



# **SPECIFIC FACTORS AND INCOME DISTRIBUTION**

Chapter 4

# Chapter Organisation

- Introduction
- The Specific Factors Model
- International Trade in the Specific Factors Model
- Income Distribution and the Gains from Trade
- Political Economy of Trade: A Preliminary View
- International Labour Mobility
- Summary

# Introduction

- If trade is so good for the economy, why is there such opposition?
- Two main reasons why international trade has strong effects on the distribution of income within a country:
  - *Resources cannot move immediately or costlessly from one industry to another.*
  - *Industries differ in the factors of production they demand.*

# The Specific Factors Model

- The **specific factors model** allows trade to affect income distribution.
- Assumptions of the model:
  - *Two goods, cloth and food.*
  - *Three factors of production: labour (L), capital (K) and land (T for terrain).*
  - *Perfect competition prevails in all markets.*

# The Specific Factors Model (cont.)

- *Cloth produced using capital and labour (but not land).*
- *Food produced using land and labour (but not capital).*
- *Labour is a mobile factor that can move between sectors.*
- *Land and capital are both specific factors used only in the production of one good.*

# The Specific Factors Model (cont.)

- How much of each good does the economy produce?
- The production function for cloth gives the quantity of cloth that can be produced given any input of capital and labour:

$$Q_C = Q_C(K, L_C) \quad (4-1)$$

- $Q_C$  is the output of cloth
- $K$  is the capital stock
- $L_C$  is the labour force employed in cloth

# The Specific Factors Model (cont.)

- The production function for food gives the quantity of food that can be produced given any input of land and labour:

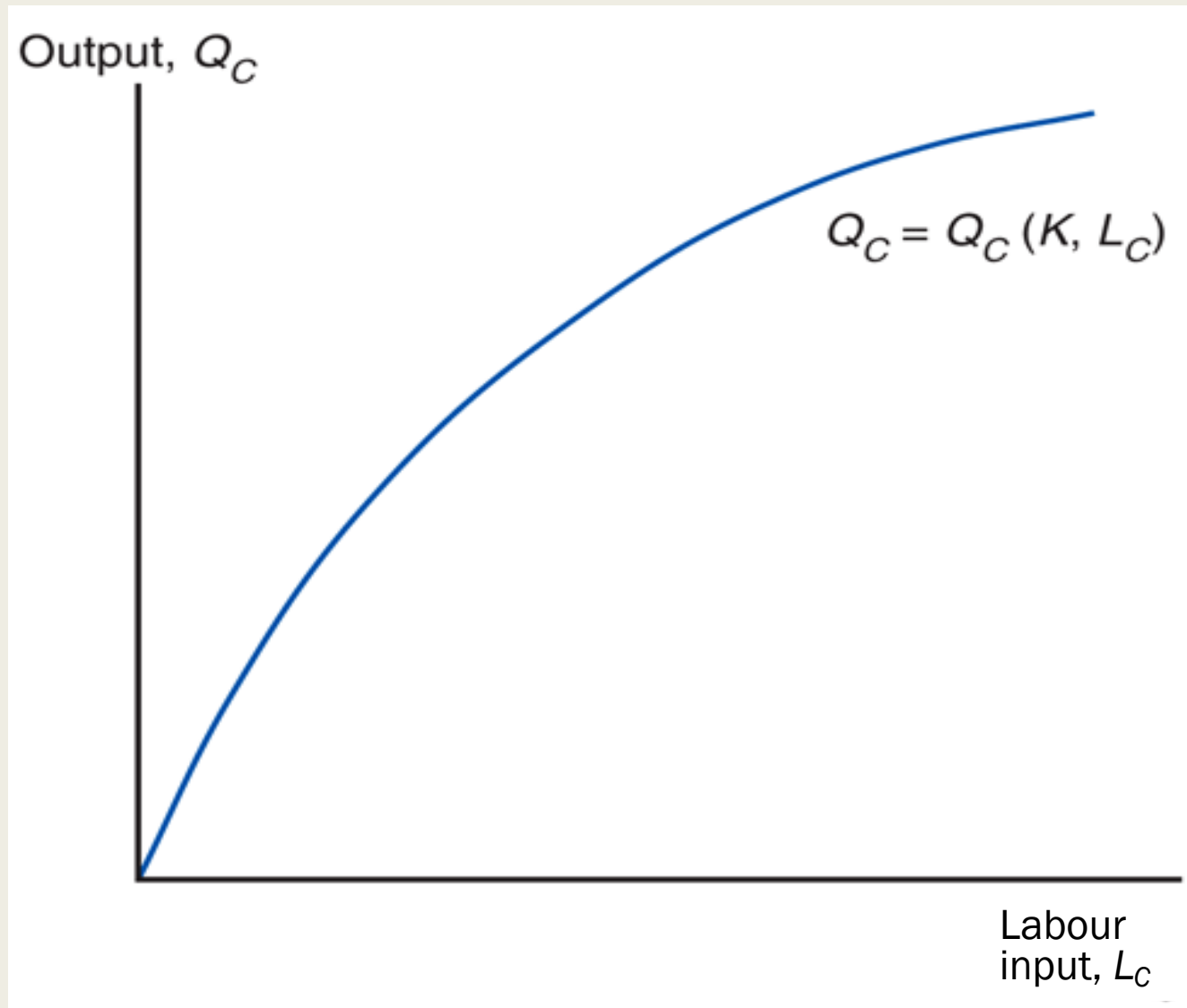
$$Q_F = Q_F(T, L_F) \quad (4-2)$$

- $Q_F$  is the output of food
- $T$  is the supply of land
- $L_F$  is the labour force employed in food

# Production Possibilities

- How does the economy's mix of output change as labour is shifted from one sector to the other?
- When labour moves from food to cloth, food production falls while the output of cloth rises.
- Figure 4-1 illustrates the production function for cloth.

