, user
 - ▣ Ignores secondhand value of used goods
 - These goods were counted in GDP when they were produced
- ⊕ **Intermediate goods and services**
 - ▣ purchased for additional processing and resale
 - ▣ Excluded to avoid the problem of double counting
 - Counting added-value more than once

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GDP: Expenditure Approach

- ⊕ **Divide aggregate expenditure into its four components**
 - ▣ Consumption
 - ▣ Investment
 - ▣ Government Purchases
 - ▣ Net Exports

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Consumption

- ▣ Consists of purchases of final goods and services by households
- ▣ Largest spending category
- ▣ Accounting on average for about two-thirds of U.S. GDP
- ▣ Three components
 - Services
 - Durable Goods: Goods that are expected to last at least three years
 - Nondurable Goods

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Investment

- ⊕ **Gross private domestic investment**
 - ▣ Consists of
 - spending on new capital goods
 - additions to inventories
 - ▣ That is, spending that is not used for current consumption
 - ▣ Categories
 - Physical capital: new buildings and new machinery purchased by firms
 - New residential construction
 - Inventories

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Inventories

- ⊕ Consists of
 - ▣ stocks of goods in process
 - ▣ stocks of finished goods
- ⊕ Deal with unexpected changes in the
 - ▣ supply of their resources
 - ▣ demand for their products
- ⊕ Net changes in inventories
 - ▣ *Net increase in inventories*
 - Counts as investment
 - Current production not used for current consumption
 - ▣ *Net decrease in inventories*
 - Counts as negative investment, or *disinvestment*,
 - Sale of output already credited to a prior year's GDP

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Investment

- ⊕ Excludes
 - ▣ Household purchases of durable goods
 - ▣ Purchases of existing buildings and machines
 - ▣ Purchases of financial assets
 - Like Stocks and bonds
 - Simply an indication of ownership

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Government Purchases

- ⊕ *Government consumption and gross investment*
 - ▣ Spending by all levels of government
 - ▣ A little less than one-fifth of U.S. GDP
- ⊕ Excludes *transfer payments*
 - ▣ an outright grant from government to the recipient
 - ▣ Not true purchases by government
 - ▣ Ex: Social security, welfare benefits, unemployment insurance

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Net Exports

- ⊕ Equal the value of U.S. exports minus the value of U.S. imports of goods and services
 - ▣ *Include merchandise trade and services*
 - ▣ The value of U.S. imports has exceeded the value of our exports nearly every year since the 1960s
- ⊕ Export: Produce in domestic, but not consume in domestic → Add to GDP
- ⊕ Import: Consume in domestic, but not produce in domestic, → Subtract from GDP

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GDP: Expenditure Approach

- ⊕ Nation's aggregate expenditure equals the sum of
 - ❏ Consumption, C
 - ❏ Investment, I
 - ❏ Government Purchases, G
 - ❏ Net Exports, (Exports, X, minus Imports, I)
- ❏ $C + I + G + (X - M) = \text{Aggregate Expenditures} = \text{GDP}$

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GDP: Income Approach

- ⊕ Sum incomes arising from that productions
- ⊕ In double-entry bookkeeping:
 - ❏ Value of aggregate output equals the aggregate income paid for resources used to produce that output
 - ❏ Wages
 - ❏ Interest
 - ❏ Rent
 - ❏ Profit arising from production

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GDP : Income Approach

- ⊕ *Aggregate income* equals the sum of all the income earned by resource suppliers
- ⊕ Aggregate expenditure = GDP = aggregate income
- ⊕ Avoid double counting either by
 - ❏ including only the market value of the final goods and services, or
 - ❏ calculating the value added at each stage of production

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Computation of Value Added for a New Desk

Value added= selling price minus the amount paid for inputs

Value added represents income to resource suppliers.

Stage of Production	Sale Value (1)	Cost of Intermediate Goods (2)	Value Added (3)
Logger	\$ 20		\$ 20
Miller	50	\$ 20	30
Manufacturer	120	50	70
Retailer	200	120	80
Market Value of Final Good			\$200

Sum of the value added = market value of the final good

Value added for all final goods and services equals GDP based on the income approach

