Econ. 1A. Chapter 5. **GDP and Standard of Living.**

In macroeconomics, **three statistics** - gross domestic product (GDP), the consumer price index (CPI) and the unemployment rate (UR) – **quantify the performance of the economy**. Public and private decision makers use these statistics to **monitor** changes in the economy and to **formulate** appropriate policies. Economists use these statistics to **develop** and to **test** theories about **how the economy works**.
In chapters 5, 6 and 7, we will study **these three statistics carefully**.

GDP, Income and Expenditure

1. **Standard of living**: The level of consumption of goods and services that people enjoy, on average; it is measure by average income per person, or **RGDP/population.**
2. **GDP (gross domestic product)**: The *market value* of all the **final goods and services** within a country during a given time period.

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a. **Final good or service**: A good or service that is produced for its final user and not as a component of another good or service.
b. **Intermediate good or service**: A good or service that is produced by one firm, bought by another firm, and used as a component of a final good or service.

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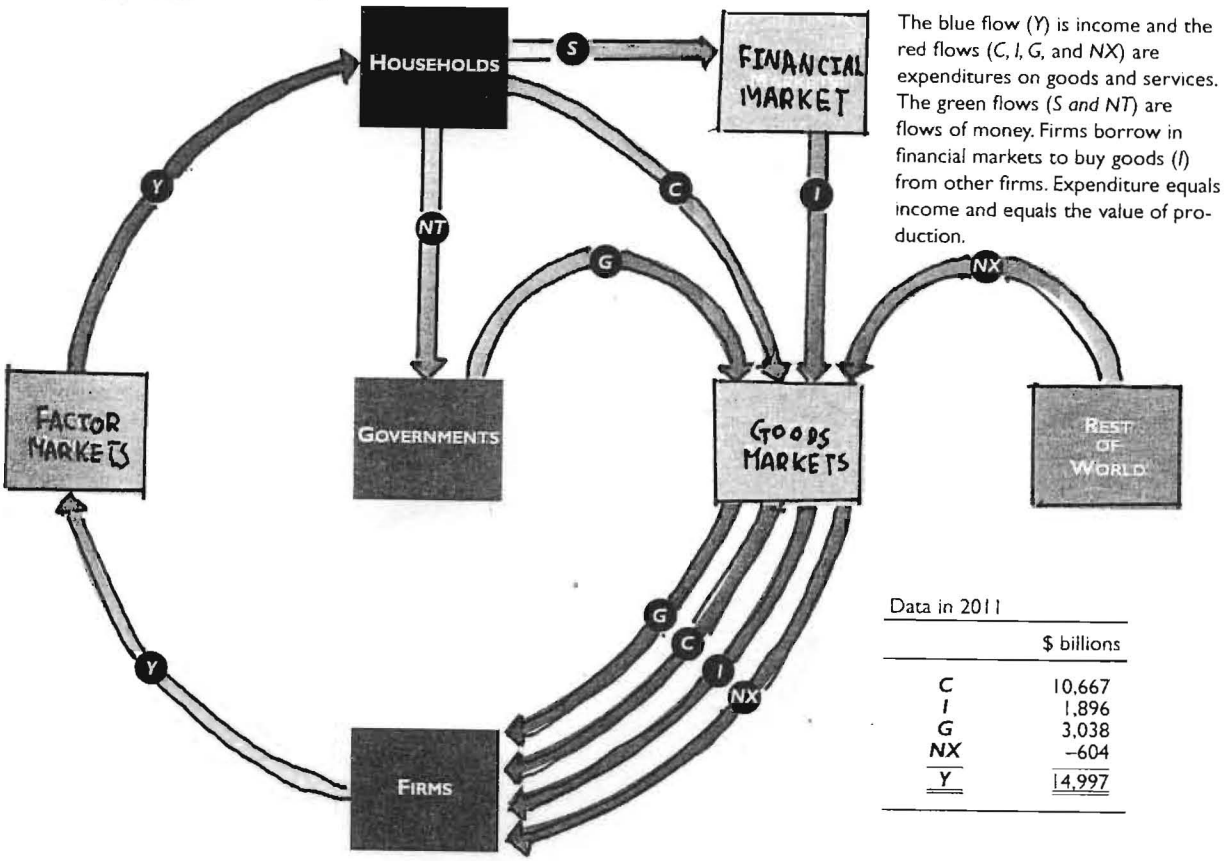
3. Calculating of GDP: Value of Production = Income = Expenditure
4. **The Circular Flow Model**

Assumptions:

(a) **Four sectors**: Households, Firms, Governments, the Rest of the World.
(b) **Three markets**: Goods market, Resources market, Financial market.
(c) A given time period.



