Chapter 2

Up Around the Circular Flow

GDP, Economic Growth, and Business Cycles
LEARNING OBJECTIVES

2.1: Different types of GDP, and how each relates to living standards

2.2: Economic growth and how it is measured

2.3: Business cycles and output

2.4: Measuring GDP: value added, aggregate spending and aggregate income

2.5: Identify five limitations of real GDP per person as a measure of well-being
1. HIGHER PRICES, MORE STUFF, OR BOTH? NOMINAL GDP AND REAL GDP

GDP measures value final products/services produced annually; **nominal GDP** combines changes in prices & quantities; **real GDP** measures only changes in quantities; **real GDP per person** best measure of material standard of living.
NOMINAL GDP AND REAL GDP

Nominal GDP

value *at current prices* of all final products/services produced annually in a country

\[
\text{Nominal} = \sum_{i} P_i X_i
\]

Differences in nominal GDP between years due to either price changes or quantity changes

\[
\text{Nominal}_{1935} = P^A_{1935} Q^A_{1935} + P^B_{1935} Q^B_{1935} + P^C_{1935} Q^C_{1935} + \ldots + P^Z_{1935} Q^Z_{1935}
\]

\[
\text{Nominal}_{2008} = P^A_{2008} Q^A_{2008} + P^B_{2008} Q^B_{2008} + P^C_{2008} Q^C_{2008} + \ldots + P^Z_{2008} Q^Z_{2008}
\]
Fig 2.1: Nominal GDP and Real GDP, 1926 - 2008
Real GDP

value at constant prices of all final products/services produced annually in a country

\[
\text{Real GDP}_{1935} = P^A_{2002} Q^A_{1935} + P^B_{2002} Q^B_{1935} + P^C_{2002} Q^C_{1935} + \ldots + P^Z_{2002} Q^Z_{1935}
\]

\[
\text{Real GDP}_{2008} = P^A_{2002} Q^A_{2008} + P^B_{2002} Q^B_{2008} + P^C_{2002} Q^C_{2008} + \ldots + P^Z_{2002} Q^Z_{2008}
\]

– real GDP uses constant prices for a single year to value quantities produced in different years

– differences in real GDP between years show only changes in quantities
Fig. 2.2: Nominal GDP and Real GDP, 2002 - 2008
Q: Explain why real GDP per person is a more accurate measure of standard of living than nominal GDP.

A: When nominal GDP increases between years, the increase might be due to increases in prices or to increases in quantities of products/services. Only increases in quantities can improve our standard of living. Real GDP holds prices constant, so any increases in real GDP between years must be due to increases in quantities.

But even if real GDP increases, our standard of living may not increase if the population is growing faster than the increases in real GDP. *Real GDP per person* — *real GDP divided by the population of a country* — *is the best available measure of standard of living*. *Real GDP per person measures the average quantities of products/services per person that are produced annually in a country.*
2. WHEN MACROECONOMIC DREAMS COME TRUE: POTENTIAL GDP AND ECONOMIC GROWTH

By increasing quantity and quality of inputs, economic growth increases productivity and potential GDP per person, raising maximum possible living standards.
Potential GDP

- real GDP when all inputs fully employed (labour, capital, land/resources, entrepreneurship)
- short-run goal for ideal economic performance
- outcome if Invisible Hand works perfectly

Potential GDP per person

- potential GDP divided by population
- short-run maximum living standards
Fig. 2.3: Potential GDP/Person and Real GDP/Person, 1926 - 2008
Increases in labour

- **quantity** — population growth, immigration, and labour force participation rate
- **quality** — human capital — work experience, on-the-job training, and education
Increases in capital

- **quantity** — more factories and equipment
- **quality** — technological change — innovation, research and development

Increases in land/resources

- **quantity** — bringing land/resources into circular flow of markets
- **quality** — usually due to increases in capital used with land

Increases in entrepreneurship

- **quantity** and **quality** interrelated
- better management, organization, and worker/management relations
Economic growth rate

annual percentage change in real GDP per person

\[
\text{Real GDP per person growth rate} = \frac{\text{Real GDP per person this year} - \text{Real GDP per person last year}}{\text{Real GDP per person last year}} \times 100
\]

Canada’s average annual economic growth rate, 1926-2008, was 2.1 %
Impact of Economic Growth Rate

Anything that effects the long-run rate of economic growth – even by a tiny amount – will have huge effects on living standards in the long run.

<table>
<thead>
<tr>
<th>annual growth rate of income per capita</th>
<th>percentage increase in standard of living after…</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>...25 years</td>
</tr>
<tr>
<td>2.0%</td>
<td>64.0%</td>
</tr>
<tr>
<td>2.5%</td>
<td>85.4%</td>
</tr>
</tbody>
</table>
Fig. 2.6: Annual Growth Rate of Canadian Real GDP/Person, 1926 - 2008
Fig. 2.7: Growth in Real GDP/Person, Industrialized Countries, 1870 - 2007
Rule of 70

number of years for initial amount to double is roughly 70 divided by annual percentage growth rate

<table>
<thead>
<tr>
<th>Growth Rate (% per year)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years to Double</td>
<td>70</td>
<td>35</td>
<td>23.3</td>
<td>17.5</td>
<td>14</td>
<td>11.7</td>
<td>10</td>
<td>8.8</td>
<td>7.8</td>
<td>7</td>
</tr>
</tbody>
</table>

compounding causes small differences in annual growth rates to have large consequences over long time periods
Productivity

quantity of real GDP produced by an hour of labour

- increases in productivity increase living standards
- more products/services produced
- reducing work time needed to buy products/services

Creative destruction

competitive innovations generate profits for winners, improve living standards for all, but destroy less productive/desirable products and production methods
Q: If real GDP per person was $50 000 last year and increases to $52 000 this year, what is the annual economic growth rate?