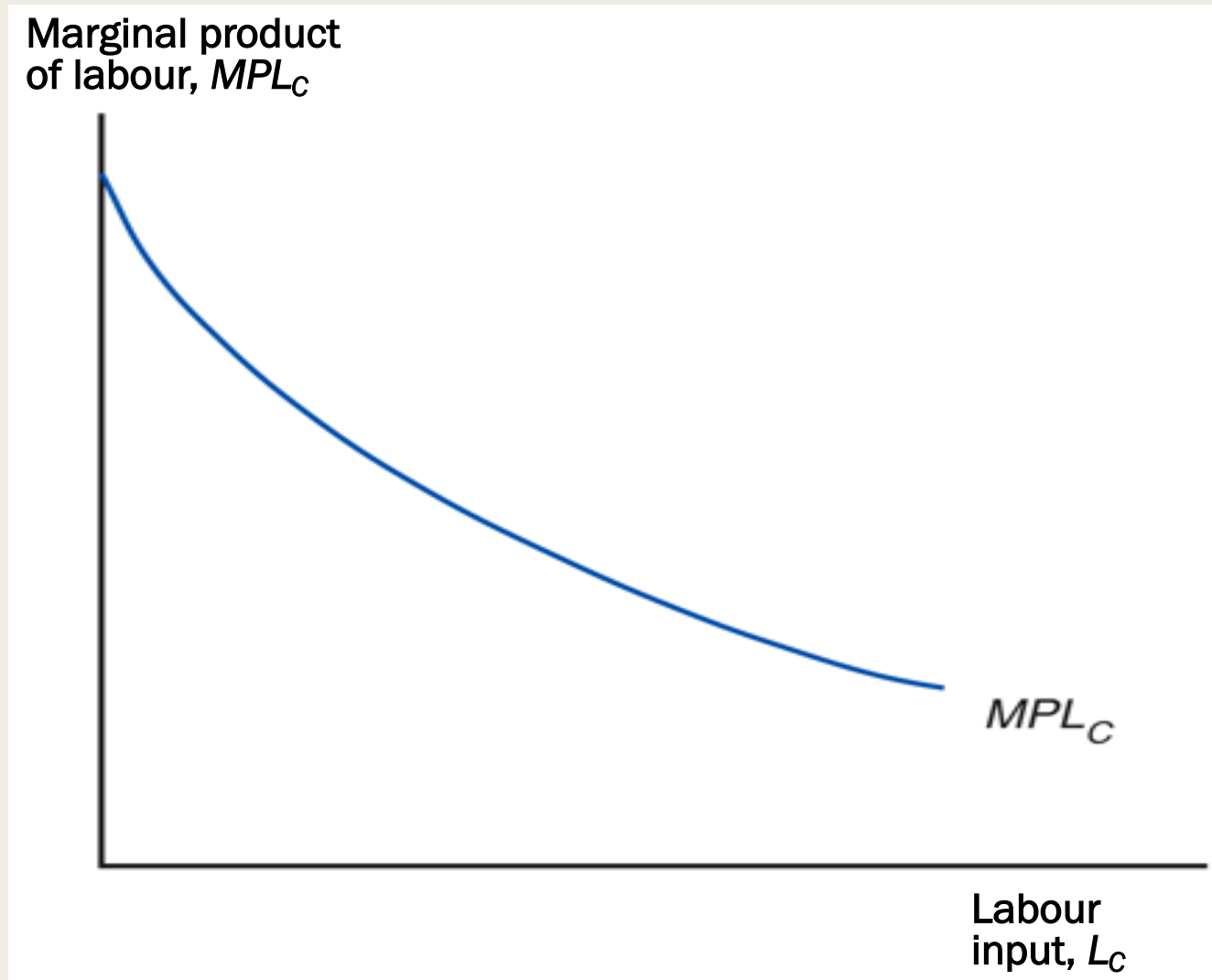
# Fig. 4-1: The Production Function for Cloth



# Production Possibilities (cont.)

- The shape of the production function reflects the law of **diminishing marginal returns**.
  - Adding one worker to the production process (without increasing the amount of capital) means that each worker has less capital to work with.
  - Therefore, each additional unit of labour adds less output than the last.
- Figure 4-2 shows the **marginal product of labour**, which is the increase in output that corresponds to an extra unit of labour.

# Fig. 4-2: The Marginal Product of Labour



# Production Possibilities (cont.)

- For the economy as a whole, the total labour employed in cloth and food must equal the total labour supply:

