Objectives

After studying this chapter, you will be able to:

- Describe the long-term growth trends in Canada and other countries and regions
- Identify the main sources of long-term real GDP growth
- Explain the productivity growth slowdown in Canada during the 1970s and the speedup during the 1990s
- Explain the rapid economic growth rates being achieved in Asia
- Explain the theories of economic growth

Transforming People’s Lives

In Canada, real GDP per person doubled between 1961 and 2001.

What causes the growth in production, income, and living standards?

Elsewhere, notably in China and other parts of Asia, growth is even faster; technology 2,000 years old coexists with the most modern.

Why is Asian growth so fast?

Transforming People’s Lives

Lucas Wedge

Here is the Lucas wedge for Canada.

If the productivity growth slowdown of the 1970s hadn’t happened, in 2001, real GDP per hour of labour would have been $67 rather than the $38 that we actually produced.

<table>
<thead>
<tr>
<th>Year</th>
<th>Real GDP per hour of work (dollars)</th>
<th>Actual, 2001</th>
<th>0.25 percent faster</th>
<th>0.5 percent faster</th>
<th>1.0 percent faster</th>
<th>2.0 percent faster</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>$38 per hour</td>
<td>1,028</td>
<td>1,131</td>
<td>1,246</td>
<td>1,508</td>
<td>2,206</td>
</tr>
<tr>
<td>1971</td>
<td>$38 per hour</td>
<td>38.06</td>
<td>41.90</td>
<td>46.13</td>
<td>55.87</td>
<td>81.71</td>
</tr>
<tr>
<td>1981</td>
<td>$38 per hour</td>
<td>33,146</td>
<td>36,497</td>
<td>40,178</td>
<td>48,657</td>
<td>71,168</td>
</tr>
</tbody>
</table>
Long-Term Growth Trends

Growth in the Canadian Economy

From 1926 to 2001, growth in real GDP per person in Canada averaged 2.2 percent per year.
Real GDP per person fell precipitously during the Great Depression and rose rapidly during World War II.
Figure 30.1 on the next slide illustrates.

<table>
<thead>
<tr>
<th>Country</th>
<th>Annual Growth Rate</th>
<th>Levels of Real GDP per Capita (1995 U.S. dollars, PPP basis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td></td>
<td>3.123</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td>1.347</td>
</tr>
<tr>
<td>France</td>
<td></td>
<td>1.571</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>1.300</td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td>0.618</td>
</tr>
<tr>
<td>Sweden</td>
<td></td>
<td>1.316</td>
</tr>
<tr>
<td>United Kingdom</td>
<td></td>
<td>2.610</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td>2.247</td>
</tr>
</tbody>
</table>

Some developed nations have grown more rapidly than Canada.
Until the 1990s, Japan grew fastest of the rich economies.
Figure 30.2(a) illustrates.

Many developing countries in Africa, Central America, and South America stagnated during the 1980s, and have grown slowly since.
They have fallen farther behind Canada.
Figure 30.2(b) illustrates.
Long-Term Growth Trends

Other formerly low-income economies—Hong Kong, Korea, Singapore, and Taiwan are examples—have grown very rapidly and have caught up or are catching up with Canada. Many other Asian nations have faster growth than Canada. Figure 30.3 illustrates.

The Causes of Economic Growth: A First Look

Preconditions for Economic Growth
The basic precondition for economic growth is an appropriate incentive system.

Three institutions are crucial to creation of the proper incentives
- Markets
- Property rights
- Monetary exchange

The Causes of Economic Growth: A First Look

For economic growth to persist, people must face incentives that encourage them to pursue three activities
- Saving and investment in new capital
- Investment in human capital
- Discovery of new technologies

The Causes of Economic Growth: A First Look

Saving and Investment in New Capital
The accumulation of capital has dramatically increased output and productivity.

Investment in Human Capital
Human capital acquired through education, on-the-job training, and learning-by-doing has also dramatically increased output and productivity.

Discovery of New Technologies
Technological advances have contributed immensely to increasing productivity.
Growth Accounting

The quantity of real GDP supplied, $Y$, depends on the quantity of labour, $L$, the quantity of capital, $K$, and the state of technology, $T$.

The purpose of **growth accounting** is to calculate how much real GDP growth results from the growth of labour and capital and how much is attributable to technological change.

The key tool of growth accounting is the aggregate production function,

$$ Y = F(L, K, T). $$

**Labour Productivity**

Labour productivity is real GDP per hour of labour; it equals real GDP divided by aggregate hours.

Canadian productivity growth slowed after 1973 but then speeded up in the “new economy” of the late 1990s.

**Growth Accounting**

Growth accounting divides growth in productivity into two components

- Growth in capital per hour of labour
- Technological change.

Any productivity growth not accounted for by growth in capital is allocated to technological change, so this category is a broad catchall concept.

**The Productivity Curve**

The productivity curve is the relationship between real GDP per hour of labour and the amount of capital per hour of labour, with technology held constant.

Figure 30.4 shows Canadian productivity over the 1961 to 2001 period.
Growth Accounting

Figure 30.5 illustrates the productivity curve. An increase in capital per hour brings a movement along productivity curve. Technological change shifts the productivity curve.

