2. National Income and National Product

EE 212 : Read: Case & Fair, ch. 6; LCR, ch.3, 22

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Contents

1 Introduction

- **Macroeconomics**: the study of the aggregate level of economic activity.
- Macroeconomics is the **science** that has been developed for the purpose of policy-making decision.

" Science begins with a measurement. "

Lord Kelvin (William Thomson, 1st Baron Kelvin), a famous physician.

- The sentence was quote in the Bank of Thaland Governor's speech, September 2016
- Advancement in Science begins with observations
- "Measure" is a very essential fundamentals for discovering and learning process.

- Policy-making decision requires information; data is so important for making judgment on the desirability of alternative policies. Normally, we need to know if aggregate activities are slack (too weak) or tight (too strong).
- Here is about how to measure **GDP.**

2 Meaning and significance of national income accounting

- National income accounting : the study of the methods of measuring the "aggregate output" and "aggregate income" of an economy
- What is counted? a measure of the total value of "**final** goods and services newly produced" in a country over a period of time
  - **Final goods** : Goods and services produced for final use.
  - **Intermediate goods** : Goods that are produced by one firm for use in further processing by another firm.

- "aggregate output" or "aggregate income" = ...
- Why do we count only "final goods" ?
- Example:
  - A house build 3 years ago, should it be counted in GDP this year ?
  - How about commission fee for the commissioner who sell the house?
- What is included in GDP?

☐ Intermediate goods
☐ Market activities
☐ Unreported activities
☐ Illegal activities
☐ Second hand goods
☐ Transfer payment
☐ Value of new stocks/bonds issued by a company
☐ Value of stocks traded in the stock market

- Is GDP a flow or a stock variable?
- Does the product from the previous year or period count?
- What does the GDP really measure?
- Is GDP a good measure?

3 Distinction between GNP and GDP

- Thailand $\rightarrow$ import some inputs from aboard $\rightarrow$ output (goods and services)
- Some of Thai factors of production $\rightarrow$ is used aboard $\rightarrow$ output (goods and services)

- Gross Domestic Product (GDP) : "Geographic baPased"
- Gross National Product (GNP) : "Ownership based"

- GDP is superior to GNP as a measure of domestic economic activity.
- GNP is superior to GDP as a measure of the economic well-being of domestic residents.

- GDP : the value of final output produced during a given period of time within the borders of a given country.
- GNP : the value of output produced by domestic factors of production, regardless of whether the production takes place.
- GNP $=$ GDP+Net factor income from abroad
- Net Income Payment from Abroad = Receipts of Income from Abroad – Payments of Income to Abroad
- Can you imagine the case in which the two measurements for the same nation can be largely different?
- Measuring the GDP, how? The circular-flow shows the way.

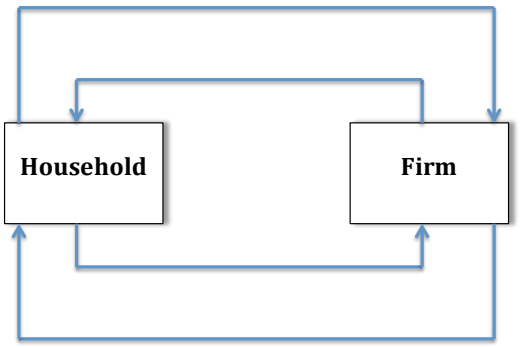
4 Circular flow of production and expenditure

- Circular flow: A diagram showing the income received and payments made by each sector of the economy.