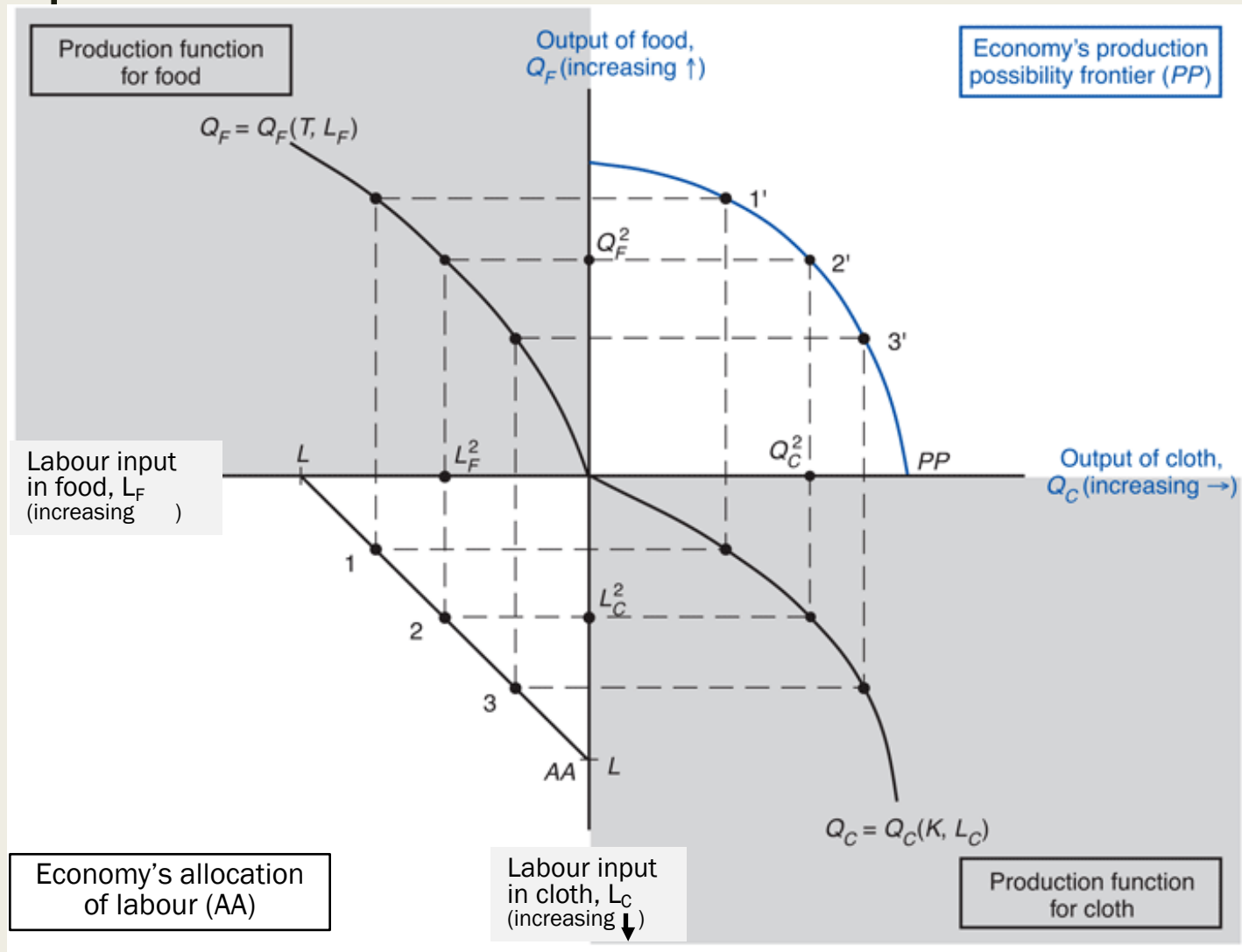
$$L_C + L_F = L \quad (4-3)$$

- Use these equations to derive the **production possibilities frontier** of the economy.

# Production Possibilities (cont.)

- Use a four-quadrant diagram to construct production possibilities frontier in Figure 4-3.
  - *Lower left quadrant indicates the allocation of labour.*
  - *Lower right quadrant shows the production function for cloth from Figure 4-1.*
  - *Upper left quadrant shows the corresponding production function for food.*
  - *Upper right quadrant indicates the combinations of cloth and food that can be produced.*

# Fig. 4-3: The Production Possibility Frontier in the Specific Factors Model



# Production Possibilities (cont.)

- Why is the production possibilities frontier curved?
  - *Diminishing returns to labour in each sector causes the opportunity cost to rise when an economy produces more of a good.*
  - *Opportunity cost of cloth in terms of food is the slope of the production possibilities frontier – the slope becomes steeper as an economy produces more cloth.*

# Production Possibilities (cont.)

- Opportunity cost of producing one more metre of cloth is  $MPL_F/MPL_C$  pounds of food.
  - *To produce one more metre of cloth, you need  $1/MPL_C$  hours of labour.*
  - *To free up one hour of labour, you must reduce output of food by  $MPL_F$  kilograms.*
  - *To produce less food and more cloth, employ less in food and more in cloth.*
- The marginal product of labour in food rises and the marginal product of labour in cloth falls, so  $MPL_F/MPL_C$  rises.

# Prices, Wages and Labour Allocation

- How much labour is employed in each sector?
  - *Need to look at supply and demand in the labour market.*
- Demand for labour:
  - *In each sector, employers will maximize profits by demanding labour up to the point where the value produced by an additional hour equals the marginal cost of employing a worker for that hour.*

# Prices, Wages and Labour Allocation (cont.)

- The demand curve for labour in the cloth sector:

$$MPL_C \times P_C = w \quad (4-4)$$

- *The wage equals the value of the marginal product of labour in manufacturing.*

- The demand curve for labour in the food sector:

$$MPL_F \times P_F = w \quad (4-5)$$

- *The wage equals the value of the marginal product of labour in food.*

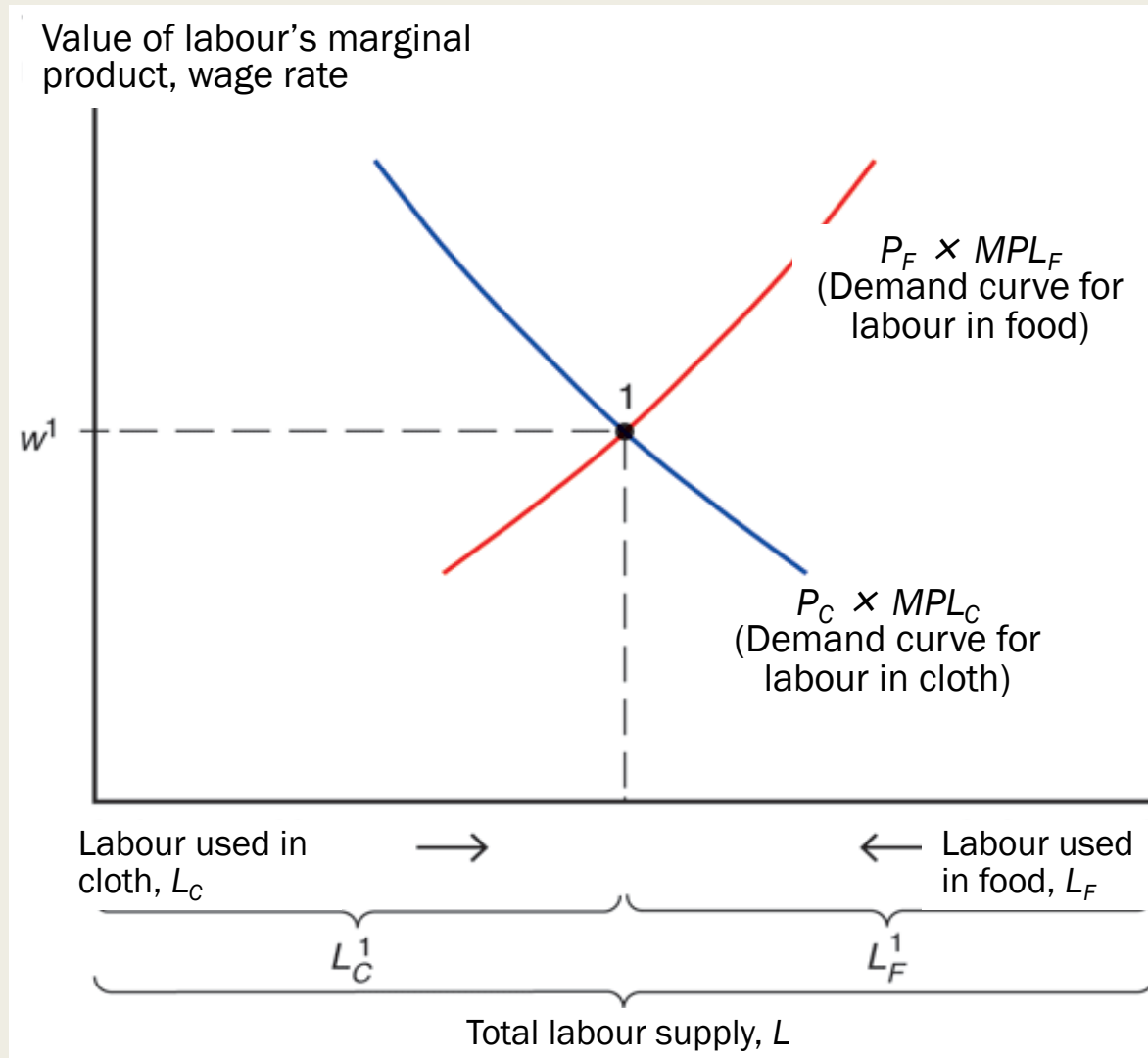
# Prices, Wages and Labour Allocation (cont.)