The blue flow (*Y*) is income and the red flows (*C*, *I*, *G*, and *NX*) are expenditures on goods and services. The green flows (*S and NT*) are flows of money. Firms borrow in financial markets to buy goods (*I*) from other firms. Expenditure equals income and equals the value of production.

Data in 2011

	$ billions
C	10,667
I	1,896
G	3,038
NX	–604
Y	14,997

5. GDP can be valued in two ways:

(i) The amount that buyers pay for the goods and service: **Total Expenditure** (AE),

$$AE = C + I + G + NX$$

where C = consumption, I = investment, G = government purchases of goods, NX = export – import = net export.

(ii) The amount it costs producers to make goods, i.e., the income (wages, interest, rent and profits) pay for resources, L, N, K, E: **Aggregate Income** (Y).

$$Y = \text{wages} + \text{interest} + \text{rent} + \text{profits}.$$

Households allocate all their incomes after paying net taxes (NT) to consumption (C) and saving (S), i.e.,

$$Y = C + S + NT$$

where S = saving, NT = net taxes (taxes paid minus cash benefits received from governments).

6. According to national income account principle, **$Y = C + I + G + NX$.**

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a. **Consumption expenditure (C)**: The expenditure by households on consumption goods and services.
b. **Investment (I):** The purchase of new capital goods (tool, instruments, machines, building, and other constructions) and additions to inventories. Note that *investment does not include the purchase of financial assets (eg. Stocks and bonds).*
c. **Government purchases of goods and services (G)**: The expenditure by all levels of government on goods and services.
d. **Net export (NX)**: the value of exports of goods and services minus the value of imports of goods and service.
e. **Saving (S)**: the amount of income that is not paid in next taxes or spent on consumption goods and services.
f. **Net taxes**: taxes paid minus cash benefits received from governments.

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Measuring US GDP

7. The expenditure approach

GDP (expenditure approach) = C + I + G + NX

Notes: GDP does not include **used goods** and **financial assets.**

GDP: The Expenditure Approach

Item	Symbol	Amount in 2011 (second quarter) (billions of dollars)	Percentage of GDP
Consumption expenditure	*C*	10,667	71.1
Investment	*I*	1,896	12.6
Government expenditure	*G*	3,038	20.3
Net exports	*NX*	–604	–4.0
GDP	*Y*	14,997	100.0

SOURCE OF DATA: U.S. Department of Commerce, Bureau of Economic Analysis.

The expenditure approach measures GDP by adding together consumption expenditure (*C*), investment (*I*), government expenditure (*G*), and net exports (*NX*).

In 2011, GDP measured by the expenditure approach was $14,997 billion.

GDP: The Income Approach

The sum of all incomes equals net domestic product at factor cost. GDP equals net domestic product at factor cost plus indirect taxes less subsidies plus depreciation (capital consumption).

In 2011, GDP measured by the income approach was $15,070 billion. This amount is $73 billion more than GDP measured by the expenditure approach—a statistical discrepancy of −$73 billion.

Wages are by far the largest part of total income.

Item	Amount in 2011 (second quarter) (billions of dollars)	Percentage of GDP
Wages (compensation of employees)	8,273	55.2
Interest, rent, and profit (net operating surplus)	3,818	25.5
Net domestic product at factor cost	12,091	80.7
Indirect taxes less subsidies	1,039	6.9
Depreciation (capital consumption)	1,940	12.9
GDP (income approach)	15,070	100.5
Statistical discrepancy	–73	–0.5
GDP (expenditure approach)	14,997	100.0

SOURCE OF DATA: U.S. Department of Commerce, Bureau of Economic Analysis.

8. The income approach

GDP = compensation of employees + (interest + rent + profits)
+ indirect taxes less subsidies + depreciation (capital consumption).

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a. **Compensation of employees (wage)**: The payment for labor services.
b. **Interest + rent + profit:** This is called net operating surplus. It is the total income earned by capital (K), land (N) and entrepreneurship (E).
c. **Indirect taxes**: Sales taxes. Subsides: The payments by government to firms.
d. **Depreciation (capital consumption)**: The value of capital that results from its use.

