ECON 385. Intermediate Macroeconomic Theory II. Introduction

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General info

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General info

- Required text: Gregory Mankiw and William Scarth (2010), Macroeconomics, Worth Publishers. Canadian, Fourth Edition.
- Will also teach some material not included in the textbook.
- Prerequisites: ECON 281 (intermediate micro I), ECON 282 (intermediate macro I), and ECON 299 (quantitative methods in economics)
- Grading: an in-class midterm (30%) and final (50%) exams, and two problem sets (20%).

Scope of the course

- Build up on ECON 282
- Growth (Solow model and models of endogenous growth)
- Consumption and savings, investment
- Stabilization policy and the role of monetary and fiscal policies
- Inflation and unemployment
- The role of expectations in macroeconomic models

Outline for today

- What is macroeconomics?
  - Difference to microeconomics
  - Important macroeconomic issues
- How do economists think?
  - Models
  - Endogenous vs. Exogenous variables
- Short vs. Long Run.
- GDP, and the supply side of the economy (factor markets, factor prices, and determination of output/income)
- Readings: Mankiw and Scarth, Chapters 1–3.

What is macroeconomics?

- Macro: means large-scale; overall, comprehensive
- Macroeconomics is the study of the economy as a whole
- Difference to micro? Deals with aggregate phenomena such as inflation, unemployment, or economic growth
- Modern macro is based on micro

Why macroeconomics?

- Macroeconomics is relevant (especially in the times of crises)
- Positive questions (= understand economy): Why does an economy behave in a certain way?
- Normative questions (= policy prescriptions): How should an economy behave?

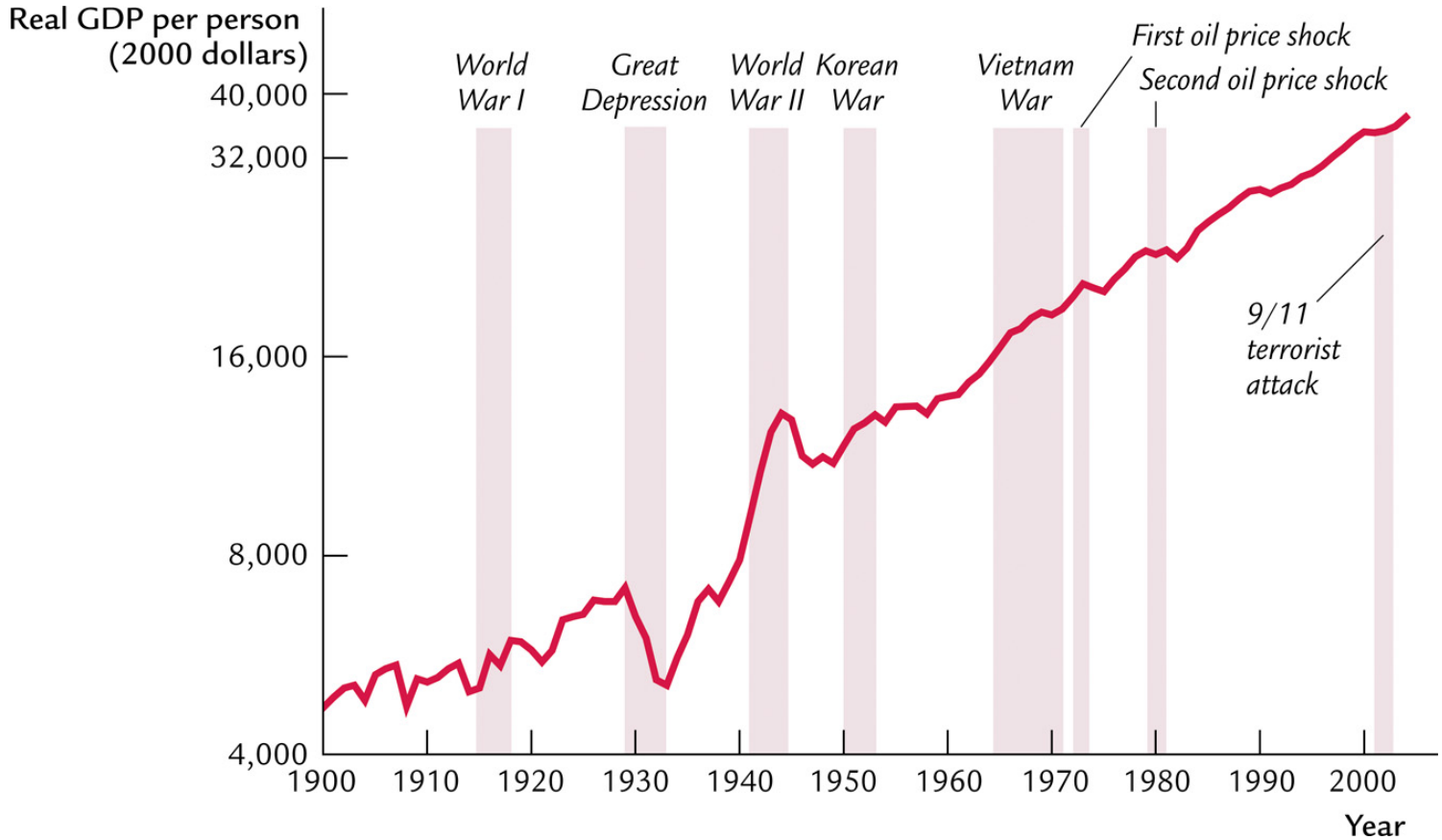
Important issues in macroeconomics

- Why did the recent global economic crisis happen?
- Why are there recessions?
- Can governments do anything to combat recessions? Should they?
- Why does the cost of living keep rising?
- Why are millions of people unemployed, even when an economy is booming?

Important issues in macroeconomics

- Why are there large wealth and income inequality between people both in rich and poor countries?
- What is the government budget deficit? How does it affect the economy?
- Why are so many countries poor? What policies might help them grow out of poverty?

