2

National Income and Product Account

2.1 The component of Macroeconomy

Macroeconomics focuses on five groups:

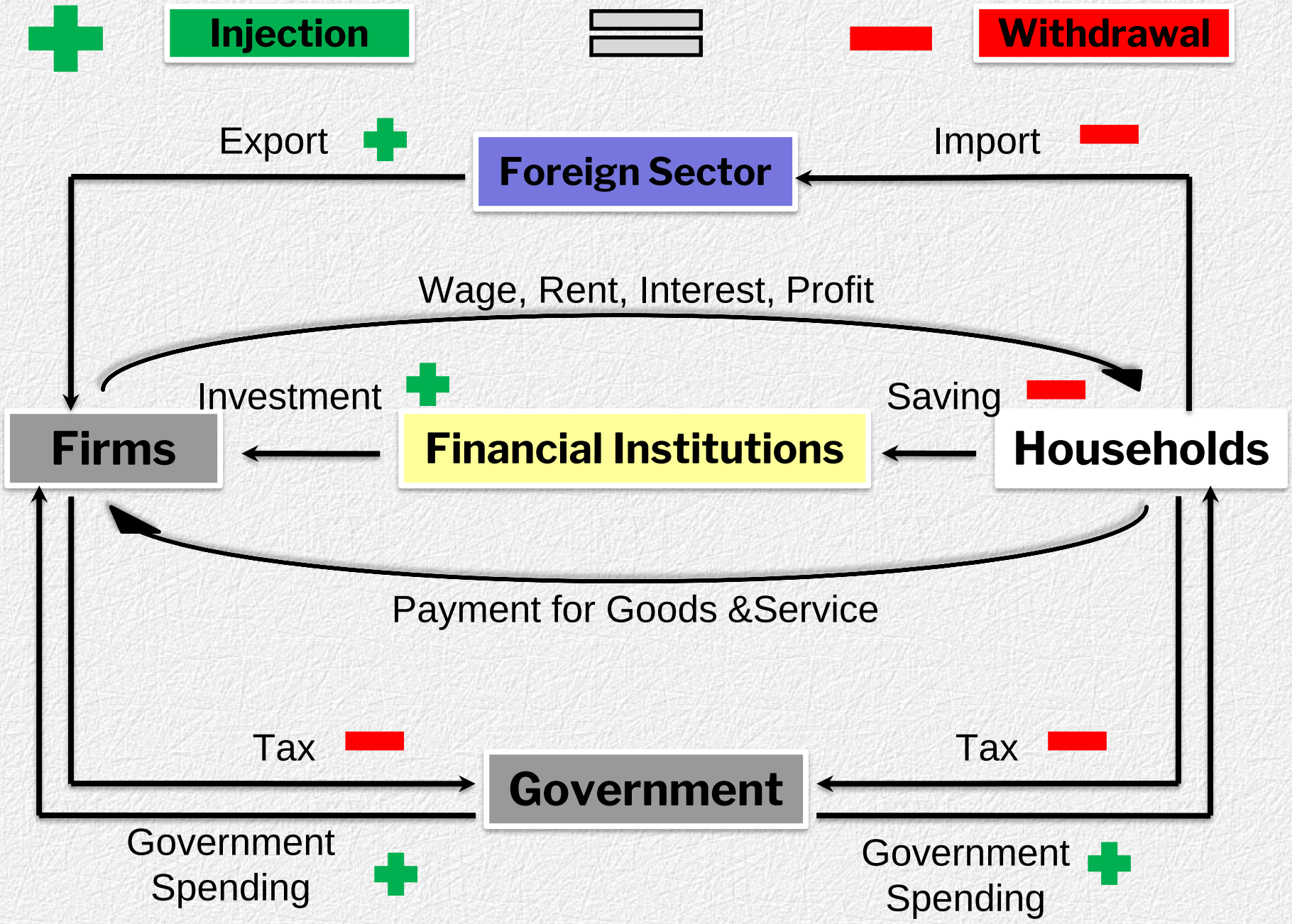
(1) Households
(2) Firms

(1) + (2) = **the private sector**

(3) Government **(the public sector)**
(4) The rest of the world **(the international sector)**
(5) Financial institution

2.2 Circular flow diagram

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


Injection
Withdrawal
Export
Foreign Sector
Import
Wage, Rent, Interest, Profit
Investment
Saving
Firms
Financial Institutions
Households
Payment for Goods &Service
Tax
Tax
Government
Government Spending
Government Spending

2.3 National Income and Product Account

❖ **National income and product accounts:**
Data collected and published by the government describing the various components of national income and output in the economy.

❖ **Office of the National Economics and Social Development Board (NESDB)**

www.nesdb.go.th

Gross Domestic Product

Gross Domestic Product (GDP): The total market value of **all final goods and services** produced **within a given period** by **factors of production located within a country**.

Concept of final goods and services

Final goods and services: Goods and services produced for final use.

Intermediate goods: Goods that are produced by one firm for use in further processing by another firm.

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.

2.4 GDP versus GNP

❖ Gross Domestic Product (GDP):

Look at output that **use factor of production within the country** to produce goods and services

❖ Gross National product (GNP)

The total market value of all final goods and services produced within a given period by **factors of production owned by a country's citizens, regardless of where the output is produced.**

2.4 GDP versus GNP

Example

- Profit from factory located in other country

  Count as GNP but not GDP in our country

  but count as GDP in foreign country

- Maid and labor work in other country
- ***GNP = GDP +*** Income from Thai factors of production used to produce G&S abroad - Income from foreign factors of production used to produce G&S in Thailand
- ***GDP = GNP +*** Income from foreign factors of production used to produce G&S in Thailand - Income from Thai factors of production used to produce G&S abroad

2.5 Measurement of GDP

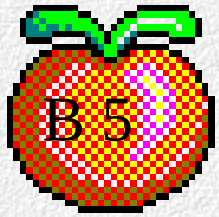
- Production approach
- Expenditure Approach
- Income Approach

2.5.1 Production Approach

- Calculated from value of final goods and services
- Calculated using value added method

Production Approach: using final G&S values

- Calculate total value of final goods and service: suppose there are 400 apples and 300 oranges in the economy



GDP = (price of apples × amount of apples)
+ (price of oranges × amount of oranges)
= (**B 10 × 400**) + (**B 5 × 300**)
GDP = **B 4,000 + B 1,500 = B 5,500**

Production Approach: using value-added values

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.