1. Closed Economy : Firm and Household
2. Closed Economy : Firm and Household + Financial Institution
3. Closed Economy : Firm and Household + Financial Institution + Government
4. Opened Economy : Foreign Sector

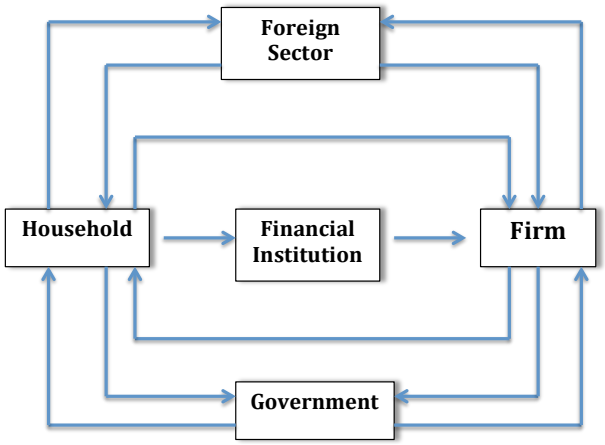
- Consumer :
  - Own the factors of production, sell/rent them to firms for income
  - Buy and consume goods & services
- Firm :
  - Buy/hire factors of production, use them to produce goods and services
  - Sell goods & services

Closed Economy



- Goods and Services = ... = ...

- Three approaches to GDP measurement
- What did you learn from the circular flow diagram?
  - The relationship between aggregate production, aggregate expenditure, and aggregate income within an economic system
- In a simple economy (as reflected by the circular flow diagram)
  - Total value of production = Total value of expenditure = Total value of income
  - **GDP, therefore, can be measured from three sides: production side, expenditure side, and income side**
- **leakages(withdrawals) VS. injections**
  - Leakage : flow out of the circular flow when resource income is received and not spent directly on purchases from domestic firms
  - Injection : added spending in the circular flow that is not paid for out of current resource income



5 Measurement of GDP

- The circular flow of production and expenditure : closed economy (household and firm)
- Total value of production = Total value of expenditure = Total value of income
- There are three methods to measure GDP
    1. Product Approach
    2. Expenditure Approach
    3. Income Approach
- Theoretically, all three methods yiled the same result.

5.1 Product Approach : (2 methods - final goods and services, value added)

5.1.1. using final goods and services value

- This is the most direct method Summing up the value of all "final" goods and services produced in each sector
- Sector = each type of product. For example, farming, mining, manufacturing etc.
- GDP = Value of production from all the sectors

- Problem in practice?
- The presence of intermediate goods represent a major problem for calculating GDP from the production side.
    - **Final goods** : Goods and services produced for final use.
    - **Intermediate goods** : Goods that are produced by one firm for use in further processing by another firm.
- If we count the value of an intermediate goods, its value will be counted more than once, as the value is also included in the final product.
- We can avoid this problem by using the value-added method in finding the value of production for each final goods.

Example.

- Only value of final sale is counted.
- We do not count auto parts in a new car.
- Auto parts in a new car are intermediate goods.

  - The tires that come with the car is not counted as a final good.
  - However if you get a flat and buy the same tire it is counted as a final good.
  - This is confusing. We use "Value Added Approach" to avoid double counting.

- Final goods include both consumption goods and capital goods.

  - The equipments used in producing a car are not included in the value of a car as an intermediate goods.
  - Newly produced equipments are counted in GDP as final goods.

5.1.2. using valued added

- Value for each of the good can be calculated through summing up the "value added" from each production stage of a certain goods.

Value added = The difference between the value of goods as they leave a stage of production and the cost of the goods as they entered that stage

Stage of production	Value of Sales	Cost of materials	Value added
Farmer	1000	0	
Rice Mill	2500	1000	
Retailer	5000	2500	
Total			