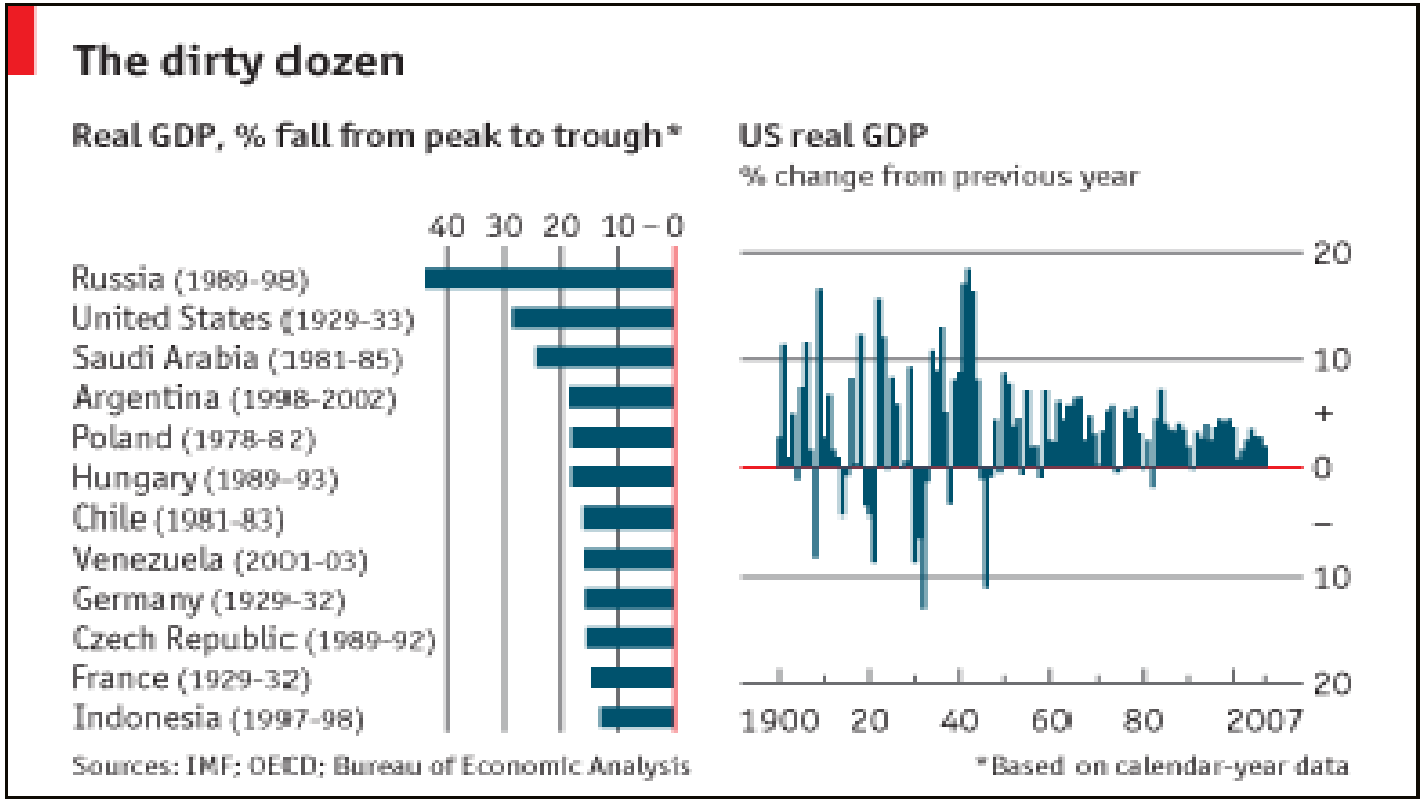
US per capita GDP



Note: GDP steadily grows over time; but there're fluctuations (**business cycle**).

Recessions and Depressions

- **Recessions**: mild reductions in GDP for 2-3 quarters
- **Depressions**: strong fall in GDP associated with unusually high unemployment and often preceded or accompanied by a financial crisis (sharp reduction in the availability of credit, etc.)
  - No consensus definition for depressions. One definition: (1) a decline in real GDP exceeding 10%, and (2) a recession lasting 2 or more years.



Source: `http://www.economist.com/node/12852043`
Before the 1930s all economic downturns were commonly called depressions. In 1978 Alfred Kahn, one of Jimmy Carter's economic advisers, once called it banana: "We're in danger of having the worst banana in 45 years."

How do Economists Think?

- Use models to understand real world
  – "toy" economy in absence of controlled experiments (those are costly in macroeconomics)
  – illustrate relationships between variables
- Endogenous variables: explained within model
- Exogenous variables: taken as given

A Multitude of Models

No single model can address all the issues we care about. For example,

- If we want to know how a fall in aggregate income affects pizza prices, we can use the S/D model for pizzas
- But if we want to know **why** aggregate income falls, we need a different model

- So we will learn *different models* for studying *different issues* (e.g., unemployment, inflation, long-run growth)
- For each new model, you should keep track of
  – its assumptions,
  – which of its variables are endogenous and which are exogenous,
  – the questions it can help us understand,
  – and those it cannot

Economic Models

"We cannot live without big and ambitious economic models. But neither can we entirely trust them." The Economist, July 13th 2006

"Big questions and big numbers" at
`http://www.economist.com/node/7159491`

Prices: Flexible Versus Sticky

- Market clearing: an assumption that prices are flexible and adjust to equate supply and demand.
- In the short run, many prices are sticky—they adjust only sluggishly in response to supply/demand imbalances. For example,
  – labor contracts that fix the nominal wage for a year or longer
  – magazine prices that publishers change only once every 3-4 years

Prices: Flexible Versus Sticky

- The economy's behavior depends partly on whether prices are sticky or flexible
- If prices are sticky, then demand won't always equal supply. This helps explain
  – unemployment (excess supply of labor)
  – the occasional inability of firms to sell what they produce
- **Long run**: prices flexible, markets clear, economy behaves very differently

Short Run vs. Long Run

- What if prices adjust slowly?
  Sticky prices provide a better description of **short-run** behavior of economy?
- Technology and fixed production factors (e.g., structures) are given in the short run
- Public infrastructure (roads, bridges) is given in the short run

Short Run vs. **Long Run**

- Eventually, prices adjust to ensure equilibrium in markets
  Flexible prices provide a good description of **long-run** behavior of economy
- Technology and fixed production factors will evolve as well responding to market incentives
- Public policy can affect infrastructure

Short Run vs. Long Run

In the first part of the course we'll focus mainly on the behavior of the economy in the long run.