A: The growth rate

\[
\text{growth rate} = \frac{\text{real GDP per person this year} - \text{real GDP per person last year}}{\text{real GDP per person last year}} \times 100\%
\]

\[
= \frac{($52 000 - $50 000)}{$50 000} \times 100\%
\]

\[
= 4\%
\]
3. BOOM AND BUST: BUSINESS CYCLES

Business cycles track real GDP expansion and contraction. Output gaps measure the difference between real GDP and potential GDP. “Closing the gap” is an important policy target.
BUSINESS CYCLES

Language of business cycles
fluctuations of real GDP around potential GDP

- **expansion**
  period when real GDP increases

- **peak**
  highest point of an expansion

- **contraction**
  period when real GDP decreases

- **trough**
  lowest point of a contraction

- **recession**
  2+ successive quarters of real GDP contraction
Fig. 2.9: Most Recent Complete Canadian Business Cycle
Output gaps

real GDP minus potential GDP

- recessionary gap
  real GDP below potential GDP

- inflationary gap
  real GDP above potential GDP
4. HOW TO MEASURE GDP: VALUE ADDED, ENLARGED CIRCULAR FLOW

Value added solves double counting measurement problems, distinguishing final and intermediate products/services, reveals aggregate spending = aggregate income in circular flow.
Q: In the first quarter of 2009, real GDP (measured in 2002 dollars) was $1292 billion and potential GDP was $1331 billion. What kind of gap existed and what was its size?

A: The output gap = real GDP — potential GDP
= $1292 billion — $1331 billion
= — $39 billion dollars.

When real GDP is less than potential GDP this is a recessionary gap. The output gap is a negative number.
Value added

value of output minus value of intermediate products/services bought from other businesses

- Value added solves problems of double counting, distinguishing final and intermediate products/services
  - value of final products/services = value added
  - value of final products/services = inputs’ income
  - GDP = inputs’ income
Fig. 2.10: Value Added and Final Spending
Fig. 2.11: Value Added Equals Value of Final Products

![Diagram showing the concept of value added in the production process involving a farmer, miller, baker, and grocer.](image)
GDP can be calculated using either half of circular flow of income and spending

\[
\text{aggregate spending (GDP)} = \text{aggregate income (Y)}
\]

spending on final products/services = payments to input owners
Fig. 2.12: Simple Circular Flow without Government
Fig. 2.13  Simple GDP Circular Flow of Income & Spending
Flows of spending on the enlarged circular flow

- $C$: consumption spending by consumers
- $I$: business investment spending on factories and machines made by businesses
- $G$: government spending on products/services
- $X$: spending by R.O.W. on Canadian exports
- $IM$: Canadian spending on imports produced by R.O.W.
Fig 2.14  Enlarged GDP Circular Flow of Income & Spending ($)

\[ C + I + G + X - IM = Y \]

Aggregate Spending = Aggregate Income
**Consumer choices**

- spend or save
- *disposable income*
  
  aggregate income minus net taxes
- *net taxes*
  
  taxes minus transfer payments

**Business choices**

- hiring inputs and producing products/services
- investment spending
Government choices

- collect taxes, make transfer payments
- spending on products/services

R.O.W. choices

- buy Canadian exports or from elsewhere
- sell imports to Canada or elsewhere
- invest and borrow money in Canada or elsewhere

Bank choices

- take deposits and make loans
Q. Using *expenditure* method, calculate the GDP for the following hypothetical economy for the year 2020.

<table>
<thead>
<tr>
<th>Item</th>
<th>Billions of dollars</th>
<th>Billions of Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wages paid to labour</td>
<td>815</td>
<td></td>
</tr>
<tr>
<td>Consumption expenditure</td>
<td>885</td>
<td></td>
</tr>
<tr>
<td>Net domestic income at factor cost</td>
<td>1,210</td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>304</td>
<td></td>
</tr>
<tr>
<td>Government expenditure</td>
<td>357</td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Subsidies</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Import</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td><strong>GDP Expenditure method:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. My GDP is bigger than yours: What’s wrong with GDP as a measure of well-being?

Real GDP per person is a limited measure of well-being; excludes nonmarket production, underground economy, environmental damage, leisure, political freedoms and social justice.
WHAT’S WRONG WITH GDP AS A MEASURE OF WELL-BEING?

Real GDP per person is limited measure of well being because it does not include

- non-market production
  household production that improves quality of life

- underground economy
  activities that are illegal, or legal but avoid taxes
environmental damage
 costs of environmental damage, resource depletion

leisure
 leisure lowers real GDP, but is desirable

political freedoms and social justice
 limited freedoms, uneven income distributions
Growth rates of real GDP per person still useful for judging economic progress if no significant changes over time in the limitations

United Nations Human Development Index (HDI) measures quality of life across countries by combining life expectancy, educational achievement, and income

Canada ranked 4th, U.S. 15th in 2006