Production Approach: using value-added values

Value added in production of bottle orange juice		
Stage of production	**Sales**	**Value Added**
(1) Orange	500	500
(2) Orange juice	650	150
(3) Orange juice in bottle (factory level)	900	250
(4) Retail sale (Supermarket level)	1200	300
Total value added		1200

Some concerns: measuring GDP

EXCLUSION OF USED GOODS AND PAPER TRANSACTIONS

GDP is concerned only with new, or current, production.

GDP ignores all transactions in which money or goods change hands and in which no new goods and services are produced.

Example:

- **A house build 3 years ago, should it be counted in GDP this year ?**

  It should not be counted as GDP this year

- **How about commission fee for the commissioner who sell the house?**

  It should be counted as GDP this year

2.5.2 Expenditure Approach

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

THE EXPENDITURE APPROACH

There are four main categories of expenditure:

Expenditure Categories:

- **Personal consumption expenditures** (***C***): household spending on consumer goods
- **Gross private domestic investment** (***I***): spending by firms and households on new capital, i.e., plant, equipment, inventory, and new residential structures
- **Government consumption and investment (*G*)**
- **Net exports (*X* - *M*):** net spending by the rest of the world, or exports (*EX*) minus imports (*IM*)

$$GDP = C + I + G + (X - M)$$

THE EXPENDITURE APPROACH (C)

Personal Consumption Expenditures (*C*)

personal consumption expenditures (*C*): expenditures by consumers on goods and services.

There are three main categories of consumer expenditures: durable goods, nondurable goods, and services.

THE EXPENDITURE APPROACH (C)

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.

THE EXPENDITURE APPROACH (I)

Gross Private Domestic Investment (*I*)

Gross private domestic investment (*I*): Total investment in capital—that is, the purchase of new housing, plants, equipment, and inventory by the private (or nongovernment) sector.

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

THE EXPENDITURE APPROACH (I)

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

Example of changes in inventories

- Inventory beginning of the year is 2 unit, price of each unit is 10 Baht

  = 2*10 = 20 Baht

- In that year can produce 7 unit, price of each unit is 10 Baht

  = 7*10 = 70 Baht

- In that year can sell 6 unit, price of each unit is 10 Baht = 60 Baht

- Inventory at the end of the year is 3 units, price of each unit is 10 Baht

  = 30 Baht

- Changes in inventories =

  = Inventory end of period – inventory beginning of period

  = 30 – 20 = 10 Baht

GDP vs. Total Sales

Question: GDP = Total Sales ????

Ans:

GDP = final sales + change in business inventories

+ other components of GDP

GDP = final sales + (inventory end of period –

inventory beginning of period)

+ other components of GDP

THE EXPENDITURE APPROACH (I)

Gross Investment versus Net Investment

Depreciation: The amount by which an asset's value falls in a given period.

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

Net investment = Gross investment - Depreciation.

$$\text{capital}_{\text{end of period}} = \text{capital}_{\text{beginning of period}} + \text{net investment}$$

$$\text{capital}_{\text{end of period}} = \text{capital}_{\text{beginning of period}} + \textbf{Gross investment} - \textbf{Depreciation}$$

THE EXPENDITURE APPROACH (G)

Government Consumption and Investment (*G*)

Government consumption (purchases) and investment (*G*): Expenditures by federal, state, and local governments

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

THE EXPENDITURE APPROACH (X - M)

Net Exports (*EX - IM*)

Net exports (*EX - IM*): The difference between exports (sales to foreigners of Thai produced goods and services) and imports (Thai purchases of goods and services from abroad).

The figure can be positive or negative.

THE EXPENDITURE APPROACH

Conclusion

Gross Domestic Product

$$GDP = C + I + G + (X - M)$$

Net Domestic Product

$$NDP = C + net\ I + G + (X - M)$$

$$NDP = C + (I - Depreciation) + G + (X - M)$$

$$NDP = C + I + G + (X - M) - Depreciation$$

$$NDP = GDP - Depreciation$$

Net National Product

$$NNP = GNP - Depreciation$$

Expenditure on Gross Domestic Product at Current Market Prices (Original), 2011-2019, (Millions of Baht)