We'll then turn to the **business cycle theory**: how the economy works in the short run, when prices are sticky and technology is fixed

What is GDP?

- Total **expenditure** on domestically produced final goods and services

- Total **income** earned by domestically located factors of production

What is GDP?

- Summary measure of all economic activity over a period of time
- Summary measure of economy's total output *and* income
- Note: economists use the words "output" and "income" interchangeably

Income, Expenditure and Circular Flow

- Suppose there is just one representative good (say bread) which uses only labor in production
- 2 sorts of economic actors: households and firms (bakeries)
- Firms hire workers and pay wages
- Workers supply input (labor) and spend income on output (bread)

Why expenditure = income

In every transaction, the buyer's expenditure becomes the seller's income. Thus, the sum of all expenditures equals the sum of all incomes.

Circular flow diagram

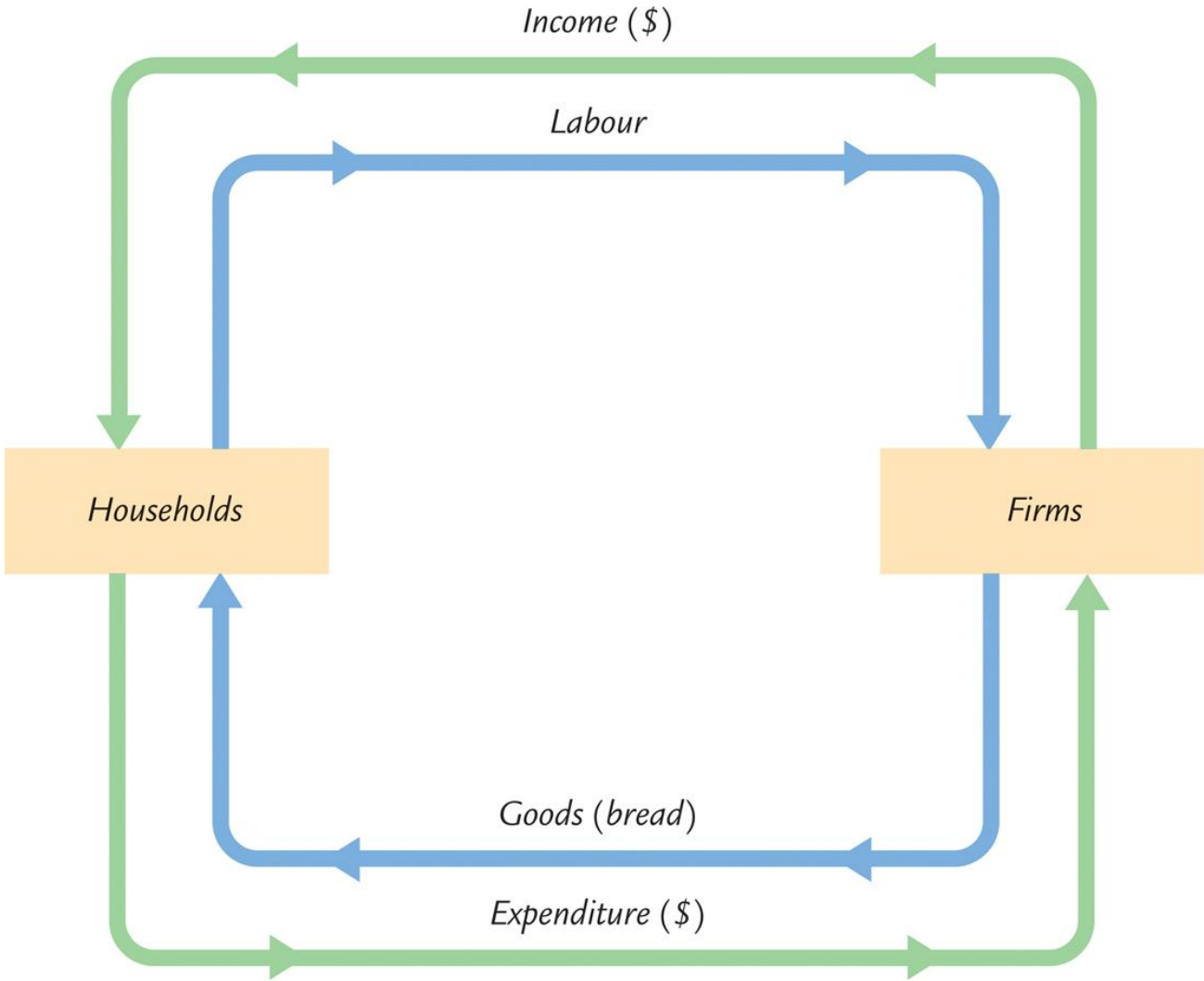


Figure 2-1 The Circular Flow
Mankiw and Scarth: Macroeconomics, Canadian Fifth Edition

GDP from Value Added

- Sum up value added at all stages of production
- A firm's value added equals the value of its output minus the value of the intermediate goods the firm used to produce that output
- Miller produces flour for 50 cents, baker buys flour, bakes bread and sells it for \$1
- What is GDP? What is the value added? \$1

GDP from Final Goods

- GDP = value of final goods produced
- The value of the final goods already includes the value of the intermediate goods, so including intermediate goods in GDP would be **double-counting**