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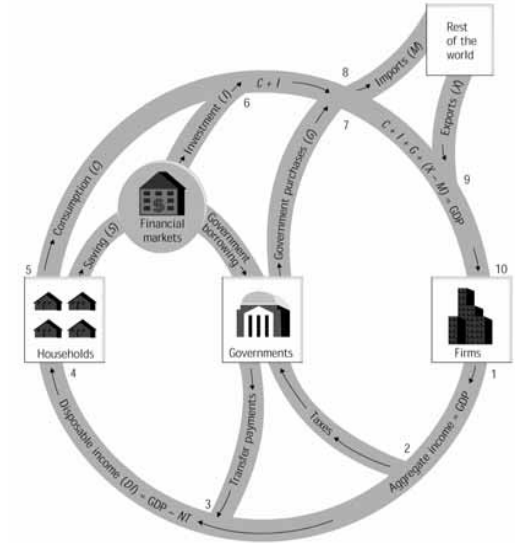
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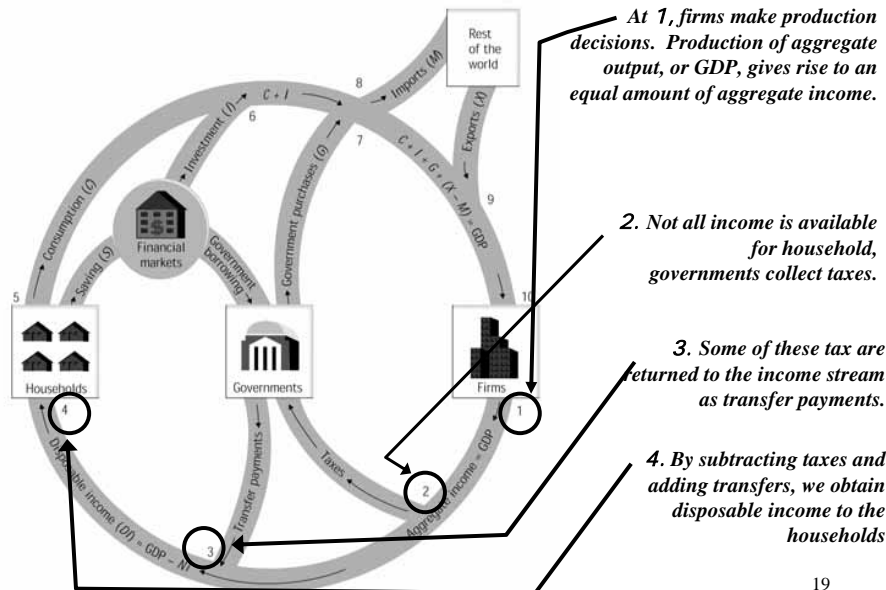
The Circular Flow Model

Money stream flows clockwise
 Income from firms to
 households: Lower half of the
 circle
 Spending from households to
 firms – the upper half of the
 circle.

For each flow of money
 there is an equal and
 opposite flow of goods or
 resources.



The Circular Flow



The Circular Flow

- ⊕ **Aggregate income**
 - ⊕ total income from producing GDP
- ⊕ **Disposable income (DI)** is the income remaining after
 - ⊕ taxes are subtracted
 - ⊕ transfers added
- ⊕ **Net taxes (NT)**
 - ⊕ Taxes minus transfer payments
 - ⊕ $GDP = \text{Aggregate income} = DI + NT$

The Circular Flow

- Households, with DI in hand, must decide how much to consume (C) and to save (S)
 - $DI = C + S$
- Firms produced the output, they wait and see how much consumers want to spend
- If any output go unsold, suppliers will be stuck with it in the form of unplanned additions to inventories

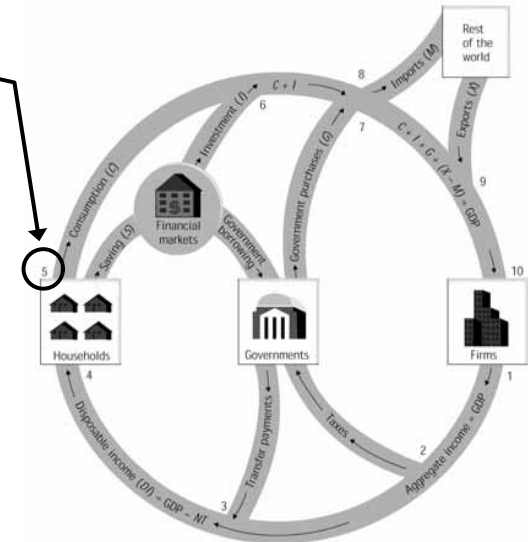
Expenditure Half of the Circular Flow

Disposable income splits at 5 →
 $DI = C + S$.

Consumption spending remains in the circular flow.

Saving flows to financial markets.

While the primary borrowers are firms and governments, in reality, financial markets are connected to all four economic decision-makers.



