Macroeconomics Notes

Part1: Data in Macroeconomics

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July 26, 2023

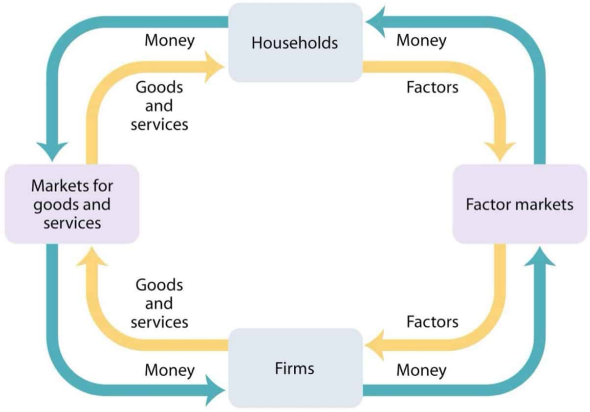
Contents

1 Income Measurement of A Country

- Microeconomics: How firms and families make decisions and how they effect each other.
- Macroeconomics: The functioning of the whole economics.

1.1 Income and Expenditure of Economics

For the whole economic body, the expenditure is equal to the income.
Reason: In every transaction, there are both seller and buyer.(shown in the **Circular Flow Diagram** below)



1.1.1 Gross Domestic Product(GDP)

- GDP: The total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period.

1.1.2 *Other Measurement of Income

- **Gross National Product(GNP)**: Absorb the value according to producers' nationality.
- **Net National Product(NNP)**: Based on GNP, considering the depreciation.

- **National Income**: Almost the same as NNP, but there still exist some statistical errors.
- **Personal Income**: The income of families and unincorporated business.(National Income deducts Retained earnings)
- **Disposal Personal Income**: Personal Income deducts Personal Tax and some Non-tax Expenditure(e.g. Traffic Ticket)

1.2 The Measurement of GDP

Some explanatioins of the definition:

- **monetary/market value**: Market price can be a measure of the value of economic activities by aggregating different goods.
- **total**: GDP needs to be a comprehensive measure, which absorbs all market value. (Note: Karen mowned the lawn for Doug, if Doug paid for Karen, the money will be aggregated to GDP. But if they are couples, this value won't be aggregate to GDP.)
- **finished goods**:GDP only includes finished goods, intermediate goods are excluded.
- **goods and services**:Goods are tangible, while services are intangible.
- **produced**: GDP includes the goods and services produced in the specific period of time, it not includes the transaction of goods produced in the past(e.g. The transaction of a second-hand car).
- **within a country's borders**: The country of production (geographical significance indicator) is the only factor, this won't be affected by the nationality of producer.
- **in a specific time period**: Usually 1 year or 3 months(1 quater). GDP measures the flow of income and expenditure in this period.(Note: GDP of a quater is the expenditure and income of this quater times 4. This makes it easy for comparison of quatenary GDP and yearly GDP)

Note: The defination above defines GDP as the **total expenditure**.
Another way of compute GDP for government is to aggregate the **total income**. Two results are almost the same(There are some statistical errors).

1.3 Components of GDP

GDP(denoted by Y),is divided into 4 parts: Consumption(C), Investment(I), Government Purchase(G) and Net Export(NX).

There's an identity equation:

$$Y = C + I + G + NX$$

1.3.1 Consumption

Consumption-Household expenses for goods and services other than purchasing new housing.

1.3.2 Investment

Investment-Expenditures for capital equipment, inventory, and buildings, including household expenses for purchasing new housing.

1.3.3 Government Purchase

Government Purchase-Government Expenditure on goods and services. In recent years, it's also called "Government consumption expenditures and gross investment".
(Note that **Transfers**, like old-age and survivors insurance and some unemployment insurance and old-age assistance, are not included in Government Purchase.)

1.3.4 Net Export

Net Export-Foreigners' expenditure on domestically produced goods (exports) minus domestic residents' expenditure on foreign goods (imports).