The expenditure components of GDP

- Consumption
- Investment
- Government spending
- Net exports

Consumption, C

The value of all goods and services bought by households. Includes:

- **durable goods**: last a long time, e.g., cars, home appliances
- **nondurable goods**: last a short time, e.g., food, clothing
- **services**: work done for consumers, e.g., dry cleaning, air travel, lawyers

Investment, I

Spending on capital (goods bought for future use). Includes:

- **business fixed investment**: spending on plant and equipment that firms will use to produce other goods & services
- **residential fixed investment**: spending on housing units by consumers and landlords
- **inventory investment**: the change in the value of all firms' inventories

- Gross fixed investment = business + residential fixed investment (includes repairs)

- Also known as **Gross Fixed Capital Formation**

Investment vs. Capital

- Capital is one of the factors of production. At any given moment, the economy has a certain overall **stock** of capital
- Investment is **spending** on new capital (flow)

Government spending, G

- includes all government spending on goods and services
- but excludes transfer payments (e.g. unemployment insurance payments), because they just reallocate existing income, they are not spending on goods and services so not accounted in GDP

Net exports, NX

The value of total exports (**EX**) minus the value of total imports (**IM**)

$$\text{NX} = \text{EX} - \text{IM}$$

Accounting identity

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

- Accounting identity true by definition
- Have to explain components of the accounting identity, that's what macroeconomic models do!

Canadian GDP

	Total (billions of dollars)	Per Person (dollars)
Gross Domestic Product	**$1,658**	**$47,533**
Consumption	**923**	**26,461**
Durables and nondurables	424	12,155
Services	499	14,305
Investment	**393**	**11,267**
Business fixed investment (factories, machinery)	276	7,912
Residential construction	112	3,210
Inventory investment	5	143
Government Purchases	**387**	**11,095**
Net Exports	**−45**	**−1,290**
Exports	506	14,506
Imports	551	15,796

Source: Statistics Canada, *National Income and Expenditure Accounts*, http://www.statcan.gc.ca/pub/13-010-x/2009001/t/tab03-eng.htm

Table 2-1 GDP and the Components of Expenditure: 2012

Measurement issues for GDP

- Used goods not counted
- Housing services and other imputations (e.g., imputed rents of homeowners for service of housing)
- Production outside marketplace (home)
- Informal/black economy not measured (illegal activities)

Real vs. Nominal GDP

- GDP is the value of all final goods and services produced
- The Nominal GDP measures these values using *current* prices
- The Real GDP measures these values using the prices of a *base* year
- Real GDP is a better measure, because it controls for inflation (changes in real GDP can only be due to changes in quantities, not in prices)

National Income Identity

$$\underbrace{Y}_{\text{supply side}} = \underbrace{C + I + G + NX}_{\text{demand side}}$$

Have to explain components of the accounting identity (very simple in the Solow model, we'll do more while discussing business cycles)

Supply Side

- Production Function

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

- Factors of production: capital (K), labour (L), fully employed

Marginal Products

- Marginal Product of Labour (MPL): amount of extra output produced when labour input increases by 1 unit

$$\text{MPL} = F(K, L+1) - F(K, L) \approx \frac{\partial F(K, L)}{\partial L}$$

$$\text{MPK} = F(K+1, L) - F(K, L) \approx \frac{\partial F(K, L)}{\partial K}$$

- Marginal Product of Capital (MPK): The amount of extra output produced when capital input increases by 1 unit

Neoclassical Production Function

- Assumption 1: Constant Returns to Scale

$$zY = F(zK, zL)$$

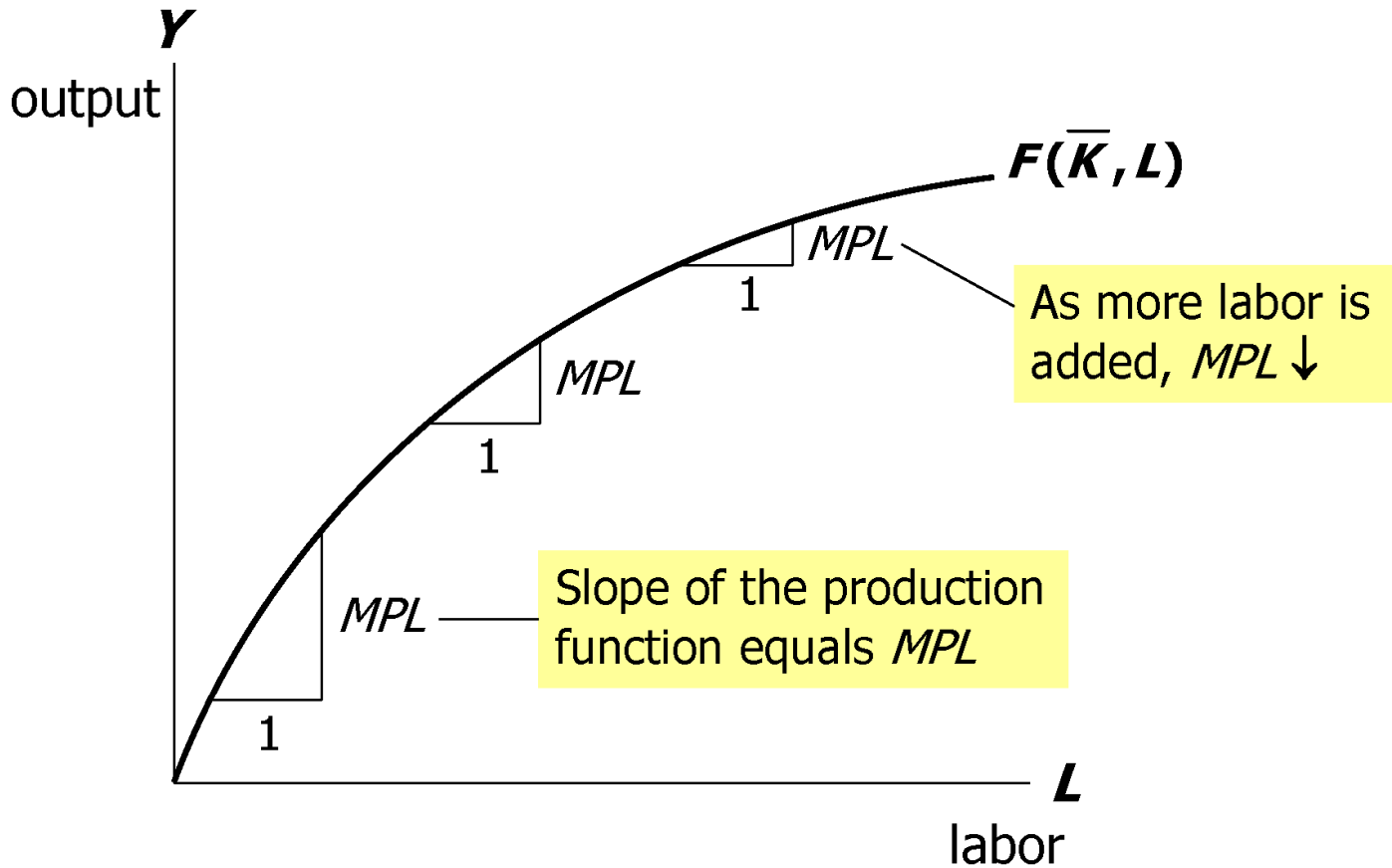
Intuition: Doubling the workers and the equipment at the bakery, yields double amount of bread loaves.