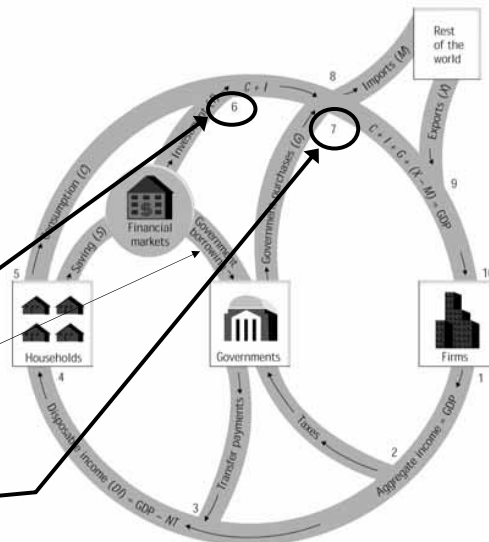
Circular Flow

Firms in our simplified model pay resource suppliers an amount equal to the entire value of output, Nothing left for investment.

Firms and households must borrow to finance investments

6 investment spending enters the circular flow → aggregate spending = $C + I$.

Governments also borrow to finance deficits. These purchases, G, enter the spending stream in 7.



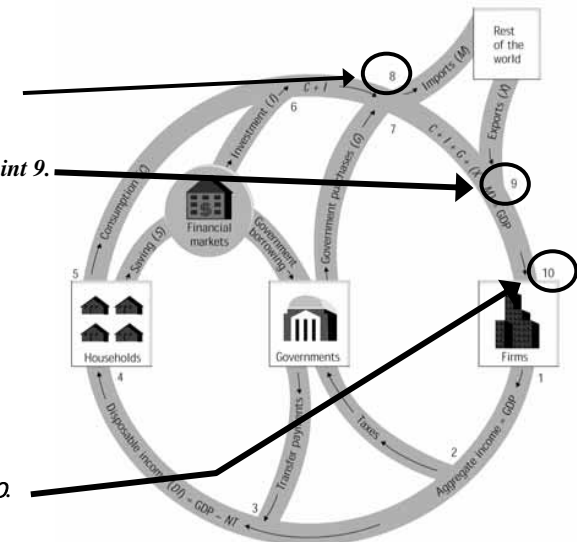
Circular Flow

Some spending goes for imports, M. This flows to foreign producers → A leakage from the circular flow at 8.

Exports enters the circular flow at point 9.

The net impact on aggregate expenditures = exports - imports, (or net exports)

Aggregate spending flows into firms at 10. (Aggregate expenditure).



Circular Flow of Income and Expenditure

- ⊕ Upper half of the circular flow:
 - ▣ expenditure half
 - ▣ focuses on the components that make up aggregate expenditure
 - Consumption, C
 - Investment, I
 - Government Purchases, G
 - Net Exports, X - M
- ⊕ $C + I + G + (X - M) = \text{aggregate expenditure} = \text{market value of aggregate output} = \text{GDP}$
- ⊕ Lower half of the circular flow:
 - ▣ aggregate income = DI + NT

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Leakages Equal Injections

- ⊕ Expenditure = income leads to
 - ▣ $DI + NT = C + I + G + (X - M)$
 - ▣ Since $DI = C + S \rightarrow$
 - ▣ $C + S + NT = C + I + G + (X - M)$
 - ▣ Subtracting C and adding M to both sides $\rightarrow S + NT + M = I + G + X$
 - ▣ Thus, the leakages (S, NT, and M) must equal the injections (I, G, and X) into the circular flow

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Planned versus Actual Investment

- ⊕ **Planned Investment**
 - ▣ The amount firms plan to invest before knowing how much they sell
- ⊕ **Actual Investment**
 - ▣ Includes both
 - planned investment and
 - unplanned changes in inventories
 - ▣ Unplanned increases in inventories cause firms to decrease production next time
- ⊕ **If there are no unplanned changes in inventories will GDP be at an equilibrium level**
 - ▣ *planned investment = actual investment*

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Limitations of National Income Accounting

- ⊕ Some production is not included in GDP
 - ❑ GDP includes only products sold in markets
 - ❑ Ignores “do-it-yourself” household production
 - If householders are largely self-sufficient
→ will understate GDP
 - ❑ Ignores the underground economy
 - Unreported because
 - it’s illegal
 - evade taxes
 - Federal study suggests the equivalent of 7.5% of GDP or about \$750 billion in 2001

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Limitations

- ⊕ For some economic activity, income must be *imputed* (estimated),
 - ❑ No market exchange!
 - ❑ *Imputed rental income*
 - homeowners receive from home ownership
 - ❑ Imputed dollar amount for wages paid in kind, such as employers’ payments for employees’ medical insurance
 - ❑ Imputed dollar amount for food produced by farm families for their own consumption