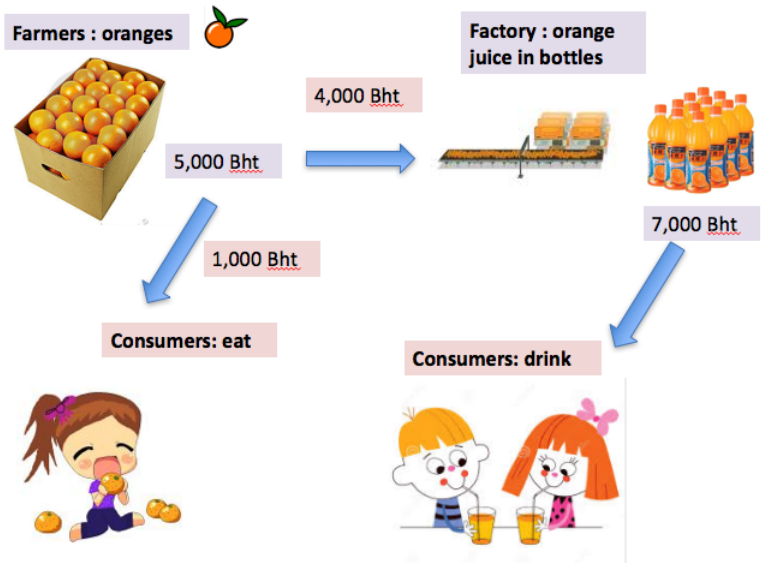
- Example : Value Added Through Stages of Production

	Firm R	Firm I	Firm F	All firms
A. Purchase from other firms	$0	$100	$130	$230
B. Purchase of factors of production (wage, rent, interest, profits)	100	30	50	180
A+B	100	130	180	410

GDP = ...

The sum of all values added in an economy is a measure of the economy's total marketed output.

Example. Find GDP of this economy.



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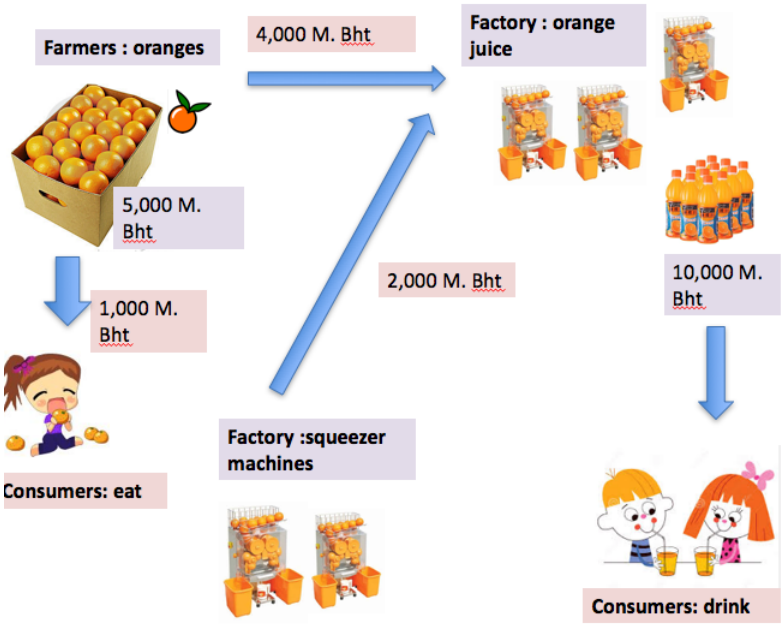


5.2 Expenditure Approach ***

A method of computing GDP that measures the amount spent on all final goods during a given period.

$$\begin{aligned} \text{GDP} &= C + I + G + (X - M) \\ \text{C} &= \textit{Consumption} \\ \text{I} &= \textit{Investment} \\ G &= \textit{Government Expenditure} \\ X &= \textit{Export} \\ \text{M} &= \textit{Import} \\ \text{(X-M)} &= \textit{Net Export} \end{aligned}$$

5.2.1 Consumption

= Total value of spending on final consumption of goods and services, as spent by households or non-profit seeking organisations.

- ☐ households expenditure on durable goods
- ☐ households expenditure on non-durable goods
- ☐ household expenditure on services
- ☐ household expenditure on new home building (residential structures)

- Durable goods: Goods that last a relatively long time, such as cars and household appliances.
- Nondurable goods: Goods that are used up fairly quickly, such as food and clothing.
- Services: The things we buy that do not involve the production of physical things, such as legal and medical services and education.
- There are three main categories of consumer expenditures: durable goods, nondurable goods, and services.