Neoclassical Production Function

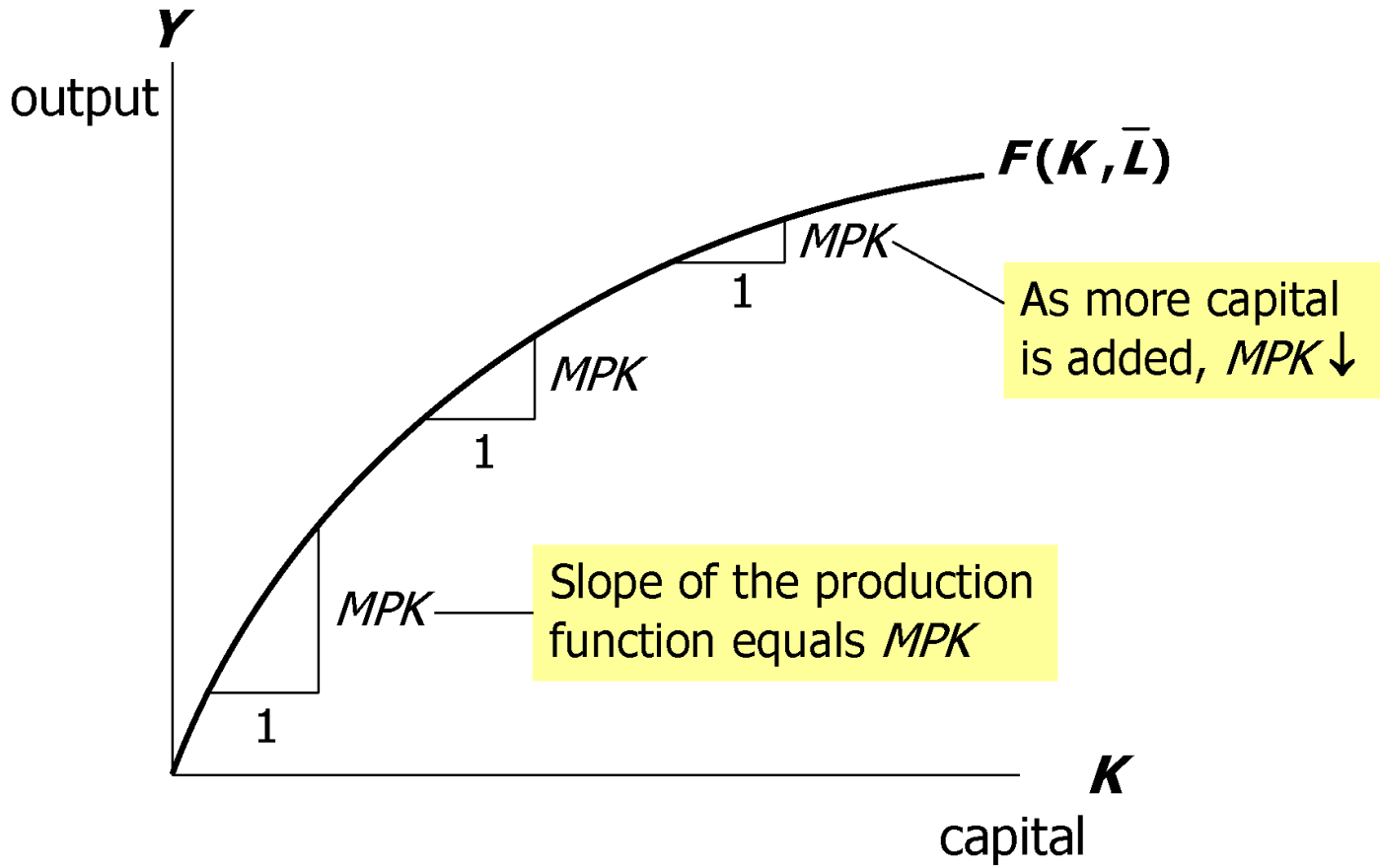
- Assumption 2: Diminishing Marginal Returns
  As one factor input is increased, its marginal product falls (other things equal)
- Intuition:

  $\uparrow$ L while holding K fixed$\Rightarrow$ fewer machines per worker$\Rightarrow$ lower productivity

MPL and the production function



MPK and the production function



Competitive Firms

Firms are perfectly competitive

- Firms small and are price takers
- maximize profits by selling output at price P
- hire workers at wage W
- rent capital at price R

How much K, L should a firm hire?

