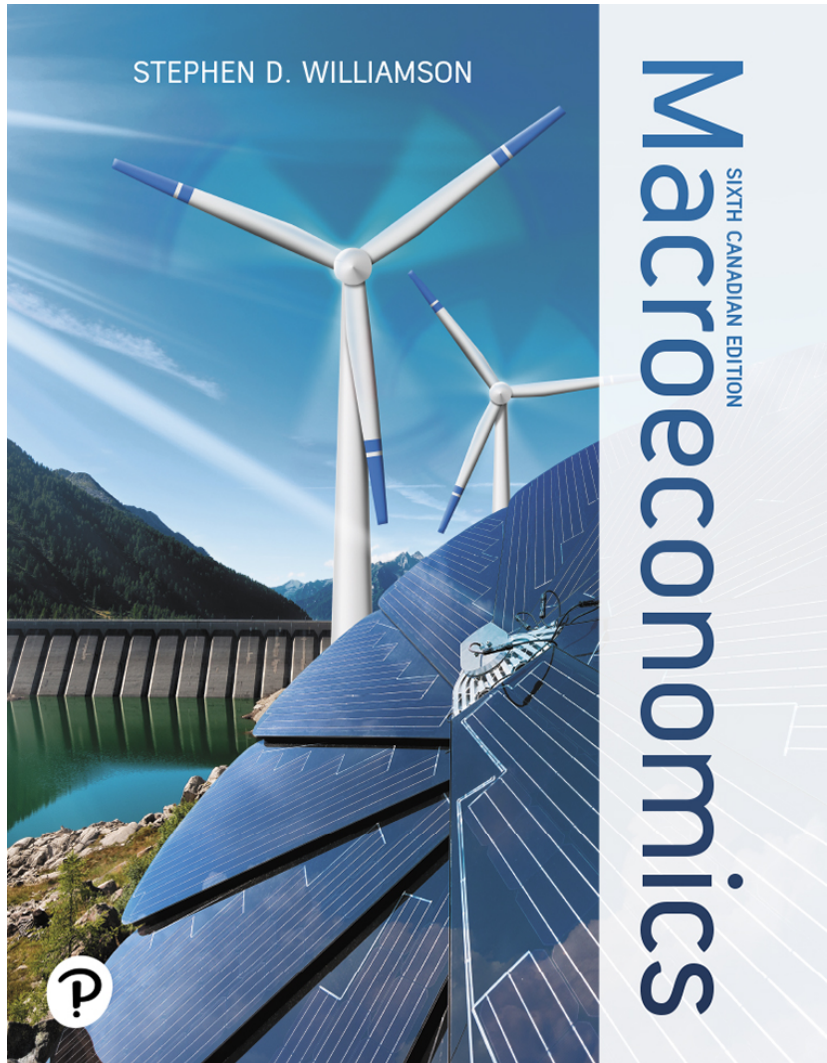


# Macroeconomics

Sixth Canadian Edition



## Chapter 2 Measurement

# Chapter 2 Topics

- Measuring GDP
- Nominal and real GDP and price indices
- Savings, wealth and capital
- Labour market measurement

# Measuring GDP: The National Income and Product Accounts (NIPA)

- GDP Measured Using: (i) the *product approach*; (ii) the *expenditure approach*; (iii) the *income approach*.
- Show how this is done using an example.

# National Income Accounting Example

- Fictional Island Economy
- Coconut Producer, Restaurant, Consumers, Government

## Table 2.1

### Coconut Producer

Total revenue	\$20 million
Wages	\$ 5 million
Interest on loan	\$ 0.5 million
Taxes	\$ 1.5 million

## Table 2.2

### Restaurant

Total revenue	\$30 million
Cost of coconuts	\$12 million
Wages	\$ 4 million
Taxes	\$ 3 million

## Table 2.3

### After-Tax Profits

Coconut producer	\$13 million
Restaurant	\$11 million

Table 2.4

Government

Tax revenue	\$5.5 million
Wages	\$5.5 million



## Table 2.5

### Consumers

Wage income	\$14.5 million
Interest income	\$ 0.5 million
Taxes	\$ 1 million
Profits distributed by producers	\$24 million

## Table 2.6

### GDP Using the Product Approach

Value added—coconuts	\$20 million
Value added—restaurant	\$18 million
Value added—government	\$ 5.5 million
GDP	\$43.5 million

## Table 2.7

### GDP Using the Expenditure Approach

Consumption	\$38 million
Investment	0
Government expenditures	\$ 5.5 million
Net exports	0
GDP	\$43.5 million

## Table 2.8

### GDP Using the Income Approach

Wage income	\$14.5 million
After-tax profits	\$24 million
Interest income	\$ 0.5 million
Taxes	\$ 4.5 million
GDP	\$43.5 million

**Table 2.9** you dont have to remember everything in this table, but u have to remember what takes up the majority of each section.