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Leisure, Quality and Variety

- ⊕ Workdays is much shorter now
 - ❑ Increase in leisure time
- ⊕ People also retire at earlier age and live longer after retirement
→ quality of life has increased
- ⊕ Quality and variety of products available have also improved because of technological advances and competition
- ⊕ GDP does not reflect these improvements

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GDP Ignores Depreciation (折舊)

- ⊕ Some capital wears out or becomes obsolete
- ⊕ *Net* production:
 - ❑ Subtracting this depreciation from GDP
- ⊕ *Depreciation* measures the value of the capital stock that is used up or becomes obsolete in the production process

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Net Domestic Product

- **Net domestic product:**
 - ▣ =GDP minus depreciation
- **Two definitions of investment**
 - ▣ *Gross investment* measures the value investment during a year
 - Used in computing GDP
 - ▣ **Net investment =gross investment-depreciation**
 - If net investment is negative →the capital stock declines
 - If it is zero → capital stock remains constant
 - If positive→ the capital stock grows
 - Used in computing net domestic product

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GDP Does Not Reflect All Costs

- Some production and consumption degrades the quality of our environment
- Negative externalities such as pollution are largely ignored in GDP accounting
- GDP also ignores the depletion of natural resources → ignores the natural capital stock

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GDP and Economic Welfare

- In computing GDP, the market value of output is the measure of value
- No information about its composition, some economists question whether GDP is a good measure of the nation's economic welfare

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Accounting for Price Changes

- ⊕ GDP measures the value of output in *current dollars*,
 - ▣ the dollar values when the output is produced
 - ▣ Called *nominal GDP*
- ⊕ Allows for comparisons among income or expenditure components in a particular year

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Accounting for Price Changes

- ⊕ Since average price level changes over time, current-dollar comparisons across years can be misleading
- ⊕ Specifically, nominal GDP increase over time because
 - ▣ Output increases
 - ▣ Prices increase
 - ▣ Both of these occur

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Real GDP

- ⊕ Real GDP refers to GDP adjusted for changes in prices → measures the changes which occurred in output
- ⊕ This process of adjusting nominal GDP for price changes is called *deflating* GDP or real GDP

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Price Indexes

- ⊕ An *index number*:
 - ▣ compares the value of some variable in a particular year to its value in a base year
 - ▣ values in other years are expressed relative to the base-year price
- ⊕ *Price index*:
 - ▣ Dividing each year's price by the price in the base year and multiplying by 100

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A Price Index (base year = 2000)

The price index for 2001 is $\$1.30 / \$1.25 \times 100 = 104$,

The price index for 2002 is $\$1.40 / \$1.25 \times 100 = 112$,

Year	Price of Bread in Current Year (1)	Price of Bread in Base Year (2)	Price Index (3) = (1)/(2)x100
2000	\$1.25	\$1.25	100
2001	1.30	1.25	104
2002	1.40	1.25	112

Thus, the index is 4% higher in 2001 than in the base year, and 12% higher in 2002 than in the base year.

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Price Indexes

• Price index permits comparisons between any two years

• Ex: what happened to the price level between 2001 and 2002?

■ Ans: $112 / 104 = 107.7$, you would find that the price level rose by 7.7%

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Consumer Price Index

• The *consumer price index*, CPI, measures changes in the cost of buying a "market basket" of goods and services purchased by a typical family

• Federal government uses 1982 – 1984 as the base period:

■ Calculating the CPI for a market basket of 400 goods and services in eight categories

• A simplified version of the process is presented as follows.

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Develop CPI in Hypothetical Market

Good or Service	Quantity in Market Basket (1)	Price in Base Year (2)	Cost of Basket in Base Year (3) = (1) x (2)
Twinkies	365 packages	\$0.84/pkg.	\$ 324.85
Fuel Oil	500 gallons	1.00/gallon	500.00
Cable TV	12 months	30.00/month	360.00
			<u>\$1,184.85</u>

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Develop CPI in Hypothetical Market

In column (4), not all prices have changed by the same percent since the base year. The cost of purchasing this same market basket in the current year is \$1,398.35

Good or Service	Prices in Current Year (4)	Cost of Basket in Base Year (5) = (1) x (4)
Twinkies	\$ 0.79	\$ 288.35
Fuel Oil	1.50	750.00
Cable TV	30.00	<u>360.00</u>
		\$1,398.35

Price index for the current year = $(\$1,398.35 / \$1,184.85) * 100 = 118$
 Between the base year and the current year, the "cost of living" increased by 18%.