- Figure 4-4 represents labour demand in the two sectors.
- The demand for labour in the cloth sector is  $MPL_C$  from Figure 4-2 multiplied by  $P_C$ .
- The demand for labour in the food sector is measured from the right.
- The horizontal axis represents the total labour supply  $L$ .

# Prices, Wages and Labour Allocation (cont.)

- The two sectors must pay the same wage because labour can move between sectors.
- If the wage were higher in the cloth sector, workers would move from making food to making cloth until the wages become equal.
  - *Or if the wage were higher in the food sector, workers would move in the other direction.*
- Where the labour demand curves intersect gives the equilibrium wage and allocation of labour between the two sectors.

# Fig. 4-4: The Allocation of Labour

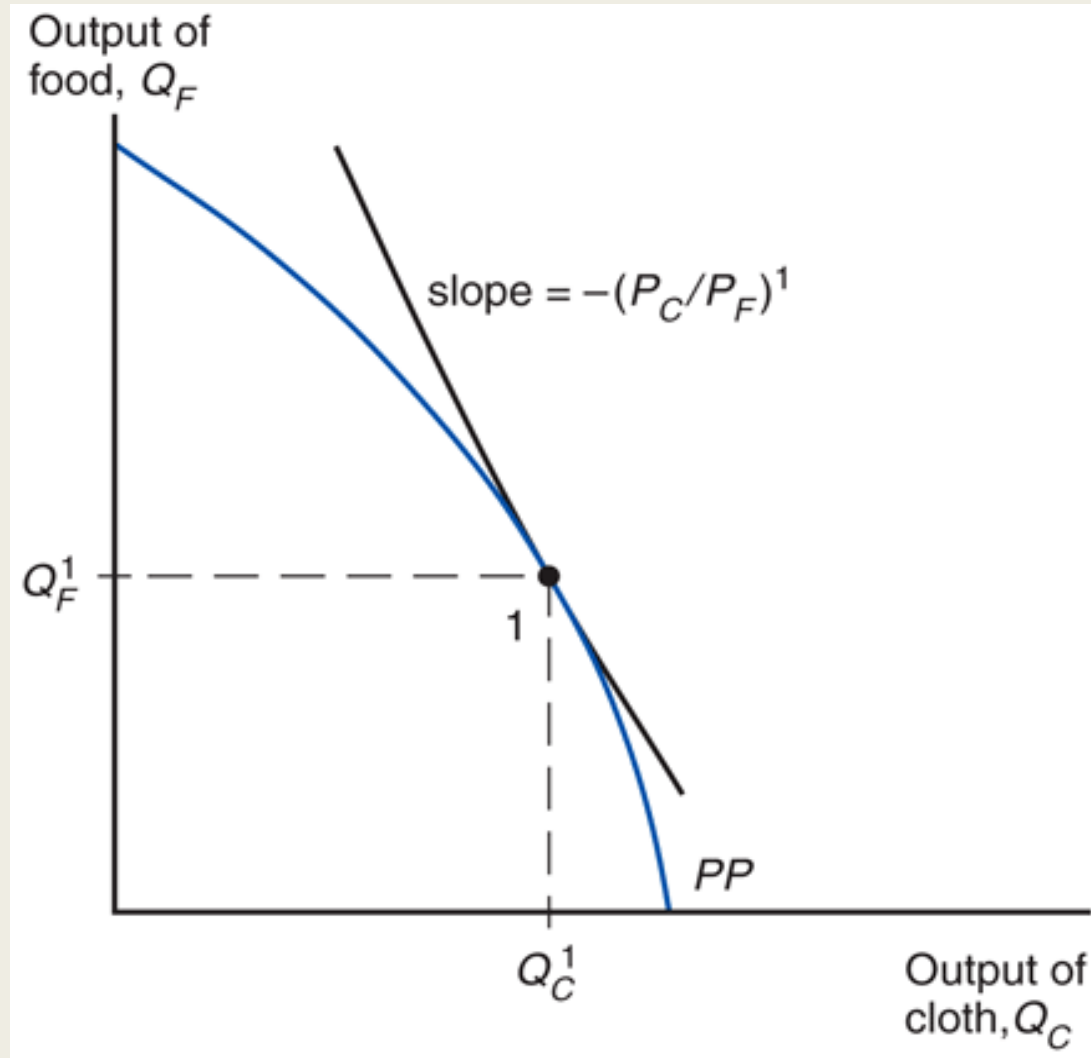


# Prices, Wages and Labour Allocation (cont.)

- At the production point, the production possibility frontier must be tangent to a line whose slope is minus the price of cloth divided by that of food.
- Relationship between relative prices and output:

$$-MPL_F/MPL_C = -P_C/P_F \quad (4-6)$$

# Fig. 4-5: Production in the Specific Factors Model



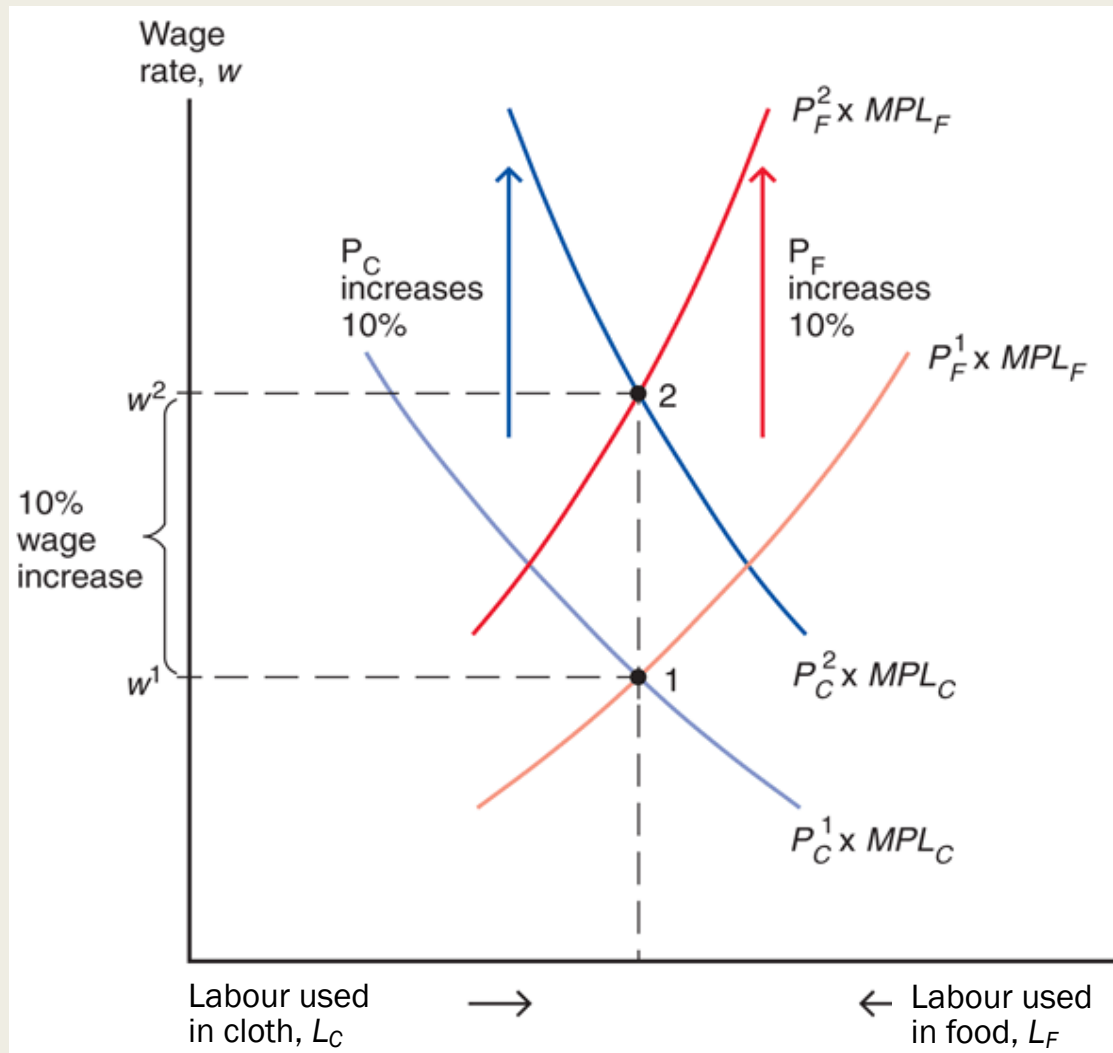
# Prices, Wages and Labour Allocation (cont.)

- What happens to the allocation of labour and the distribution of income when the prices of food and cloth change?
- Two cases:
  1. *An equal proportional change in prices*
  2. *A change in relative prices*

# Prices, Wages and Labour Allocation (cont.)

- When both prices change in the same proportion, no real changes occur.
  - *The wage rate ( $w$ ) rises in the same proportion as the prices, so real wages (i.e., the ratios of the wage rate to the prices of goods) are unaffected.*
  - *The real incomes of capital owners and landowners also remain the same.*

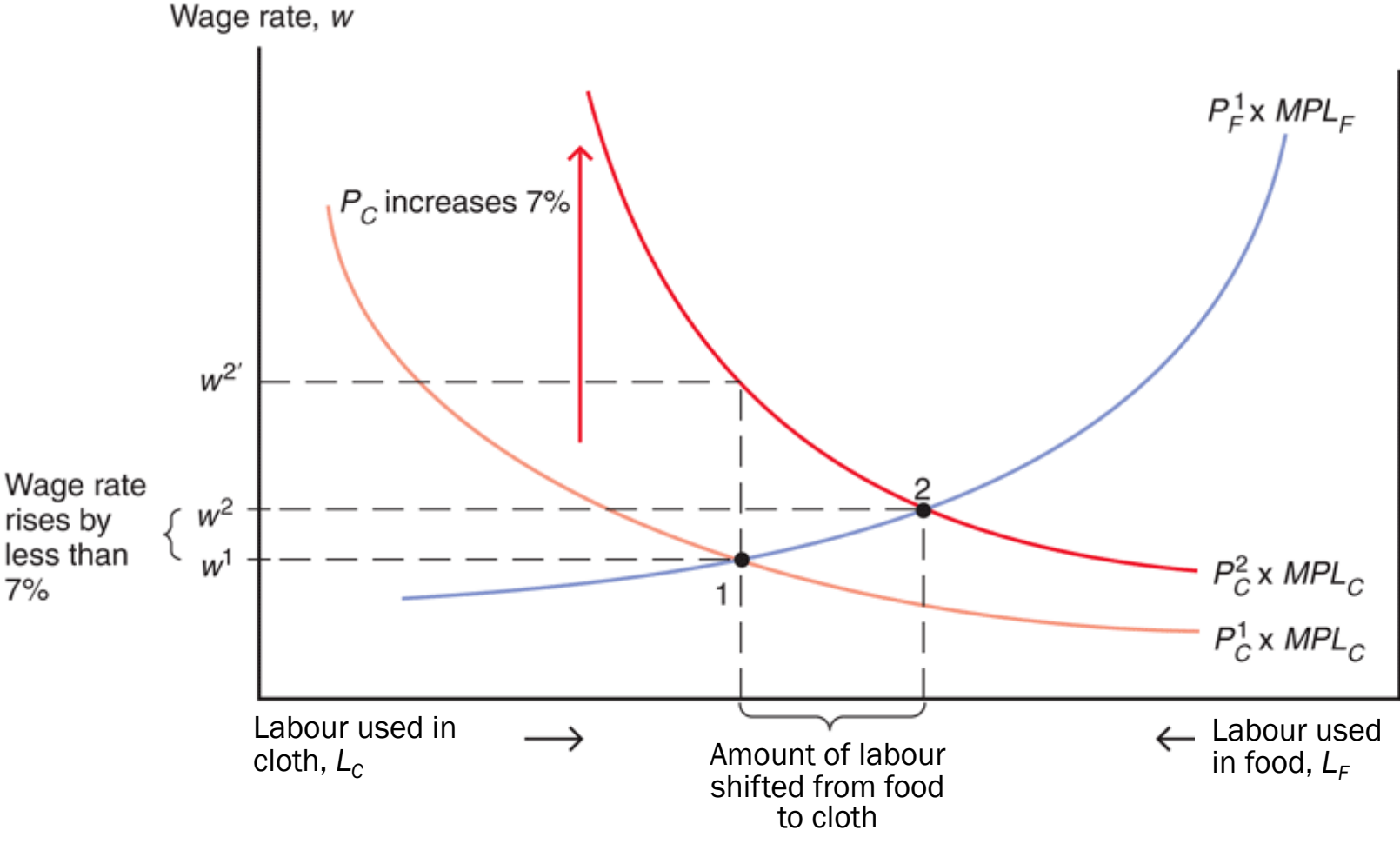
# Fig. 4-6: An Equal-Proportional Increase in the Prices of Cloth and Food