	Private Consumption Expenditure C	General Government Consumption Expenditure G	Gross Fixed Capital Formation I	Change in Inventories I	Exports of Goods and Services X	Imports of Goods and Services M	Expenditure on Gross Domestic Product	Statistical Discrepancy	Gross Domestic Product
2011	5,742,852	1,397,530	2,769,018	37,451	8,109,950	7,631,792	10,425,009	115,125	10,540,134
	54.49%	13.26%	26.27%	0.36%	76.94%	72.41%	98.91%	1.09%	100.00%
2012	6,293,508	1,544,330	3,245,925	137,205	8,529,212	8,400,223	11,349,957	25,392	11,375,349
	55.33%	13.58%	28.53%	1.21%	74.98%	73.85%	99.78%	0.22%	100.00%
2013	6,475,849	1,643,464	3,180,865	298,352	8,753,512	8,362,555	11,989,487	-90,777	11,898,710
	54.42%	13.81%	26.73%	2.51%	73.57%	70.28%	100.76%	-0.76%	100.00%
2014	6,644,632	1,729,869	3,146,155	-37,252	9,111,735	8,217,427	12,377,712	-236,616	12,141,096
	54.73%	14.25%	25.91%	-0.31%	75.05%	67.68%	101.95%	-1.95%	100.00%
2015	6,974,351	2,334,149	3,375,475	-108,626	9,340,694	7,811,706	14,104,337	-566,852	13,537,485
	51.52%	17.24%	24.93%	-0.80%	69%	57.70%	104.19%	-4.19%	100.00%
2016	7,260,410	2,461,539	3,484,345	-420,724	9,950,612	7,804,666	14,931,516	-398,041	14,533,475
	49.96%	16.94%	23.97%	-2.89%	68.47%	53.70%	102.74%	-1.95%	100.00%
2017	7,537,993	2,531,913	3,580,036	-49,559	10,534,540	8,442,039	15,692,884	-240,002	15,452,882
	48.78%	16.38%	23.16%	-0.32%	68%	54.63%	101.55%	-1.55%	100.00%
2018	8,002,725	2,643,380	3,726,894	395,148	10,616,164	9,169,689	16,214,622	150,950	16,365,572
	49%	16%	23%	2%	65%	56%	99%	1%	100.00%
2019	8,448,321	2,722,780	3,814,370	227,414	10,086,594	8,543,405	16,756,074	119,817	16,875,891
	50.06%	16.13%	22.60%	1.35%	59.77%	50.62%	99.29%	0.71%	100.00%

data source: NESDB

Expenditure on Gross Domestic Product, Chain volume measures [reference year = 2002], 2014-2020, (Millions of Baht)

	Private Consumption Expenditure C	General Government Consumption Expenditure G	Gross Fixed Capital Formation I	Change in Inventories I	Exports of goods and services X	Imports of goods and services M	Expenditure on gross domestic product (sum up)	Expenditure on gross domestic product (CVM)	Gross domestic product (CVM)
2014r	4,785,280 52%	1,457,176 16%	2,252,515 24%	- 63,572 -1%	7,086,417 77%	6,477,507 70%	9,040,496 98%	9,119,449 99%	9,232,088 100%
2015r	4,909,901 52%	1,493,835 16%	2,350,865 25%	-111,914 -1%	7,175,008 75%	6,477,761 68%	9,343,404 98%	9,409,628 99%	9,521,426 100%
2016r	5,051,349 51%	1,526,255 15%	2,418,543 25%	-340,739 -3%	7,368,450 75%	6,413,521 65%	9,621,277 98%	9,725,610 99%	9,848,502 100%
2017r	5,207,330 51%	1,530,150 15%	2,463,149 24%	- 68,590 -1%	7,750,198 76%	6,812,906 66%	10,076,574 98%	10,113,169 99%	10,259,941 100%
2018r	5,445,591 51%	1,570,599 15%	2,555,863 24%	259,187 2%	8,009,911 75%	7,376,626 69%	10,472,917 98%	10,526,902 98%	10,689,790 100%
2019p	5,660,992 52%	1,597,105 15%	2,606,957 24%	111,260 1%	7,773,334 71%	6,995,499 64%	10,764,405 98%	10,771,254 99%	10,932,067 100%
2020p1	5,606,049 55%	1,611,132 16%	2,481,063 24%	153,895 1%	6,262,668 61%	6,065,819 59%	10,092,190 98%	10,108,873 98%	10,265,322 100%

data source: NESDB

2.5.2 THE INCOME APPROACH

Income approach for GDP or GNP

National income = factor income

+ (indirect taxes – subsidies)

+ net business transfer payments

+ surplus of government enterprise

National income = NNP – Statistical discrepancy

THE INCOME APPROACH

Factor Incomes = **compensation of employees**

+ proprietors' income

+ corporate profits

+ net interest

+ rental income

THE INCOME APPROACH

Composition of Factor Incomes

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

THE INCOME APPROACH

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

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

Net business transfer payments: Net transfer payments by businesses to others.

Surplus of government enterprises: Net income of government enterprises

Income approach for GDP or GNP

National income = factor income

+ (indirect taxes – subsidies)

+ net business transfer payments

+ surplus of government enterprise

National income = NNP – Statistical discrepancy

Note: Statistical discrepancy is Data measurement error.

GNP = NNP + Depreciation

GNP = National income + Statistical discrepancy + Depreciation

THE INCOME APPROACH

Summarize

GNP = National income + statistical discrepancy + depreciation

GNP = factor incomes
+ (indirect taxes – subsidies)
+ net business transfer payment
+ Surplus of government enterprise
+ Statistical discrepancy
+ Depreciation

THE INCOME APPROACH

Relationship between GDP, GNP, NNP, and NI

GNP = GDP **+** Income from Thai factor of production used to produce G&S abroad **–** Income from foreign factor of production used to produce G&S in Thailand

GDP = GNP **+** Income from foreign factor of production used to produce G&S in Thailand **–** Income from Thai factor of production used to produce G&S abroad

NNP = GNP – Depreciation

National Income = NNP – Statistical Discrepancy

Note: Statistical discrepancy is data measurement error

THE INCOME APPROACH

Relationship between National Income (NI), personal income (PI), and Disposable Income (DI)

Personal Income = NI – Amount of national income not going to households

Example of Amount of national income not going to households is ***Retained earnings of corporation***

Retained earnings of corporation =

Corporate profits - Dividends

Personal Income = NI

– (Corporate profits – Dividends)

– Other parts of NI not going to households

THE INCOME APPROACH

Relationship between National Income (NI), personal income (PI), and Disposable Personal Income (DI)