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Problems with the CPI

- **CPI tends to overstate inflation**
 - ▣ **Quality bias:**
 - CPI assumes the quality of the market basket remains constant over time
 - ▣ **CPI holds constant the kind and amount of goods and services in the market basket,**
 - Slow to incorporate consumer responses to changes in relative prices
 - Does not allow households to shift away from relatively cost goods
 - ▣ **Failed to keep up with the consumer shift toward discount stores**
- **Researchers conclude the CPI has overestimated inflation by about 1 percent per year**

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Impact of These Problems

- **Overstating the inflation rate causes a number of problems**
 - ▣ **Changes in the index determine changes in tax brackets**
 - ▣ **Changes in the index determine changes in payments**
 - Wage agreements that include cost-of-living allowance (COLA)
 - Social Security benefits
 - Welfare payments
 - About 30% of federal outlays are tied CPI
 - 1% overstatement cost the federal \$180 billion per year
 - ▣ **Distorts other measures of the economy.**
 - Based on CPI, real wage fell 2% between 1980 and 2000.
 - If the CPI overstates inflation by 1% per year, the real wage increased by 20%

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GDP Price Index

- **Measures the average level of prices of goods and services included in GDP**
 - ▣ **$GDP\ price\ index = (nominal\ GDP / real\ GDP) \times 100$**
 - ▣ **Nominal GDP is the dollar value of this year's GDP measured in this-year prices**
 - ▣ **Real GDP is the dollar value of this year's GDP measured in base year prices**

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GDP Price Index

- ⊕ A measure of real GDP is constructed as the weighted sum of goods and services
- ⊕ The question is what weights (price) to use
 - ▣ Between World War II and 1995, the Bureau of Economic Analysis (BEA) used prices of a particular base year, most recently, 1987, to estimate real GDP
 - ▣ In this case, the quantity of each output in a particular year was valued by using the 1987 price

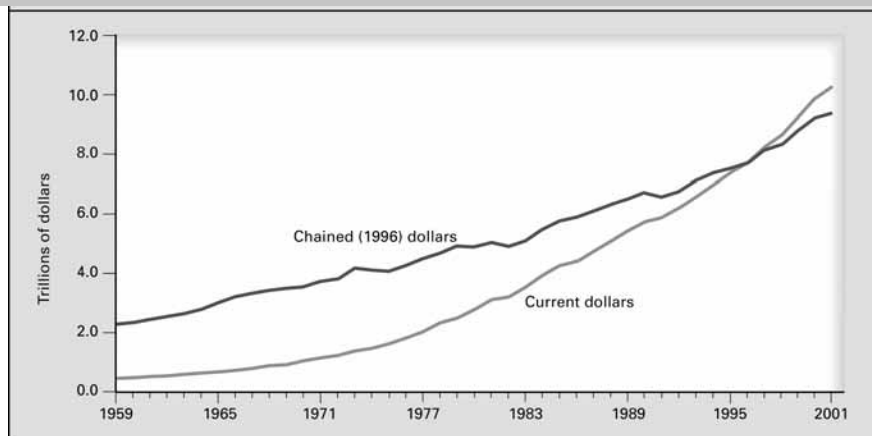
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GDP Price Index

- ⊕ As the base year is close to the year in question, this yields an accurate measure of real GDP
- ⊕ In early 1996, the BEA switched from a fixed-price weighting system to a chain-weighted system
 - ▣ real GDP adjusts the weights in calculating a price index more or less continuously from year to year

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U.S. GDP in Current Dollars and Chained (1996) Dollars



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GDP Price Index

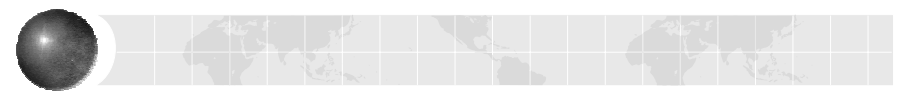
- ⊕ To provide the reference point, BEA measures U.S. real GDP and its components in chained 1996 dollars
- ⊕ To summarize
 - ▣ Current-dollar (nominal) GDP growth reflects growth in real GDP and in the price level
 - ▣ Chained-dollar GDP growth reflects only growth in output

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課堂報告

- ⊕ 請解釋何謂 Disposable income
- ⊕ 請解釋何謂 Net tax
- ⊕ 請解釋何謂 transfer payment
- ⊕ 請解釋何謂 Net domestic product
- ⊕ 請解釋 gross investment 和 net investment 的差別
- ⊕ 請解釋何謂 consumer price index



Homework

- ⊕ 15. Calculate the GDP by income approach
- ⊕ 15. Calculate GDP by expenditure approach