## Gross Domestic Product for 2017 (1 of 2)

<i>Component of GDP</i>	<i>\$ Billions</i>	<i>% of GDP*</i>
GDP	2137.5	100
Consumption	1241.0	58.1
Durables	161.4	7.6
Semi-durables	84.4	3.9
Nondurables	284.3	13.3
Services	678.3	31.7
Investment	405.9	19.0
Nonresidential	202.4	9.5
Residential	164.7	7.7
Change in inventories	17.5	0.8
Intellectual property prods.	35.6	1.7

## Table 2.9

### Gross Domestic Product for 2018 (2 of 2)

Countries that has a high GDP growing speed, they usually have a high government investment and money lending.

Government expenditures	523.7	24.5
Government consumption	442.8	20.7
Government investment	80.9	3.8
Net exports	-50.4	-2.4
Exports	663.7	31.1
Imports	-714.1	-33.4

\*Percentages do not add up to 100 because of rounding and statistical discrepancy. Source: Statistics Canada database, Table 384-0038. © Stephen D. Williamson.

# Problems in Measuring GDP

- Economic activity in the *underground economy* cannot be measured directly – this activity might be measured indirectly by accounting for the use of currency. Paid under table; black market
- Government production is difficult to measure, as the output (for example defense services) is typically not sold in the market. i.e., the revenue for a hospital

Holding a high GDP is not always indicates a good situation:

- 1) It could not tells the distribution of the income; it may has high income inequality
- 2) The welfare of the social is not reflected;
- 3) It may indicates a high working tendency; low leisure time for people

# Nominal and Real GDP and Price Indices

- Price Index: Weighted average of a set of observed prices that gives a measure of the *price level*.
- Price indices allow us to measure the *inflation rate* – the rate of change in the price level.
- A measure of the inflation rate allows us to determine how much of an increase in GDP is *nominal* and how much is *real*.

Nominal: regular year and year prices; price is a constant and it is not change

Real: nominal price adjusted with inflation



## Table 2.10

### Data for Real GDP Example

	<i>Apples</i>	<i>Oranges</i>
Quantity in year 1	50	100
Price in year 1	\$1	\$0.80
Quantity in year 2	80	120
Price in year 2	\$1.25	\$1.60

Nominal GDP for yr1 =  $50 \times 1 + 100 \times 0.8 = 130$

Nominal GDP for yr2 =  $80 \times 1.25 + 120 \times 1.60 = 292$

Change in nominal GDP =  $(292/130) - 1 = 125\%$

Real GDP for yr2 with base year yr1 =  $80 \times 1 + 120 \times 0.8 = 176$

Change in real GDP = 35%

The change in nominal GDP is greatly affected by the change in price.  
(inflation, etc...)