Disposable personal Income (DI) = Personal Income (PI) – Personal income taxes

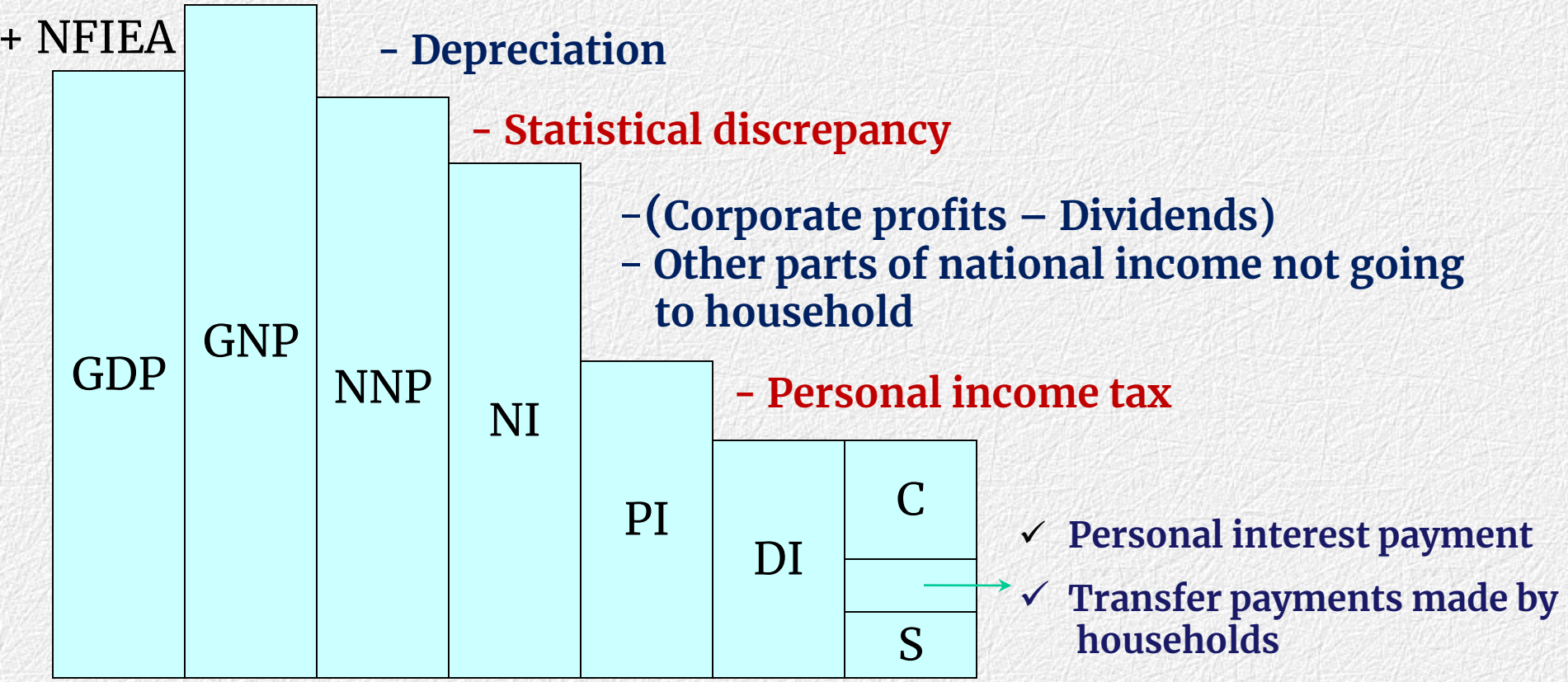
People spends Disposable Personal Income (DI) for

- ***Personal consumption expenditures (C)***
- ***Personal interest payment***
- ***Transfer payments made by households***
- ***Personal saving (S)***

If there is no "Personal interest payment" and "Transfer payments made by households" DI = C+S

GDP, GNP, NNP, NI, PI and DI

Net factor income from abroad (NFIEA)= Income from Thai factor of production used to produce G&S abroad – Income from foreign factor of production used to produce G&S in Thailand



Variables in English and Thai

- GDP = Gross Domestic Product --- ผลิตภัณฑ์มวลรวมภายในประเทศ
- GNP = Gross Domestic Product--- ผลิตภัณฑ์ประชาชาติเบื้องต้น
- NDP = Net Domestic Product --- ผลิตภัณฑ์ในประเทศสุทธิ
- NNP = Net National Product --- ผลิตภัณฑ์ประชาชาติสุทธิ
- NI = National Income --- รายได้ประชาชาติ
- PI = Personal Income --- รายได้ส่วนบุคคล
- DI = Disposable Income --- รายได้พึงใช้จ่าย

Measurement of GDP by Income Approach, 2010-2019, (Millions of Baht)

	GDP	GNP	NNP	NI	DI
2010	10,808,142	10,355,372	8,764,596	8,764,596	2,054,475
2011	11,306,907	11,034,197	9,295,671	9,295,671	2,242,584
2012	12,357,344	11,791,146	9,832,988	9,832,988	2,427,798
2013	12,915,159	12,089,670	10,005,145	10,005,145	2,552,293
2014	13,230,306	12,549,609	10,335,413	10,335,413	2,460,654
2015	13,743,478	13,034,505	10,689,671	10,689,671	2,692,529
2016	14,590,337	13,904,972	11,416,586	11,416,586	2,721,979
2017r	15,488,664	14,794,813	12,166,150	12,166,150	2,802,573
2018r	16,368,711	15,575,607	12,801,363	12,801,363	3,011,753
2019p	16,898,086	16,275,574	13,364,106	13,364,106	3,025,249

data source: NESDB, NSO

2.6 NOMINAL GDP vs. REAL GDP and GDP Deflator

Nominal GDP: Gross domestic product measured in current prices

$$= (P_{1\ \text{current}} \times Q_1) + (P_{2\ \text{current}} \times Q_2) + \ldots\ldots\ldots + (P_{n\ \text{current}} \times Q_n)$$

Real GDP: Gross domestic product measured in constant prices

$$= (P_{1\ \text{base year}} \times Q_1) + (P_{2\ \text{base year}} \times Q_2) + \ldots\ldots\ldots + (P_{n\ \text{base year}} \times Q_n)$$

2.6 NOMINAL GDP vs. REAL GDP and GDP Deflator

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100 = \frac{\Sigma (P_{current} \times Q_{current})}{\Sigma (P_{base\ year} \times Q_{current})} \times 100$$

The GDP deflator is one measure of the overall price level.