☐ household expenditure on renting a house

5.2.2 Investment

= Investments in constructions and equipments that are used in the production process and last longer than 1 year.

☐ firms or household expenditure on new machines, new equipments

☐ firms or households expenditure on new home building, new residential structures, new plants

☐ change in the firm inventories : Difference between demand and supply of goods within one accounting year.

***A convenient way to think of this is to think of goods that have been produced but have not yet been sold.

inventories = finish goods, work in progress, raw materials,

Δinventories = inventories end of period-inventories beginning of period

inventories ↓ ⇒ Δinventories....0 ⇒ produce this year.....sale

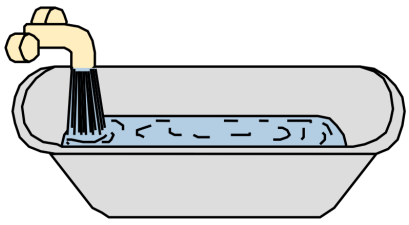
inventories ↓ ⇒ Δinventories....0 ⇒ produce this year.....sale

GDP=Expenditure on final goods and services ..... Δinventories

Gross investment VS. Net Investment

Gross investment: The total value of all newly produced capital goods (plant, equipment, housing, and inventory) produced in a given period.

Net investment : "An activity of spending which increases the availability of fixed capital goods"



Net investment=Gross investment ..... Depreciation

There are **three main categories** of investment expenditures: nonresidential investment, residential investment, and changes in inventories

- Nonresidential investment: Expenditures by firms for machines, tools, plants, and so on.
- Residential investment : Expenditures by households and firms on new houses and apartment buildings.
- Change in business inventories: The amount by which firms' inventories change during a period. Inventories are the goods that firms produce now but intend to sell later. = inventory end of period – inventory beginning of period

5.2.3 Government Expenditure

= Expenditures by federal, state, and local governments for final goods and services and investment. Total government spending on final goods and services.

- For goods and services that government consumes in providing public services
- For investment.

5.2.4 Net Export (X-M)

= The difference between exports (sales to foreigners of Thai produced goods and services) and imports (Thai purchases of goods and services from abroad).

Export of goods: values of final goods exported to foreign countries. Export of services: value of services in transportation and tourism, and other services such as communication services, insurance services, sold to foreign countries. Import of goods: values of final goods imported from foreign countries Import of services: values of services bought from foreign countries. The figure can be positive or negative.

5.3 Income Approach

- ..... = Factor Incomes: the total income earned by factors of production owned by a country's citizens .
- ..... = Factor Incomes: the total income earned by factors of production within a country.

$$GDP = \text{.....} + \text{Depreciation} + (\text{Indirect business tax-subsidies})$$

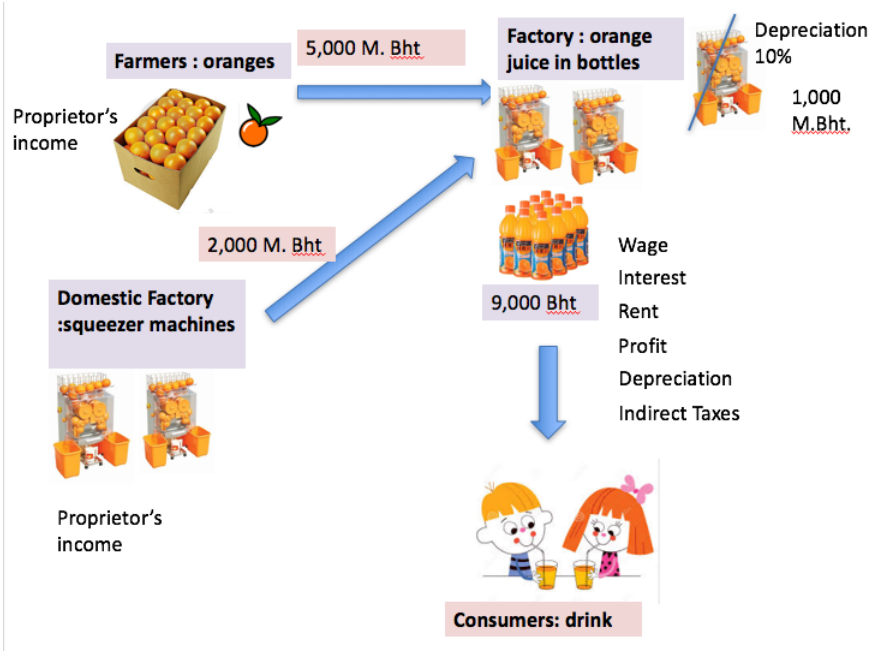
Depreciation: The amount by which the capital goods's value falls in a given period