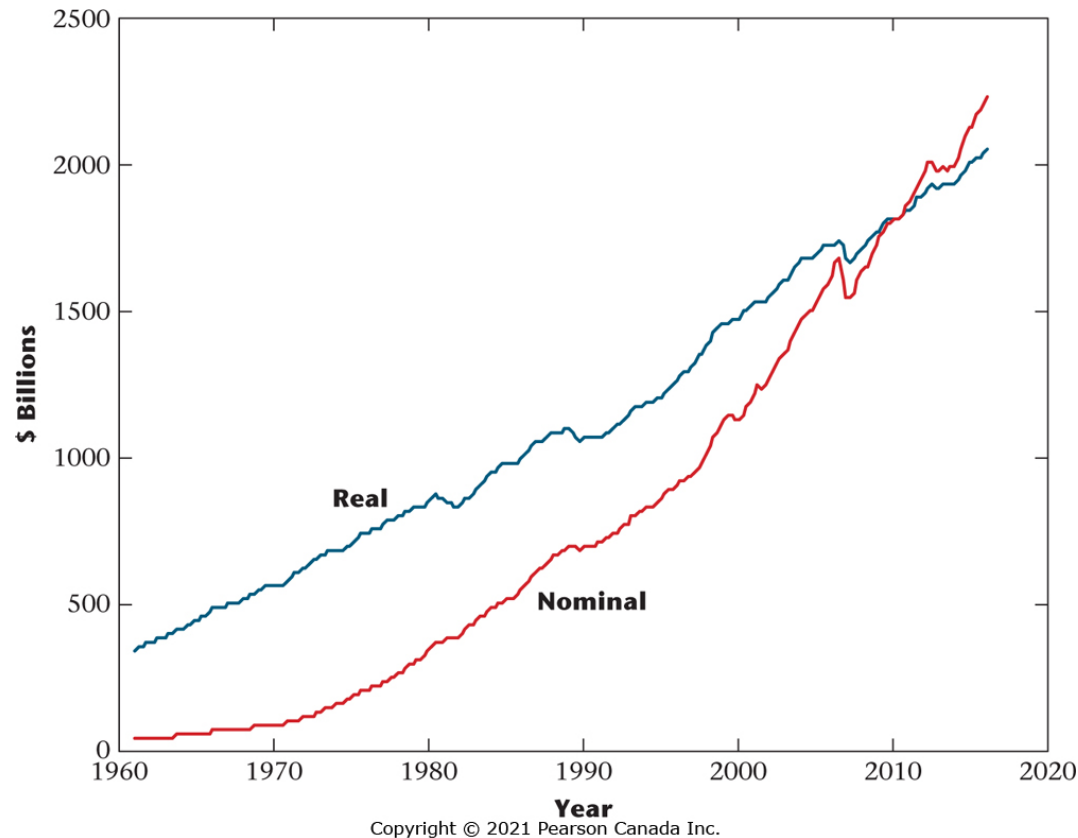
Real\_GDP\_1 = Nomial\_GDP\_1 \* Chain-weighted ratio

Real\_GDP\_2 = Nomial\_GDP\_2 / Chain-weighted ratio

Chain-Weighted Real GDP ratio =  $(g_1 \times g_2)^{(1/2)} = (1.354 \times 1.312)^{(1/2)} = 1.333 \Rightarrow \text{change in real GDP} = 33.3\%$

## Figure 2.1

Nominal GDP (red line) and Chain-Weighted Real GDP (blue line), 1961–2018



Note that the two time series cross in 2012 because real GDP is measured in 2012 dollars. The growth rate in real GDP is smaller than the growth rate for nominal GDP because of positive inflation over this period.

## Table 2.11

### Implicit GDP Price Deflators, Example

At the base year, nominal GDP = real GDP

	<i>Year 1</i>	<i>Year 2</i>	<i>% Increase</i>
Year 1 = base year	100	165.9	65.9
Year 2 = base year	58.4	100	71.2
Chain-weighting	100	168.5	68.5