Overall price increases can be sensitive to the choice of the base year.

Example: NOMINAL GDP vs. REAL GDP calculation

Three Goods Economy: Books (B), Rulers (R), Erasers (E)

Year	P_B	Q_B	P_R	Q_R	P_E	Q_E
Year 1	100	80	20	300	5	250
Year 2	120	60	30	250	6	150
Year 3	130	90	35	400	7	450

Example: NOMINAL GDP vs. REAL GDP calculation

Using year 1 as a base year, Find

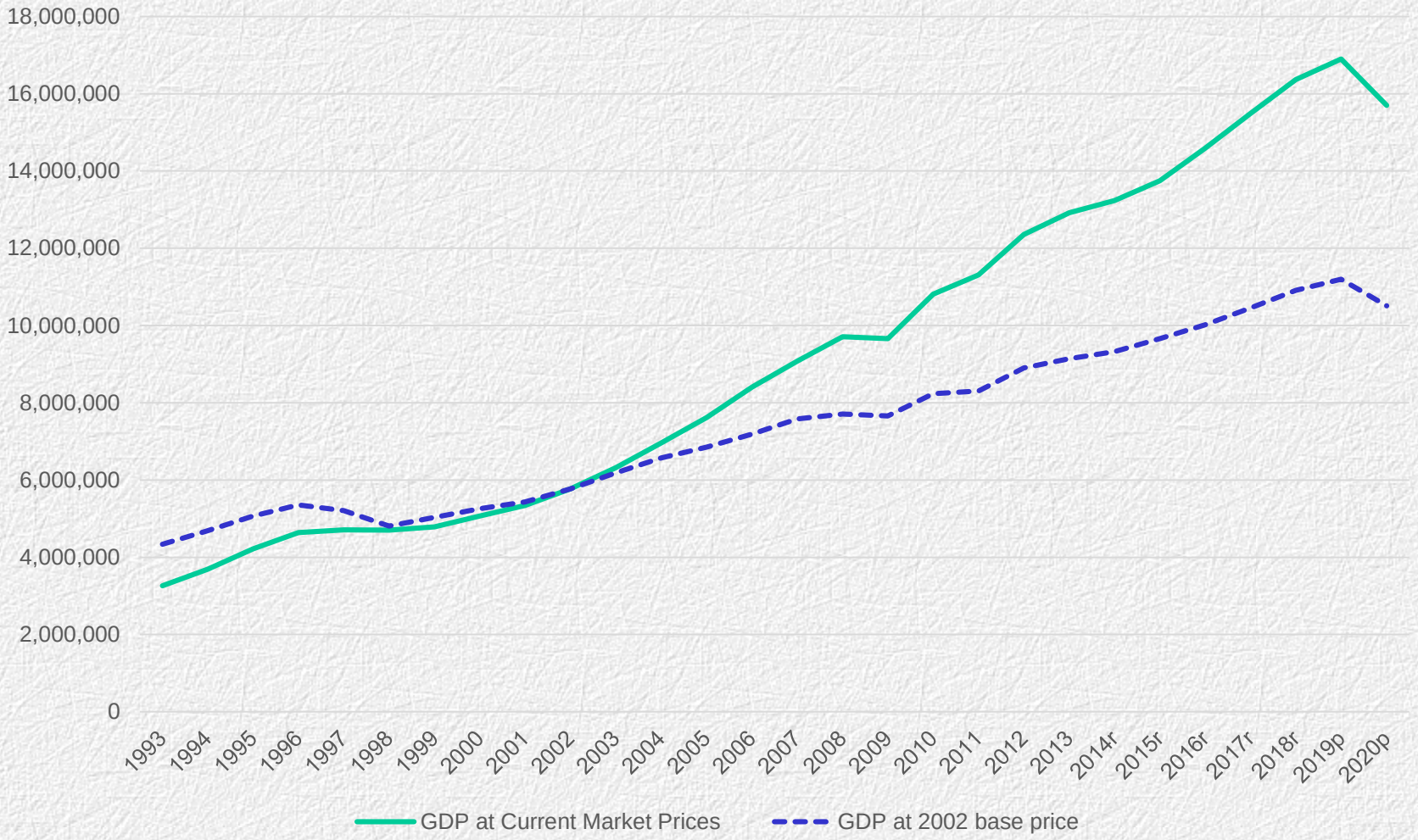
- Nominal GDP for year 1 =
- Nominal GDP for year 2 =
- Nominal GDP for year 3 =
- Real GDP for year 1 =
- Real GDP for year 2 =
- Real GDP for year 3 =