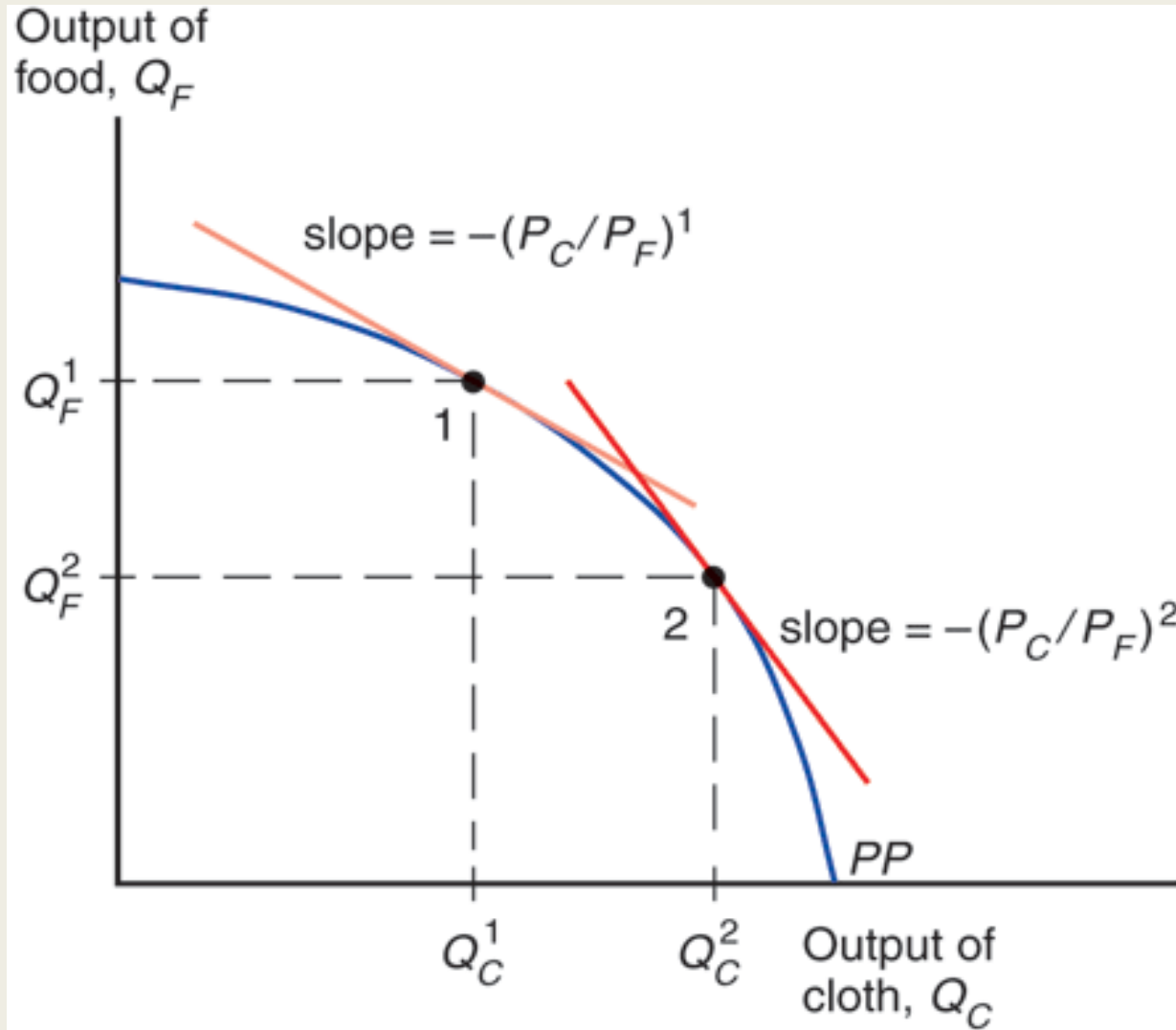
# Prices, Wages and Labour Allocation (cont.)

- When only  $P_C$  rises, labour shifts from the food sector to the cloth sector and the output of cloth rises while that of food falls.
- The wage rate ( $w$ ) does not rise as much as  $P_C$  since cloth employment increases and thus the marginal product of labour in that sector falls.