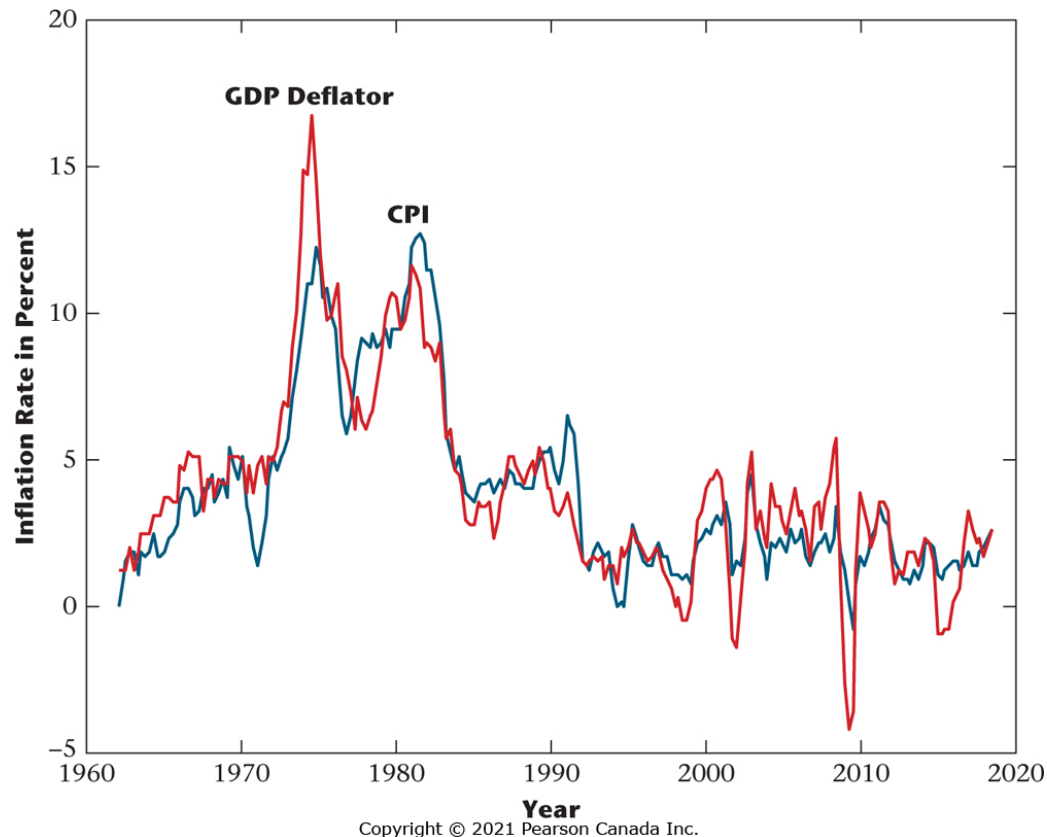
$$(1.659 \times 1.712)^{(1/2)} = 1.685$$

Implicit Price Deflator = Nominal GDP/Real GDP \*100

CPI = Cost of base year quantities at current prices / Cost of base year quantities at base year prices \* 100

## Figure 2.2

Quarterly Inflation Rate Calculated from the CPI (blue line) and the Implicit GDP Price Deflator (red line), 1962–2018



These measures are broadly similar, but there can be substantial differences.

# Problems in Measuring Real GDP and the Price Level

- The relative prices of goods change over time – a problem for CPI measurement.
- The quality of goods and services changes over time.
- New goods and services are introduced, and some goods and services become obsolete.

# Savings, Wealth and Capital (1 of 5)

- Private Disposable Income:

$$Y^d = Y + NFP + TR + INT - T$$

Private Disposable Income = Total income + Net Factor Payment + Transfer Received + Interest Income - Tax

NFP: Money that overseas Canadian is sending back home

# Savings, Wealth and Capital (2 of 5)

- Private Sector Saving:

$$S^P = Y^d - C = Y + NFP + TR + INT - T - C$$

# Savings, Wealth and Capital (3 of 5)

- Government Saving = – Government Deficit:

$$S^g = T - TR - INT - G$$

Government Saving = Government Income - Government Expenditure  
= Tax Revenue - Transfer Receipt - Investment - Government Expenditure



# Savings, Wealth and Capital (4 of 5)

- National Saving = Private Saving + Government Saving:

$$S = S^P + S_g = Y + NFP - C - G$$

Total Saving = Private Saving + Government Saving

# Savings, Wealth and Capital (5 of 5)

- National savings is reflected in investment (new capital stock) plus the current account surplus (acquisition of claims on foreigners):

$$S = I + NX + NFP = I + CA$$

i + Current Income

$CA < 0$

$\Rightarrow CA = S - I$

$\Rightarrow S < I$

$\Rightarrow$  For Canada, saving is less than investment

$\Rightarrow$  But for China, for example, saving may be more than investment, it is a good thing.

# Labour Market Measurement

- The Statistics Canada monthly household survey divides the working-age population into three groups:
  - Employed
  - Unemployed
  - Not in the Labour Force
- Labour force = employed + unemployed

# Three Key Labour Market Measures

$$\text{Unemployment Rate} = \frac{\text{number unemployed}}{\text{labour force}}$$

$$\text{Participation Rate} = \frac{\text{labour force}}{\text{working age population}}$$

$$\text{Emp - Pop Ratio} = \frac{\text{employment}}{\text{working age population}}$$