Example: NOMINAL GDP vs. REAL GDP calculation

Using year 1 as a base year, Find

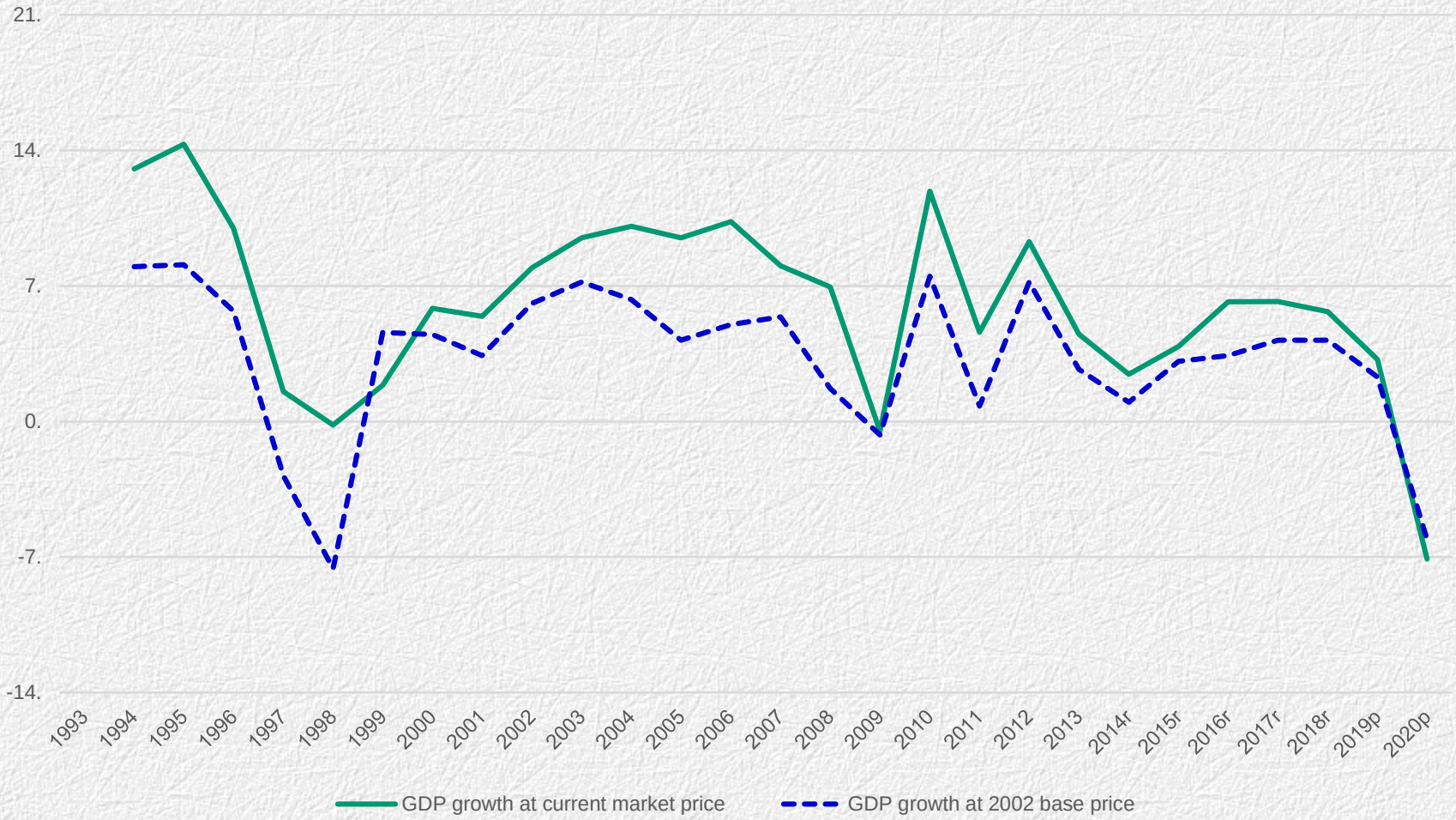
- GDP deflator for year 1 =
- GDP deflator for year 2 =
- GDP deflator for year 3 =
- Inflation rate for year 2 (from year 1) =
- Inflation rate for year 3 (from year 2) =

Level of GDP 1993 – 2020 (Unit: Millions of Baht)



Source: Draw using data from www.nesdb.go.th

Level of growth GDP 1993 – 2020 (Unit: Percent)



Source: Draw using data from www.nesdb.go.th

GDP, Chain Volume Measure (CVM)

Another way to measure Real GDP by using previous years prices as weight instead of using only based year price then link all data into series number.

For details of GDP (CVM) calculation, visit the following link (The document is in Thai language provide by NESDB)