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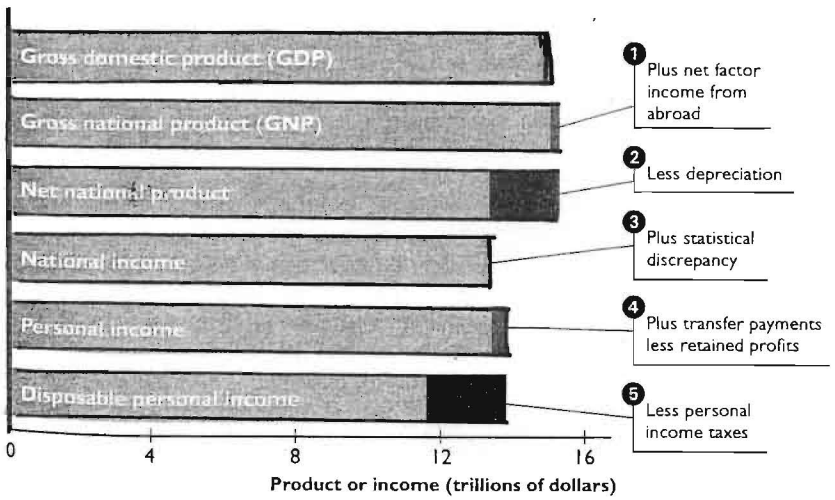
9. Compensation of employees + (interest + rent + profits) = **NDP (net domestic product at factor cost)**.
10. NDP + indirect taxes less subsidies + depreciation (capital consumption) = GDP (income approach)
11. GDP (income approach) + statistical discrepancy = GDP (expenditure approach)

GDP and Related Measures of Production and Income

12. **Gross national product (GNP)**: The market value of all the final goods and services produced anywhere in the world in a given time period by the factors of production supplied by the residents of the country. GNP = GDP + net factor income from abroad.
13. **Net national product (NNP)**: NNP = GNP – depreciation
14. **National income (NI)**: NI = NNP + statistical discrepancy
15. **Personal income**: National income – retained profits + transfer payments
16. **Disposable personal income** = personal income received by households - personal income taxes.

GDP and Related Product and Income Measures



The bars show six related product and income measures and the relationship among them.

1. Add net factor income from abroad to GDP to get GNP.
2. Subtract depreciation from GNP to get net national product.
3. Add the statistical discrepancy between the expenditure and income measures (almost invisible in the figure because it is tiny) to get national income.
4. Add transfer payments by governments less profits retained by firms to get personal income.
5. Finally, subtract personal income taxes to get disposable personal income.

SOURCE OF DATA: U.S. Department of Commerce, Bureau of Economic Analysis.

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Real GDP (RGDP) and Nominal GDP (NGDP)

18. **Nominal GDP (NGDP)** is the value of the final goods and services produced in a given year expressed in terms of the prices of that same year.
19. **Real GDP (RGDP)** is the value of the final goods and services produced in a given year expressed in terms of the prices in a base year. We will use **Y** to indicate RGDP, i.e., RGDP = Y
20. Changes NGDP combine changes in both production and prices.
21. Changes in RGDP measure changes in production.

Example: NGDP and RGDP calculation

Good	Q (2005)	Q' (2010)	P (2005)	P'(2010)
C: T-shirts	10	4	$5	$5
I: computer chips	3	2	$10	$20
G: security services	1	6	$20	$40 .

1. NGDP (2005) = ΣPQ = $5x10 + $10x3 + $20x1 = $50 + $30 + $20 = $100.
   NGDP (2010) = ΣP'Q' = $5x4 + $20x2 + $40x6 = $20 + $40 + 240 = $300.
2. **Base Year 2005: At the price of 2005**
   RGDP (2005) = ΣPQ = $5x10 + $10x3 + $20x1 = $50 + $30 + $20 = $100.
   RGDP (2010) = ΣPQ' = $5x4 + $10x2 + $20x6 = $20 + $20 + $120 = $160.
22. **GDP deflator** is an average of current prices expressed as a percentage (%) of based year prices.
    GDP deflator = (NGDP/RGDP)x100%
18. **Example:**

	NGDP	RGDP	GDP deflator
2005	$100	$100	100.0%
2010	$300	$160	187.5% .

The Uses and Limitations of RGDP

Y(RGDP) can be used to (1) compare the standard of living over time; (2) track the course of the business cycle; (3) compare the standard of living among countries.
(1) The standard of living over time

19. **Real GDP per person** = RGDP/population = Y/population. It tells the value of goods and services that each person can enjoy on average.