Profit Maximization

- Competitive firms maximize profits taking goods and factor prices as given [price takers]
- Remark: perfect competition not realistic, just a benchmark

$$\text{Profits} = PY - WL - RK$$

- Hire factor of production until extra revenue from increased production equals extra costs

$$\text{hire K, L until } \Delta\text{Profits} = 0$$

Firms' Demand for Labor

- Suppose a firm hires an extra worker

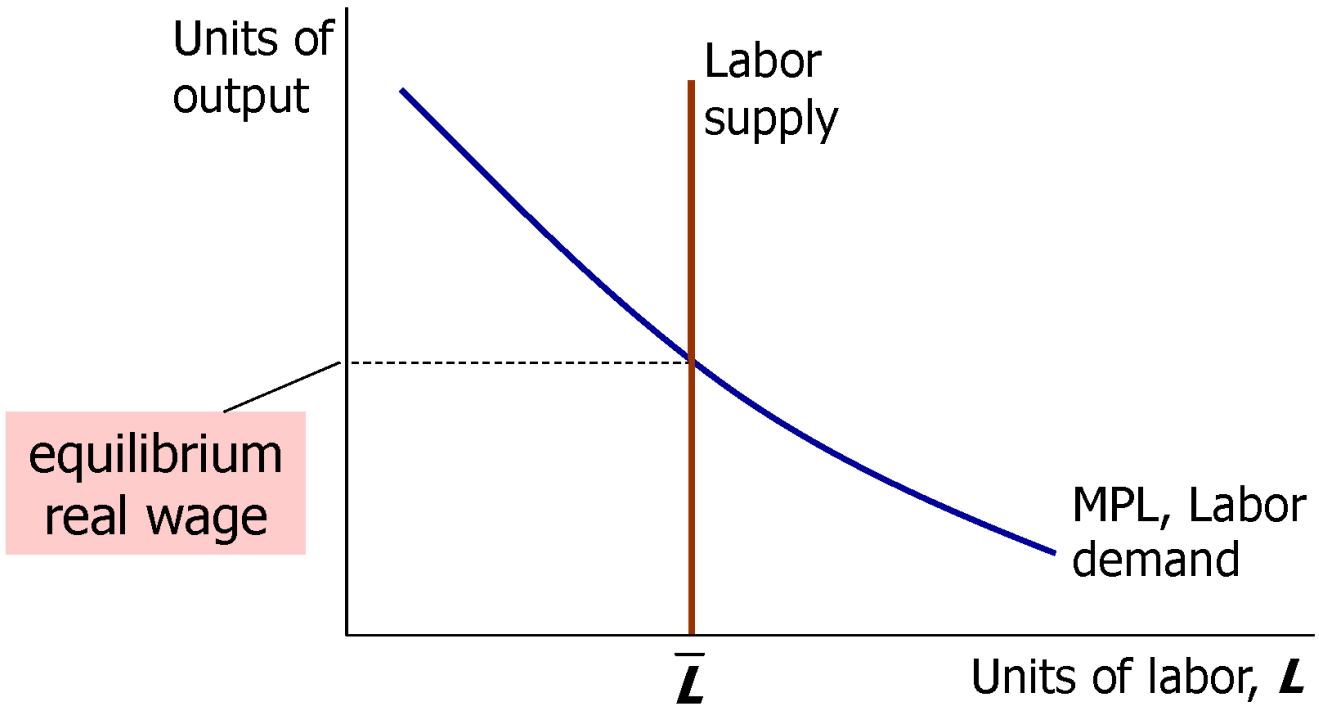
$$\begin{aligned}\Delta\text{Profit} &= \Delta\text{Revenue} - \Delta\text{Cost} \\ &= P \times \text{MPL} - W\end{aligned}$$

- Keep hiring until ΔProfit $=0$

$$P \times \text{MPL} = W$$

$$\text{MPL} = \frac{W}{P}$$

The equilibrium real wage



The real wage adjusts to equate labor demand with supply

Firms' Demand for Capital

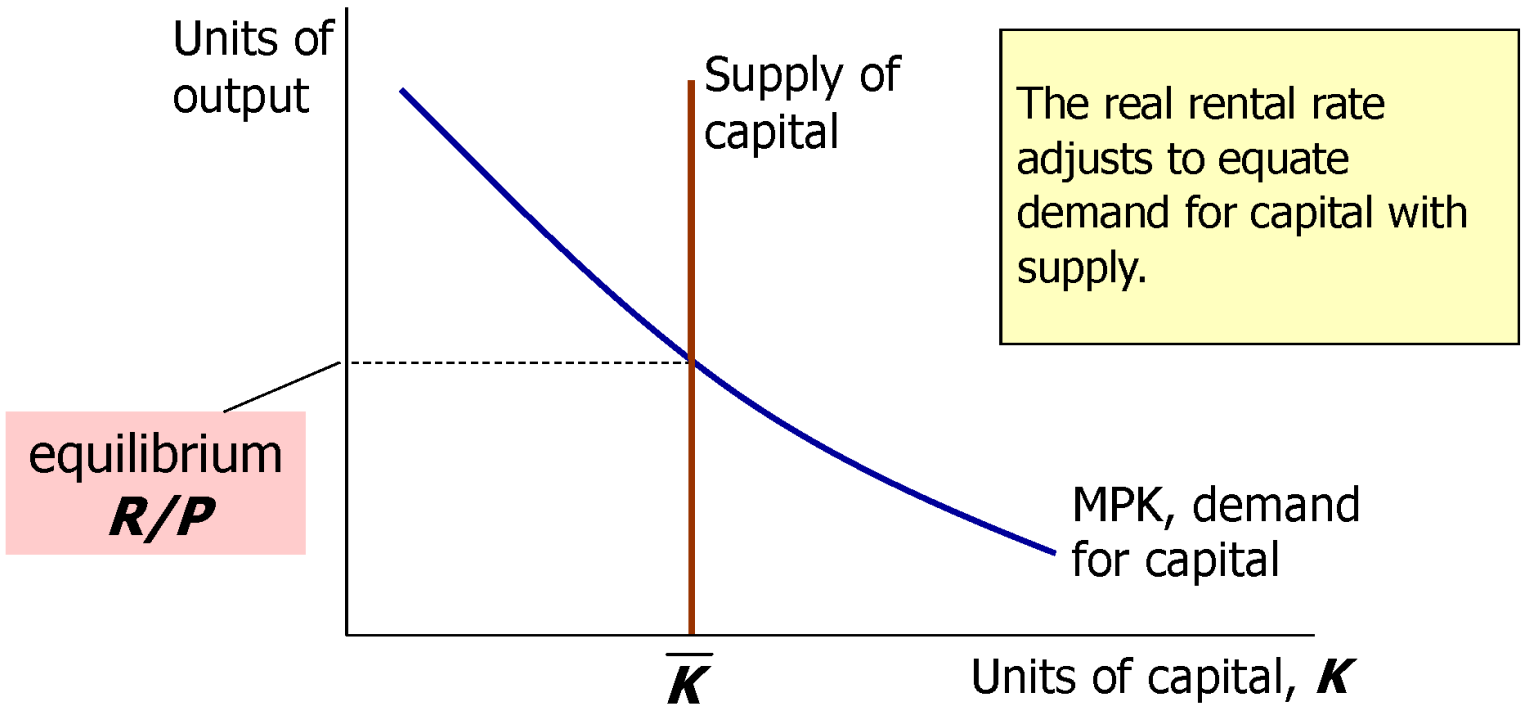
- Suppose firm uses one more machine
- Change in profit equals:

$$\begin{aligned}\Delta\text{Profit} &= \Delta\text{Revenue} - \Delta\text{Cost} \\ &= P \times \text{MPK} - R\end{aligned}$$

- Keep hiring until ΔProfit $=0$

$$\text{MPK} = \frac{R}{P}$$

The equilibrium real rental rate



Profit Maximizing Behavior

- Firms demand each factor of production until marginal product equals real factor price
- Remember that firms take prices as given
- If all firms in the economy competitive and profit-maximizing, then each factor of production is paid its marginal product.

Division of National Income

- Economic profit:

$$P\left[Y - MPL \times L - MPK \times K\right] = 0!$$

- Due to Euler's theorem: if F is CRS, then

$$Y = F(K, L) = (MPL \times L) + (MPK \times K)$$

- Intuition: perfect competition drives economic profits to zero
- We have 3 types of agents: Labor, Firm Owners, Capital Owners

Division of National Income

The supply-side of the classical model tells us that:

- Output produced by firms is divided between the payments to capital and the payments to labor

Example: Cobb-Douglas

- Cobb and Douglas noted constant factor shares
- Cobb-Douglas production function:

$$Y = K^{\alpha} L^{1-\alpha}, 0 < \alpha < 1$$

$$\text{Capital income} = \text{MPK} \times K = \alpha Y$$

$$\text{Labor income} = \text{MPL} \times L = (1 - \alpha) Y$$

Marginal Products

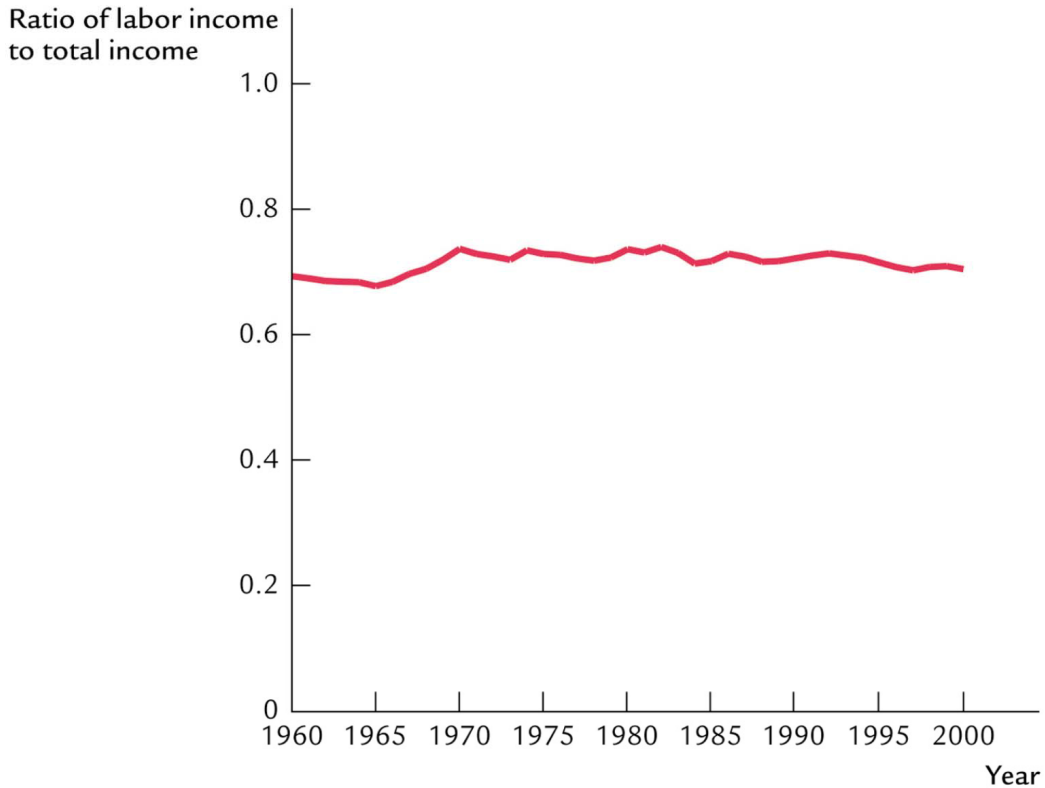
$$Y = K^{\alpha} L^{1-\alpha}$$

$$\text{MPL} = (1-\alpha) K^{\alpha} L^{-\alpha} = (1-\alpha)\frac{Y}{L}$$

$$\text{MPK} = (1-\alpha) K^{\alpha-1} L^{1-\alpha} = \alpha\frac{Y}{K}$$

- MPL and MPK positive, but diminishing in L, K
- Share of labour income $(\text{MPL} \times L)/Y = 1 - \alpha$
- Share of capital income $(\text{MPK} \times K)/Y = \alpha$

US labor income share



Note: US labor share has been approximately 70% for the last 50 years.