Example for GDP–2012 U.S.

Data from U.S. Department of Commerce

	Total (billion dollars)	Average (1 dollars)	Percentage (%)
GDP,Y	15676	49923	100
Consumption,C	11119	35411	71
Investment,I	2059	6557	13
Government Purchase,G	3064	9758	20
Net Export,NX	-567	-1806	-4

Table 1: GDP Components of U.S. 2012

1.4 Real GDP & Nominal GDP & GDP Deflator

Suppose the expenditure increased from one specific year to the next year, at least one is true for two statements below:

- 1. Having produced more goods and services
- 2. Having sold goods and services at higher prices

To classify these two effects, economists introduced two measurements: **Real GDP & Nominal GDP**.
Use these two values, define **GDP Deflator**:

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

GDP Deflator is used to monitor the price level, thus reflecting the Inflation level. Exactly, we can define the **Inflation Rate**:

$$\text{Inflation Rate} = \frac{\text{GDP Deflator}_2 - \text{GDP Deflator}_1}{\text{GDP Deflator}_1} \times 100\%$$

1.4.1 A Numerical Example

Suppose an economy only produces two goods: hotdogs and burgers.
Below are some data.

Price and Production				
Year	Price of Hotdog ($)	Production of Hotdog (unit)	Price of Burger ($)	Production of Burger (unit)
2020	1	100	2	50
2021	2	150	3	100
2022	3	200	4	150

1.4.1.1 Nominal GDP

$$N.GDP_{2020} = \$1 \times 100 + \$2 \times 50 = \$200$$
$$N.GDP_{2021} = \$2 \times 150 + \$3 \times 100 = \$600$$
$$N.GDP_{2022} = \$3 \times 200 + \$4 \times 150 = \$1200$$

1.4.1.2 Real GDP Select 2020 to be the base year:

$$R.GDP_{2020} = \$1 \times 100 + \$2 \times 50 = \$200$$
$$R.GDP_{2021} = \$1 \times 150 + \$2 \times 100 = \$350$$
$$R.GDP_{2022} = \$1 \times 200 + \$2 \times 150 = \$500$$

1.4.1.3 GDP Deflator

$$GDP\ Deflator_{2020} = \frac{200}{200} \times 100 = 100$$
$$GDP\ Deflator_{2021} = \frac{600}{350} \times 100 = 171$$
$$GDP\ Deflator_{2022} = \frac{1200}{500} \times 100 = 240$$

1.5 Is GDP a Good Index to Measure Social Welfare?

Summary GDP is a good index to measure social welfare, but not perfect. On the "***good***" hand, it directly (overall economic situation) or indirectly (medical, education, literature, etc.) measures the social welfare status of a country.
One the "***not perfect***" hand, it can't reflect **leisure, the value beyond market activities, the quality of environment, income and distribution**, etc., which are important in our overall feelings of happiness.

Robert Kennedy on GDP *"It measures everything in short, except that which makes life worthwhile. And it can tell us everything about America except why we are proud that we are Americans."*

2 Measurement of Living Expenses

2.1 Consumer Price Index(CPI)

Definition1 CPI A consumer price index is a price index, the price of a weighted average market basket of consumer goods and services purchased by households.

Definition2 Inflation Rate Percentage of price changes since the previous period.

2.1.1 How to compute CPI & Inflation Rate?

There are 5 main steps:

- **1. Fix the basket of consumer goods and services.**The more important consumer goods are, the greater the weight they are given.
- **2. Find the prices of the given goods.**
- **3. Compute the expense of a basket of goods and services.**
- **4. Select the base year and compute the index.**

$$\text{CPI} = \frac{\text{Price of a specific year}}{\text{Price of the base year}} \times 100$$

- **5. Compute the Inflation Rate.**

$$\text{Inflation Rate} = \frac{\text{CPI}_{year2} - \text{CPI}_{year1}}{\text{CPI}_{year1}} \times 100\%$$

Example:

1. **Fix the basket of consumer goods and services.**

   A basket of consumer goods and services = 4 hotdogs, 2 burgers.