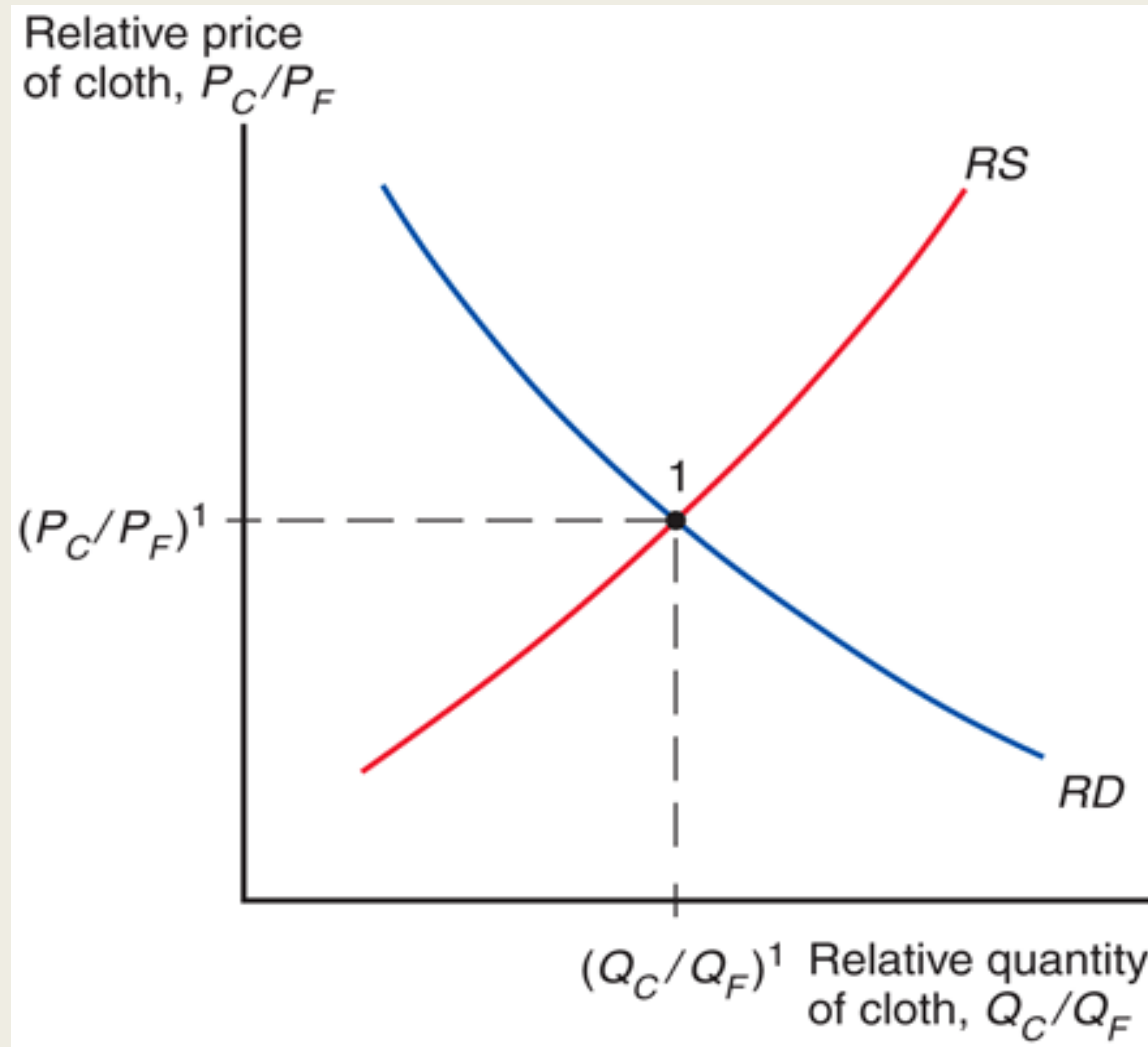
# Fig. 4-7: A Rise in the Price of Cloth



# Fig. 4-8: The Response of Output to a Change in the Relative Price of Cloth



# Fig. 4-9: Determination of Relative Prices



# Prices, Wages and Labour Allocation (cont.)

- Relative Prices and the Distribution of Income
  - *Suppose that  $P_C$  increases by 10%. Then, the wage would rise by less than 10%.*
- What is the economic effect of this price increase on the incomes of the following three groups?
  - *Workers, owners of capital and owners of land*

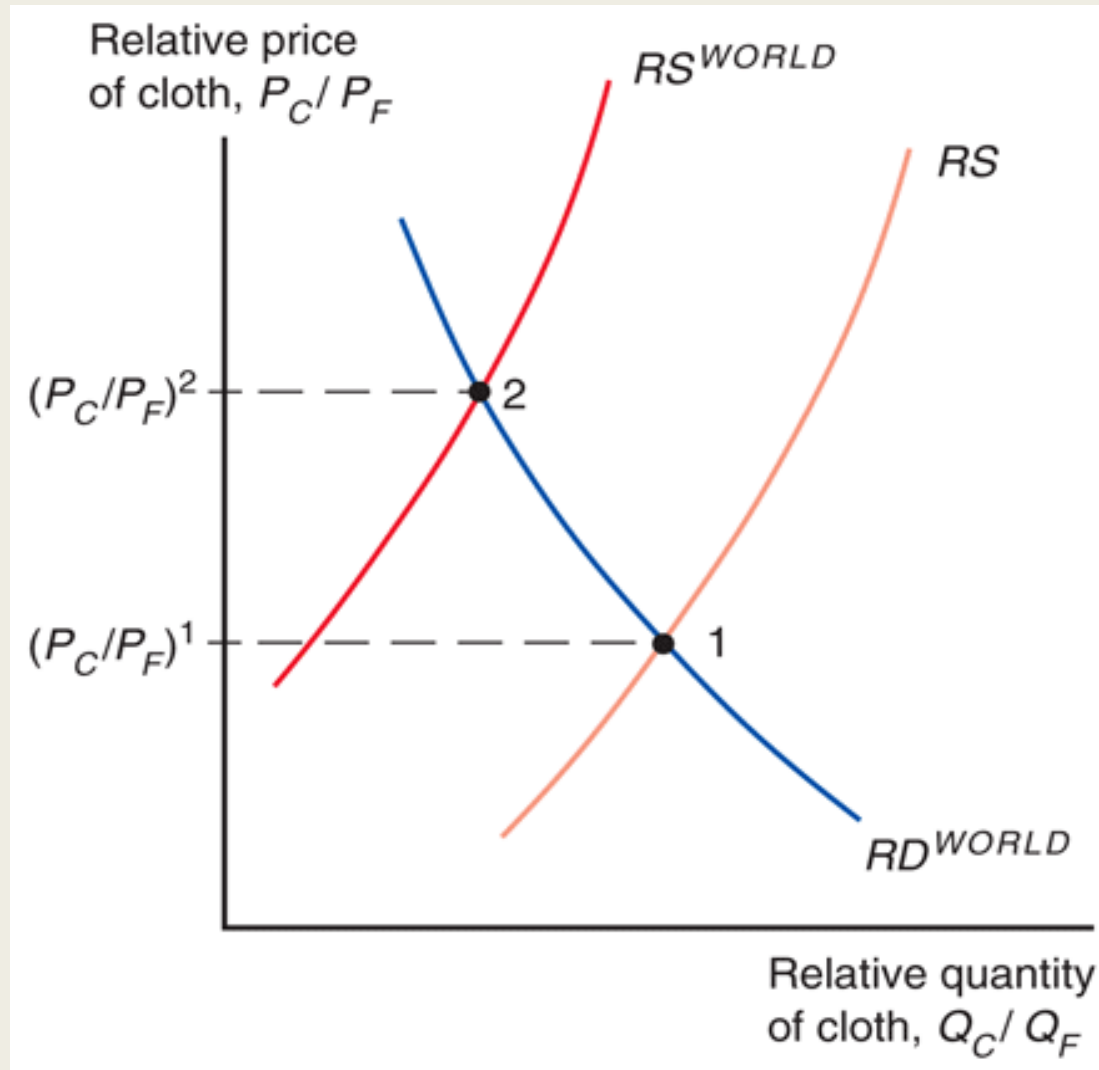
# Prices, Wages and Labour Allocation (cont.)