Indirect taxes: eg. sales taxes, custom duties, and license fees

Subsidies: government payments to firms or households for which it receives nothing in return.

- **Compensation of employees**: Includes wages, salaries, and various supplements—employer contributions to social insurance and pension funds, for example—paid to households by firms and by the government.
- **Proprietors' income**: The income of unincorporated businesses
- **Corporate profits**: The income of corporate businesses.
- **Net interest**: The interest paid by business
- **Rental income**: The income received by property owners in the form of rent

Example. Calculate GDP of this economy.



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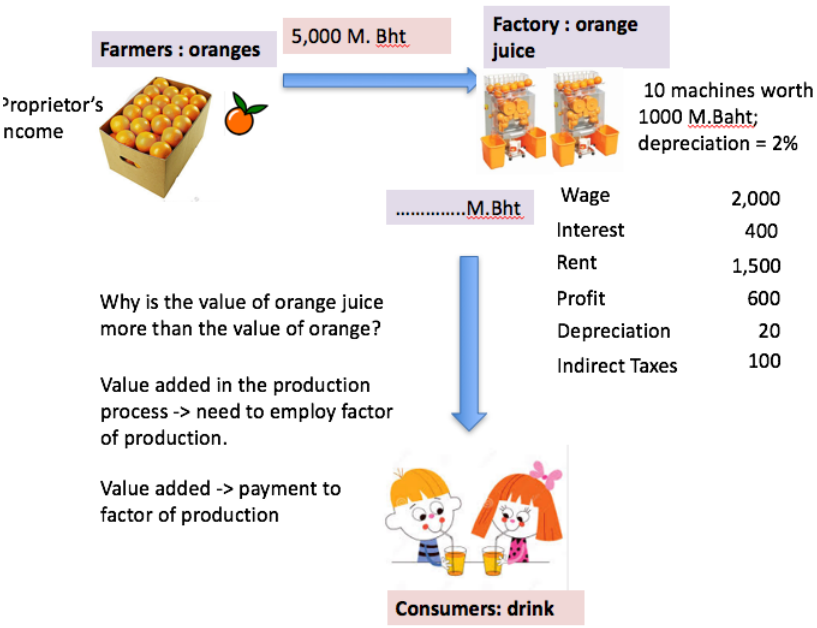


6 Relationship between GDP, GNP, NNP, NI, PI and DI

- GNP = GDP + ...
- Expenditure Approach : GDP = ... +.....+.....+(.....-.....)
- Income Approach : GDP = ...

- NNP (Net National Income)
  NNP = GNP - .....

- NI (National Income)
  NI = NNP - .....

- PI (Personal Income)
  PI = NI .....

- DI (Disposable Income)
  DI = PI - .....

7 Applications of GDP in economic analysis

7.1 Distinction between Nominal and Real GDP

- Real output vs. nominal output
  - Nominal output measures these values using current prices.
  - Real output measure these values using the prices of a base year.