https://www.nesdc.go.th/article_attach/02CVMs.pdf

2.7 LIMITATIONS OF THE GDP CONCEPT

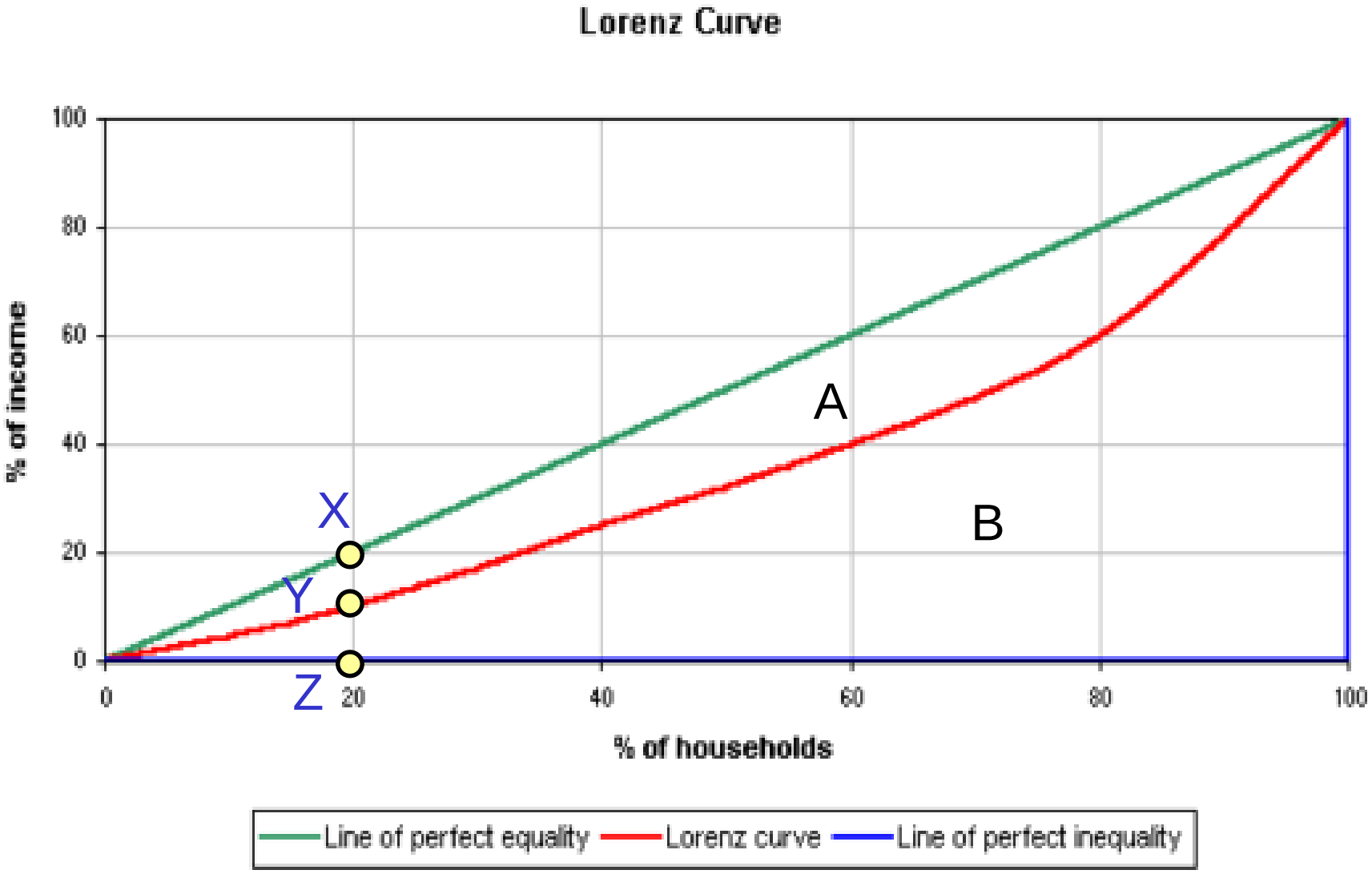
GDP and SOCIAL WELFARE

- Crime
- Leisure
- Income distribution….may use GDP per capita
- Pollution

GDP and MEASUREMENT

- Underground economy
- Nonmarket activities: such as household production, voluntary work

1.5.6 Income distribution (Lorenz Curve and Gini-coefficient)



1.5.6 Income distribution (Lorenz Curve and Gini-coefficient)

At point X ⇨ 20% of household receives 20% of income

At point Y ⇨ 20% of household receives 10% of income

At point Z ⇨ 20% of household receives 0% of income

Point X is on the "Perfect Equality Line"

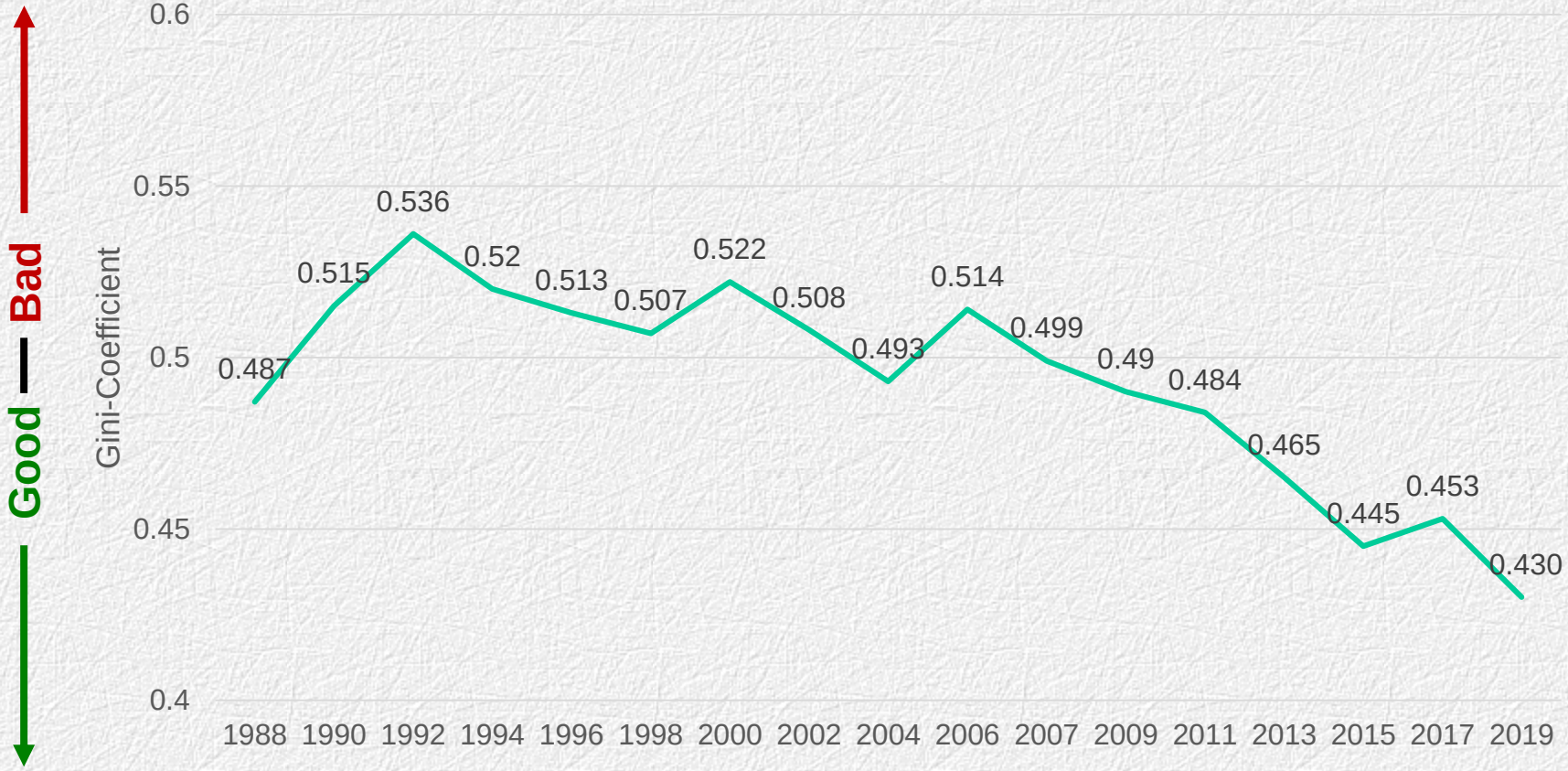
Point Y is on the "Lorenz Curve"