TABLE 3-1

Growth in Labor Productivity and Real Wages: The U.S. Experience

Time Period	Growth Rate of Labor Productivity	Growth Rate of Real Wages
1959–2003	2.1%	2.0%
1959–1973	2.9	2.8
1973–1995	1.4	1.2
1995–2003	3.0	3.0

Source: *Economic Report of the President 2005*, Table B-49. Growth in labor productivity is measured here as the annualized rate of change in output per hour in the nonfarm business sector. Growth in real wages is measured as the annualized change in compensation per hour in the nonfarm business sector divided by the implicit price deflator for that sector.

Canadian labor income share

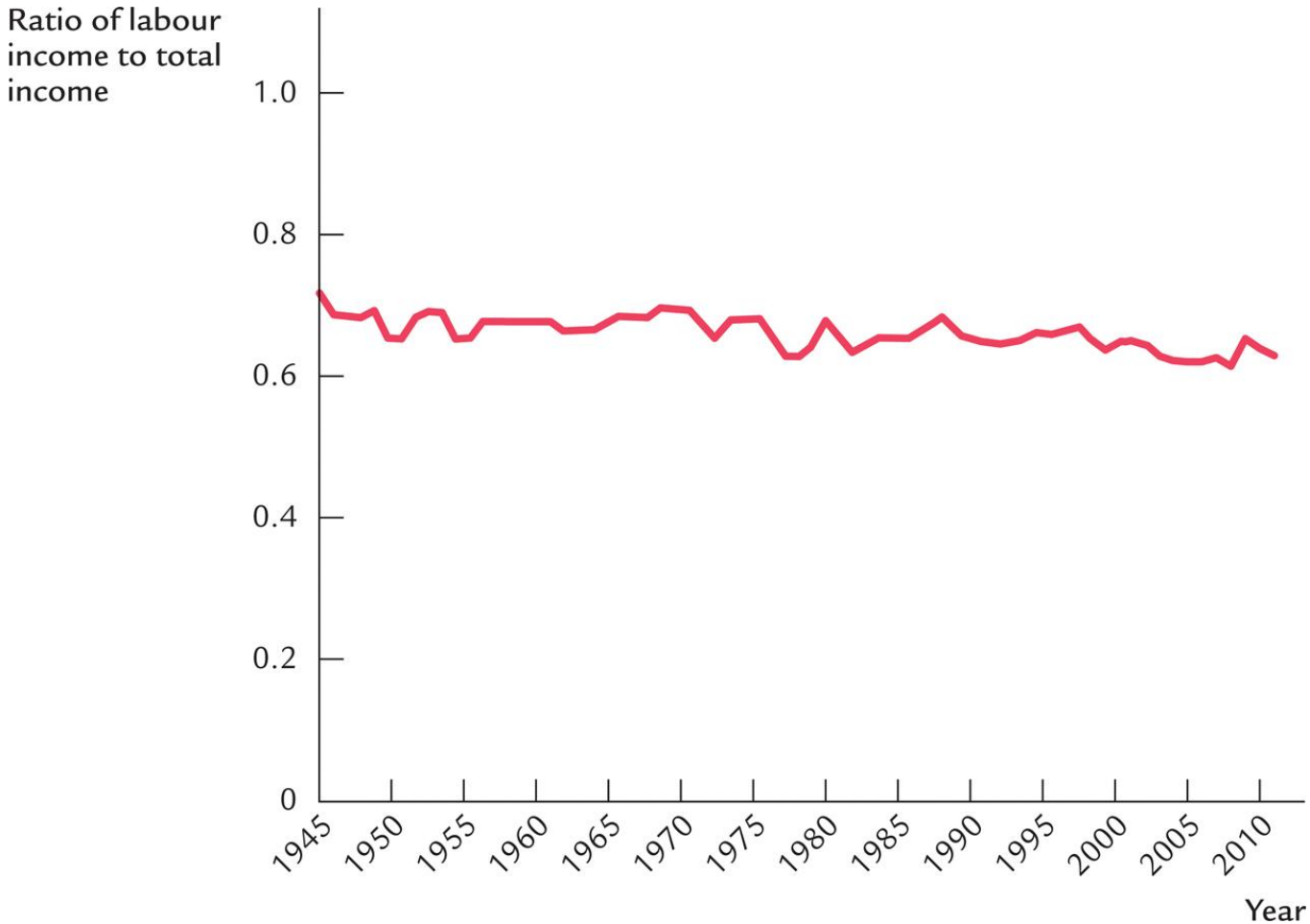


Figure 3-5 The Ratio of Labour Income to Total Income
Mankiw and Scarth: Macroeconomics, Canadian Fifth Edition

Growth in labor productivity and real wages: Canadian experience

Time Period	Labour Productivity Growth	Real Wage Growth
1961–2007	1.7%	1.7%
1961–1973	3.0%	3.9%
1973–1981	1.3%	1.4%
1981–1989	1.2%	0.3%
1989–2000	1.5%	0.8%
2000–2007	1.0%	1.2%

Source: www.csls.ca/ipm/17/IPM-17-sharpe.pdf

Table 3-1 Annual Growth in Labour Productivity and Real Wages: The Canadian Experience
Mankiw and Scarth: Macroeconomics, Canadian Fifth Edition