	2005(based year)		2016	
	P	Q	P	Q
Cars	100	192	110	200
Rice	30	900	31	900

- Calculation of nomial output

  Nominal output (2005) = ...

  Nominal output (2016) = ...

- Calculation of Real GDP using 2005 Prices

  Real output (2005) =.....

  Real output (2016) = ...

  GDP Deflator = a measure of the level of prices of all new, domestically produced, final goods and services in an economy.

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

  - Calculation of GDP Deflator (Implicit GDP Deflator)

    GDP Deflator (2005) =.....

    GDP Deflator (2016) = ...

- Nominal GDP (Money GDP) VS. Real GDP

  ..... GDP is GDP evaluated at current market prices. Therefore, nominal GDP will include all of the changes in market prices that have occurred during the current year

  ..... GDP is GDP evaluated at the market prices of some base year. For example, if 1990 were chosen as the base year, then real GDP for 1995 is calculated by taking the quantities of all goods and services purchased in 1995 and multiplying them by their 1990 prices.

- Why do we need real GDP?
- What does reflect "standard of living"?
- The focus is on "real variable"

7.2 GDP per Capita

$$\text{GDP per Capita} = \frac{\text{GDP}}{\text{population}}$$

Why do we need GDP per capita?

GDP (millions of US dollars)

Country	1990	1996	2006	2013	2016
Thailand	85,343	183,035	221,758	420,529	407,026
Hong Kong	76,928	159,717	193,536	275,697	320,914
China	360,858	863,747	2,752,132	9,607,224	11,199,145
Malaysia	44,024	100,855	162,691	323,277	296,536

GDP Per Capita in U.S. Dollars

Country	1990	1996	2006	2013	2016
Thailand	1,508	3,043	3,369	6,171	5,910
Hong Kong	13,486	24,818	28,224	38,358	43,681
China	318	709	2,099	7,078	8,123
Malaysia	2,441	4,797	6,223	10,882	9,508

source: www.worldbank.org

7.3 Some remarks on the applications

The importance of national income accounting

- It shows

  - level of production and production structure
  - aggregate expenditure on consumption and investment of various economic sectors and value of export and import
  - sources and level of household's income
  - growth rate of the economy and various economic sectors
- It is used for economic development planning
- It represents macroeconomic indicators
- It is used as a base to evaluate the performance of the government economic policy

Limitation on the use of GDP

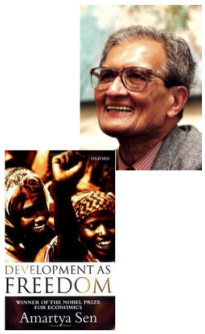
- GDP and SOCIAL WELFARE
  - Crime
    * Leisure
    * Income distribution
    * Pollution
  - GDP and MEASUREMENT
    * Underground economy

The GDP dilemmas

- Example;
  - The Devastating Effects of Pollution in China
    * http://www.youtube.com/watch?v=q4DtOhe2LfQ
  - South Korea and Japan among the countries with highest suicide rate
    * http://en.wikipedia.org/wiki/List_of_countries_by_suicide_rate
- GDP cannot reflect some of the essential conditions, but should we abandon the use of GDP?
- Nonmarket activities:
  - such as household production, voluntary work

Moving away from GDP

- The capability approach (Amartya Sen)
  - Development is about expanding people's freedom to achieve what they value in life.
    - Income is only one of the means to expand people's freedom.
  - Other important aspects of freedom include, for example;
    - Health and education
    - Political freedom
    - Safety-nets



- Operating the capability approach $\Rightarrow$ the Human Development Index (HDI)
  - Taking into account the multi-dimensionality of development, the index is measured by UNDP
  - HDI find the average value of three indicators:
    1. life expectancy at birth
    2. the adult literacy rate : statistics on enrollments in education
    3. GDP per capita
- http://hdr.undp.org/en/countries