2. **Find the prices of the given goods.**

Year	Price of Hotdog($)	Price of Burger($)
2020	1	2
2021	2	3
2022	3	4

3. Compute the expense of a basket of goods and services.

$$2020 : \$1 \times 4 + \$2 \times 2 = \$8$$
$$2021 : \$2 \times 4 + \$3 \times 2 = \$14$$
$$2022 : \$3 \times 4 + \$4 \times 2 = \$20$$

4. Select the base year and compute the index.

Select 2020 as the base year:

$$\text{CPI}_{2020} = \frac{\$8}{\$8} \times 100 = 100$$
$$\text{CPI}_{2021} = \frac{\$14}{\$8} \times 100 = 175$$
$$\text{CPI}_{2022} = \frac{\$20}{\$8} \times 100 = 250$$

5. Compute the Inflation Rate.

$$2021 : (175 - 100)/100 \times 100\% = 75\%$$
$$2022 : (250 - 175)/100 \times 100\% = 43\%$$

Expansion-PPI: Producer Price Index, measures the price of a weighted average market basket of producer goods and services.
PPI is a good index to predict the changes to happen in CPI.
Reason: The change in producers' cost will finally influence the price, which will affect CPI.

2.1.2 Problems in measuring living expenses

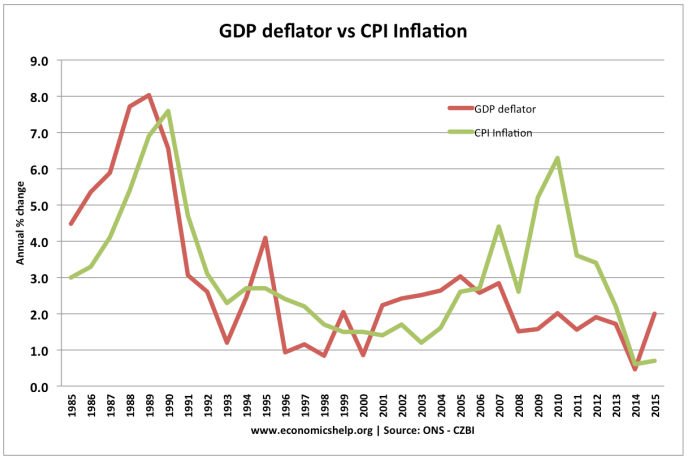
There are three main widely-accepted and difficult problems:

- Substitution Effect(Refer to Microeconomics).
- The Introduction of New Goods and Service.
- Can't measure the change in quality.

2.1.3 GDP Deflator v.s. CPI

Normally, two indexes change in the same direction. They illustrate the similar case, but there are two crucial differences.

- **Different Scopes:** GDP Deflator reflects the price change of goods and services produced domestically, while CPI reflects that of which are bought by consumers.
  For example, the price of planes that Boeing sold to the air force increases. This will affect GDP Deflator, but do nothing to CPI.
- **Different Weight Methods:** GDP Deflator compares all goods and services produced in a specific period to that of base year, while CPI compares the present price of a fixed weighted average market basket of goods and services to that in base year.



2.2 Correction Economic Values under the Influence of Inflation

2.2.1 Indexation

Definition Indexation means adjusting a price, wage, or other value based on the influence of Inflation.

$$\text{Present Dollar Quantity} = \text{Dollar Quantity in Year } T \times \frac{\text{Present Price Level}}{\text{Price Level of Year } T}$$

2.2.2 Nominal Interest Rate v.s. Real Interest Rate

The relationship between these two indexes is close to the equation below:

$$\text{Real Interest Rate} = \text{Nominal Interest Rate} - \text{Inflation Rate}$$

Note: Nominal Interest Rate is also known as Bank Interest Rate