Point Z is on the "Perfect Inequality Line"

$$\text{Gini-coefficient} = \frac{\text{area A}}{\text{area A + area B}}$$

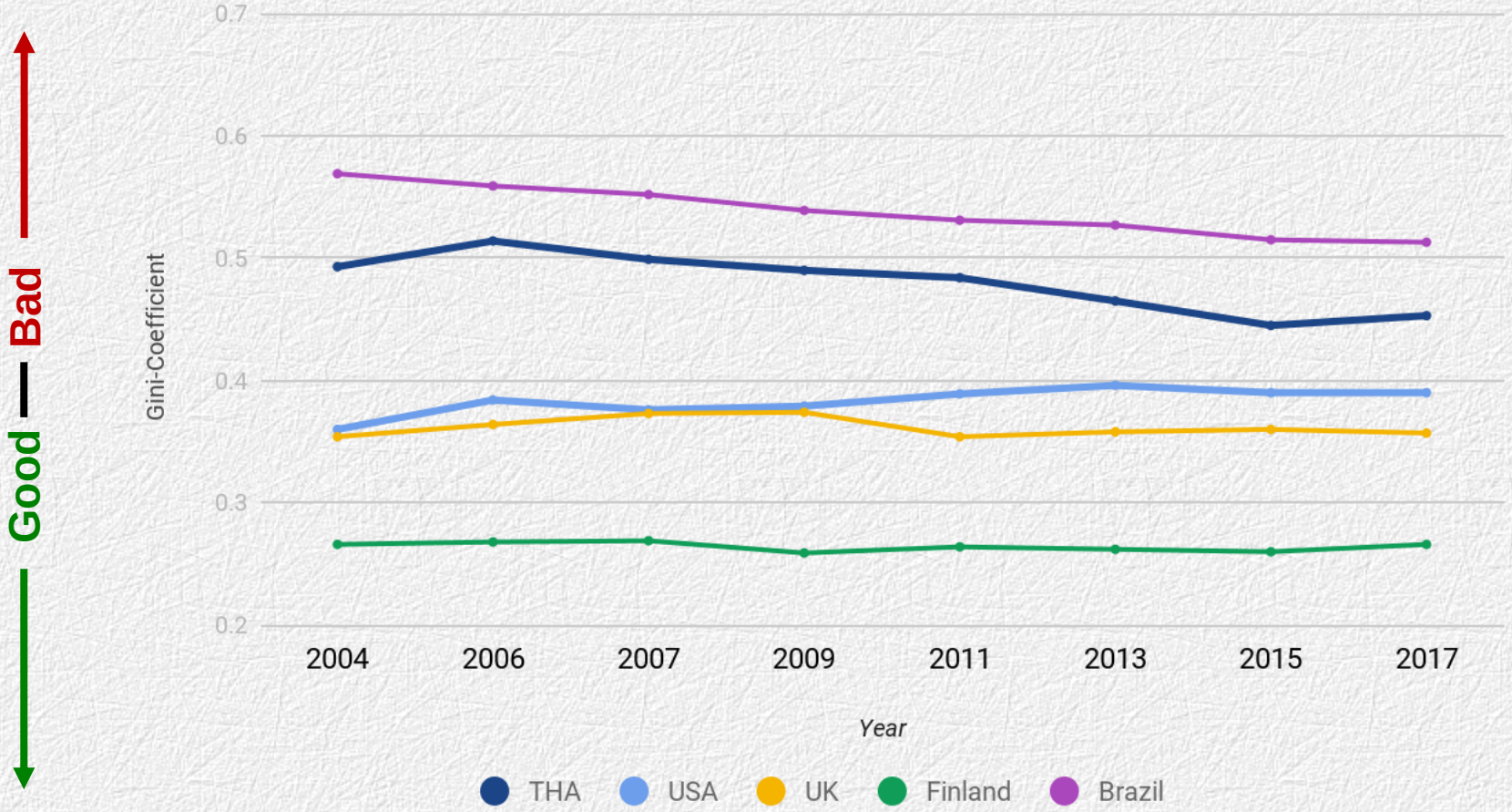
Gini-coefficient ↑ ⇨ Unequal income distribution ↑

Gini-Coefficient of Income, Thailand, 1988-2019



Data Source: NESDB

Gini-Coefficient of Income, Thailand and other countries, 2004-2017



Data Source(s): NESDB, OECD, Trading Economics

Poverty Headcount Ratio at National Poverty Line, Thailand, 2000-2019, (% of population)

Data source: NESDB