20. **Example**

Year	**1959**	**2009**
RGDP(billions)	$2,736	$12,893
Population (millions)	177.8	306.2.
RGDP per person	**$15,540**	**$42,106.**

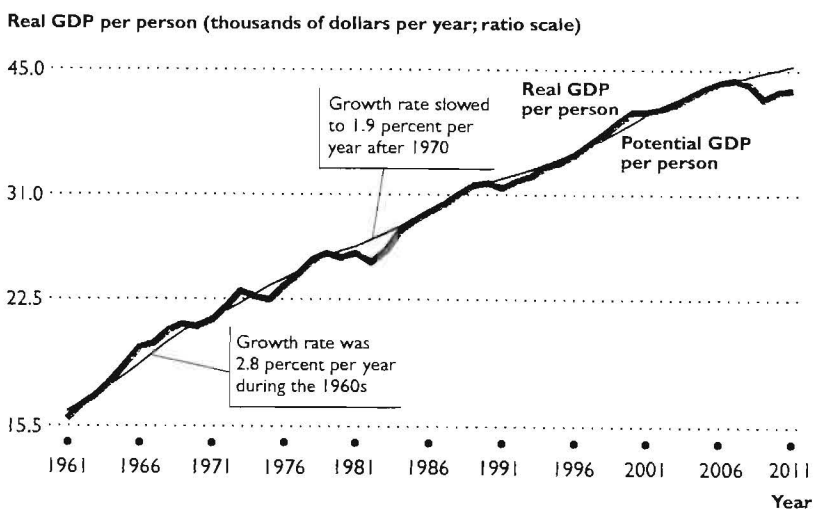
This shows that people were 2.7 times as well off in 2009 as their grandparents had been in 1959.

21. **Potential GDP (Yp)**: The value of RGDP when all the economy's factors of production – L, K, N and E – are fully employed.
(i) $Y < Yp \rightarrow$ labor and other factors of production are unemployed.
(ii) $Y = Yp \rightarrow$ labor and other factors of production are fully used.
(iii) $Y > Yp \rightarrow$ labor and factors of production are over-employed.

22.**(Y/population) and (Yp/population) in U.S. 1961-2011**.

Real GDP and Potential GDP Per Person in the United States: 1961–2011

Real GDP grows and fluctuates around the growth path of potential GDP. Potential GDP per person grew at an annual rate of 2.8 percent during the 1960s and slowed to 1.9 percent after 1970.



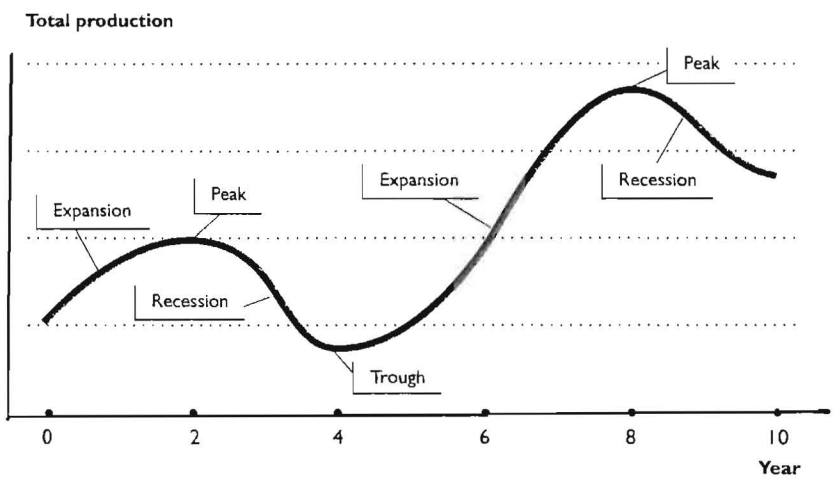
(1). RGDP per person grows and fluctuates around the growth path of potential GDP.
(2) RGDP per person growth rate from 1960 to 2009

	1960	1970	1980	1990	2000
Growth rate RGDP per person	3.32%	2.50%	2.45%	2.06%	0.68%

(2) Tracking the course of the business cycle

23. **Business cycle**: A periodic, but irregular up-and-down movement of total production (RGDP) and other measures of economic activity. Every cycle has two phases: (1) Expansion, and (2) Recession. Every cycle also contains two turning points: (1) Peak, and (2) Trough.