Growth Accounting

The shape of the productivity curve reflects the law of diminishing returns.

The **law of diminishing returns** states that, as the quantity of one input increases with the quantities of all other inputs remaining the same, output increases but ever smaller increments.

Robert Solow discovered that diminishing returns are well described by the **one-third rule**: with no change in technology, on the average, a 1 percent increase in capital per hour of work brings a one-third of 1 percent increase in output per hour of labour.

Growth Accounting

Between 1961 and 1973 labour productivity increased by 47 percent—a rate of 3.3 percent a year. Growth of capital per worker accounted for productivity growth of 1 percent a year. Technological change and other factors accounted for productivity growth of 2.3 percent a year.

Growth Accounting

Accounting for the Productivity Growth Slowdown and Speedup

The productivity function and one-third rule can be used to study productivity growth in Canada. Figure 30.6 on the next slides illustrates.
Growth Accounting

Between 1973 and 1996, labour productivity increased by 25 percent—a rate of 1 percent a year. Growth of capital per worker accounted for productivity growth of 0.6 percent a year. Technological change and other factors accounted for productivity growth of 0.4 percent a year.

Between 1996 and 2001, labour productivity increased by 8.5 percent—a rate of 1.6 percent a year. Growth of capital per worker accounted for productivity growth of 0.3 percent a year. Technological change and other factors accounted for productivity growth of 1.3 percent a year.

Technological Change During the Production Growth Slowdown

Technological change did not contribute much to advancing productivity during the 1970s for two reasons:

- Energy price hikes directed technological innovation to saving energy rather than to increasing productivity.
- Environmental protection laws were passed. Pollution abating investment raised the quality of life but did not increase measured GDP; so measured productivity did not increase.

Growth Accounting

Achieving Faster Growth

Growth accounting tells us that to achieve faster economic growth we must either increase the growth rate of capital per hour of labour or increasing the pace of technological advance.

The main suggestions for achieving these objectives are:

- **Stimulate saving**
  Higher saving rates may increase the growth rate of capital. Tax incentives might be provided to boost saving.
Growth Accounting

Stimulate research and development
Because new discoveries can be used by everyone, not all the benefit of a discovery falls to the initial discoverer. So there is a tendency to under invest in research and development activity. Government subsidies might offset some of the underinvestment.

Target high-technology firms
The suggestion is that by subsidizing high-technology industries, a nation can enjoy a temporary advantage over its competitors. This is a very risky strategy, because it is unclear that government is better at picking winners than the profit-seeking entrepreneurs.

Encourage international trade
Free international trade stimulates growth by extracting all the available gains from specialization and exchange. The fastest growing nations are the ones with the fastest growing exports and imports.

Improve the quality of education
The benefits from education spread beyond the person being educated so there is a tendency to under invest in education.

Classical Growth Theory
Classical growth theory is the view that real GDP growth is temporary and that when real GDP per person rises above the subsistence level, a population explosion brings real GDP per person back to the subsistence level. The population continues to increase until the real wage rate has been driven back to the subsistence real wage rate. At this real wage rate, both population growth and economic growth stop. Contrary to the assumption of the classical theory, the historical evidence is that population growth rate is not tightly linked to income per person, and population growth does not drive incomes back down to subsistence levels.

The basic Classical idea
There is a subsistence real wage rate, which is the minimum real wage rate needed to maintain life. Advances in technology lead to investment in new capital. Labour productivity increases and the real wage rate rises above the subsistence level. When the real wage rate is above the subsistence level, the population grows. Population growth increases the supply of labour, which lowers the real wage rate.
Neoclassical Growth Theory

Neoclassical growth theory is the proposition that real GDP per person grows because technological change induces a level of saving and investment that makes capital per hour of labour grow. Growth ends only if technological change stops.

The death rate is determined by the quality and availability of health care. As the quality and availability of health care has improved, the death rate has fallen. The fall in both the birth rate and the death rate have offset each other and made the population growth rate independent of the level of income.

The neoclassical economics of population growth

The neoclassical view is that the population growth rate is independent of real GDP and the real GDP growth rate. The population growth rate equals the birth rate minus the death rate. The birth rate is determined by the opportunity cost of a woman’s time. As women’s wage rates have increased, the opportunity cost of having children has also increased and the birth rate has fallen.

The basic neoclassical idea

Technology begins to advance more rapidly. New profit opportunities arise. Investment and saving increase. As technology advances and the capital stock grows, real GDP per person rises. Diminishing returns to capital per hour of labour lower the real interest rate and eventually growth stops unless technology keeps on advancing.
Growth Theories

**New Growth Theory**

*New growth theory* holds that real GDP per person grows because of choices that people make in the pursuit of profit and that growth can persist indefinitely.

The theory emphasizes that:
- In a market economy, discoveries result from choices
- Discoveries bring profit and competition destroys profit
- Discoveries are a public capital good
- Knowledge is not subject to diminishing returns

![Figure 30.8 illustrates neoclassical growth theory.](image1)

![Figure 30.9 illustrates new growth theory.](image2)

![Figure 30.10 summarizes the ideas of new growth theory as a perpetual motion machine.](image3)