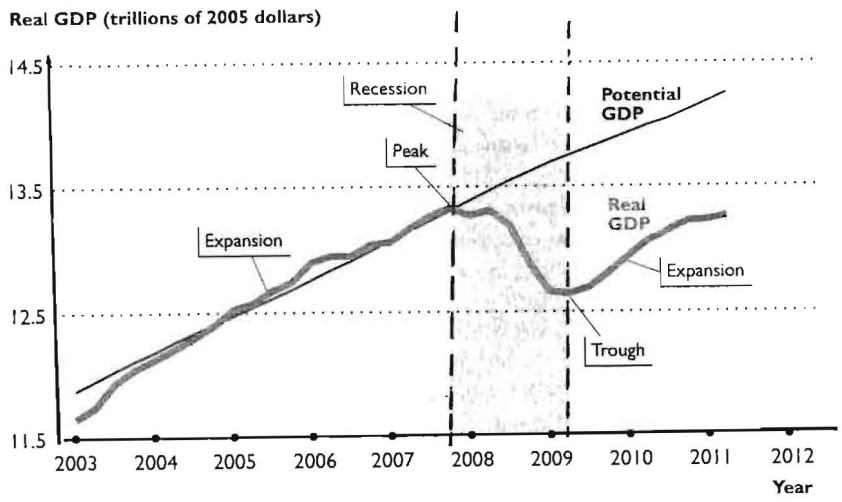
In a business cycle expansion, production and jobs increase. In a recession, production and jobs shrink. An expansion ends at a peak, and a recession ends at a trough.



24. **Expansion:** An expansion is a period during which Y(RGDP) increases.
Recession: A recession is a period during which Y(RGDP) decreases for at least two successive quarters; or defined by the NBER (National Bureau of Economic Research) as "a period of significant decline in total output, income, employment, and trade, usually lasting from 6 months to a year, and marked by contractions in many sectors of the economy."
25. **Peak and Trough are two turning points in a business cycle**. An expansion ends at a peak, and a recession ends at a trough.

26. A recent business cycle peak was in December 2007 and the trough had been reached by June 2009. It is a 19- month .recession.

The Most Recent U.S. Business Cycle



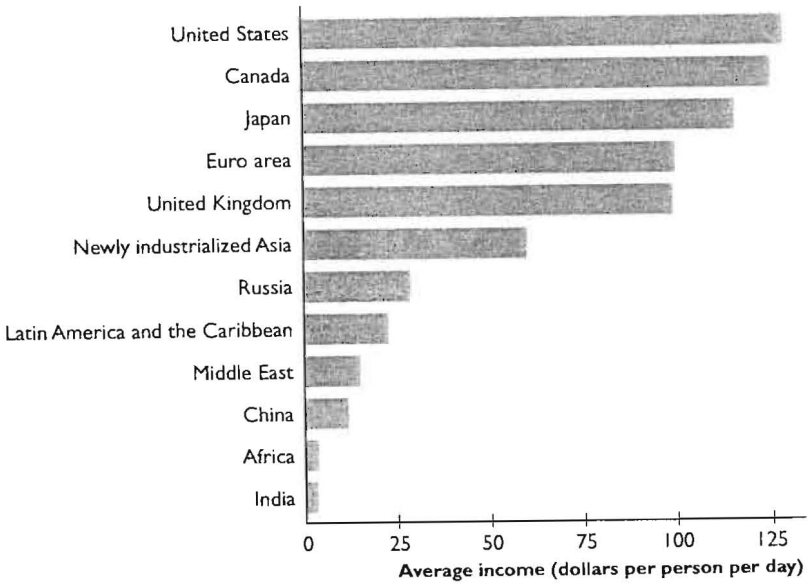
The most recent business cycle peak was in the fourth quarter of 2007 and the trough was in the second quarter of 2009 after which a new expansion began. Between the peak and the trough, the economy was in a recession. The recession was extremely deep and the expansion that followed was extremely weak—real GDP remained a long way below potential GDP.

(3) The standard of living among countries

27. RGDP per person per day = Y/(populationx365)

RGDP per person per day in 2010 .	
US	$129
Canada	$126
Japan	$116
Euro area	$100
UK	$ 99
Newly industrialized Asia	$ 63
Russia	$ 29
Latin America & Caribbean	$ 24
Middle East	$ 15
China	$ 12
Africa	$ 4
India	$ 3

From the data, we can see that an average American has a standard of living almost 8 times of an average person in China.



Goods and Services omitted from GDP

28. GDP measures the values of goods and services that are bought in markets. It excludes

(1) **Household production**: The production of goods and services in the home. For example, preparing meals, cutting grass, cleaning house, taking care of children and helping a child with homework.
(2) **Underground production**: The production of goods and services hiding the view of government. For example, people who produce and distribute illegal drugs. Farmer work that uses illegal workers who are paid less than the minimum wages.
(3) **Leisure time:** Leisure time is an economic good. But its value is difficult to measure.
(4) **Environment quality:** Pollution is an economic bad. But its value is difficult to measure.

29. GDP excludes household production, underground production, leisure time and environment. However, we know they influence our standard of living. Furthermore,
(1) **health and life expectancy** and
(2) **political freedom and social justice**
also influence our standard of living.
But can not be quantify and exclude from GDP.

30. **GDP and RGDP may not be the perfect indicator to measure our standard of living. But it is the best we have right now.**