- Owners of capital are definitely better off.
- Landowners are definitely worse off.
- Workers: cannot say whether workers are better or worse off:
  - *Depends on the relative importance of cloth and food in workers' consumption.*

# International Trade in the Specific Factors Model

- Trade and Relative Prices
  - *The relative price of cloth prior to trade is determined by the intersection of the economy's relative supply of cloth and its relative demand.*
  - *The free trade relative price of cloth is determined by the intersection of world relative supply of cloth and world relative demand.*
  - *Opening up to trade increases the relative price of cloth in an economy whose relative supply of cloth is larger than for the world as a whole.*

# Fig. 4-10: Trade and Relative Prices



# International Trade in the Specific Factors Model (cont.)

- Gains from trade
  - *Without trade, the economy's output of a good must equal its consumption.*
  - *International trade allows the mix of cloth and food consumed to differ from the mix produced.*
  - *The country cannot spend more than it earns:*

$$P_C \times D_C + P_F \times D_F = P_C \times Q_C + P_F \times Q_F$$

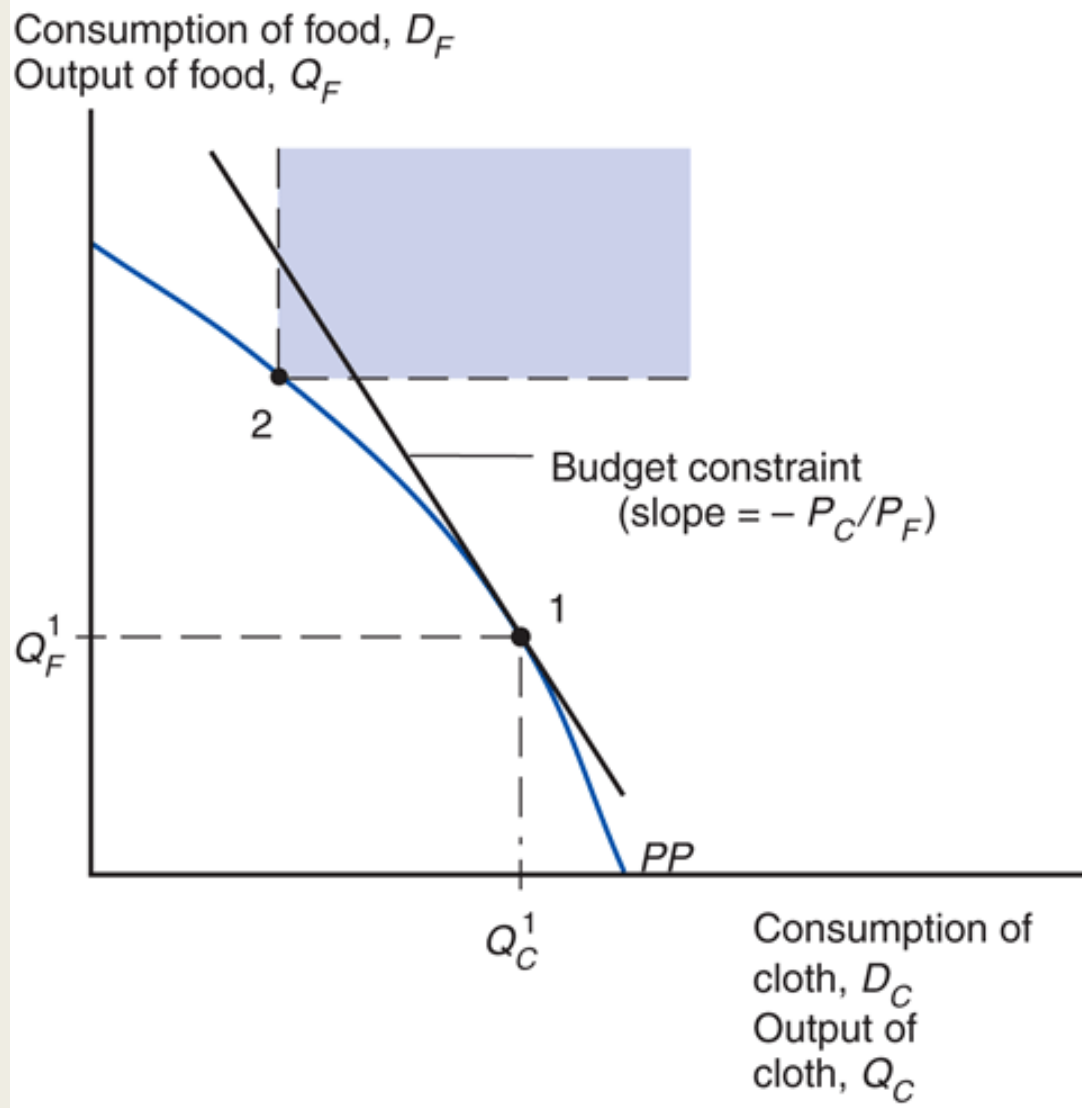
# International Trade in the Specific Factors Model (cont.)

- The economy as a whole gains from trade.
- *It imports an amount of food equal to the relative price of cloth times the amount of cloth exported:*

$$D_F - Q_F = (P_C / P_F) \times (Q_C - D_C)$$

- *It is able to afford amounts of cloth and food that the country is not able to produce itself.*
- *The budget constraint with trade lies above the production possibilities frontier in Figure 4-11.*

# Fig. 4-11: Budget Constraint for a Trading Economy and Gains from Trade



# Income Distribution and Trade Politics

- International trade shifts the relative price of cloth to food, so factor prices change.
- Trade benefits the factor that is specific to the export sector of each country, but hurts the factor that is specific to the import-competing sectors.
- Trade has ambiguous effects on mobile factors.

# Income Distribution and Trade Politics (cont.)

- Trade benefits a country by expanding choices.
  - *Possible to redistribute income so that everyone gains from trade.*
  - *Those who gain from trade could compensate those who lose and still be better off themselves.*
  - *That everyone could gain from trade does not mean that they actually do – redistribution usually hard to implement.*

# Income Distribution and Trade Politics (cont.)

- Trade often produces losers as well as winners.
- Optimal trade policy must weigh one group's gain against another's loss.
  - *Some groups may need special treatment because they are already relatively poor (e.g., workers in dairy industry in Canada).*
- Most economists strongly favour free trade.

# Income Distribution and Trade Politics (cont.)

- Typically, those who gain from trade are a much less concentrated, informed, and organized group than those who lose.
  - *Example: Consumers and producers in the Canadian dairy industry, respectively*
- Governments usually provide a “safety net” of income support to cushion the losses to groups hurt by trade (or other changes).

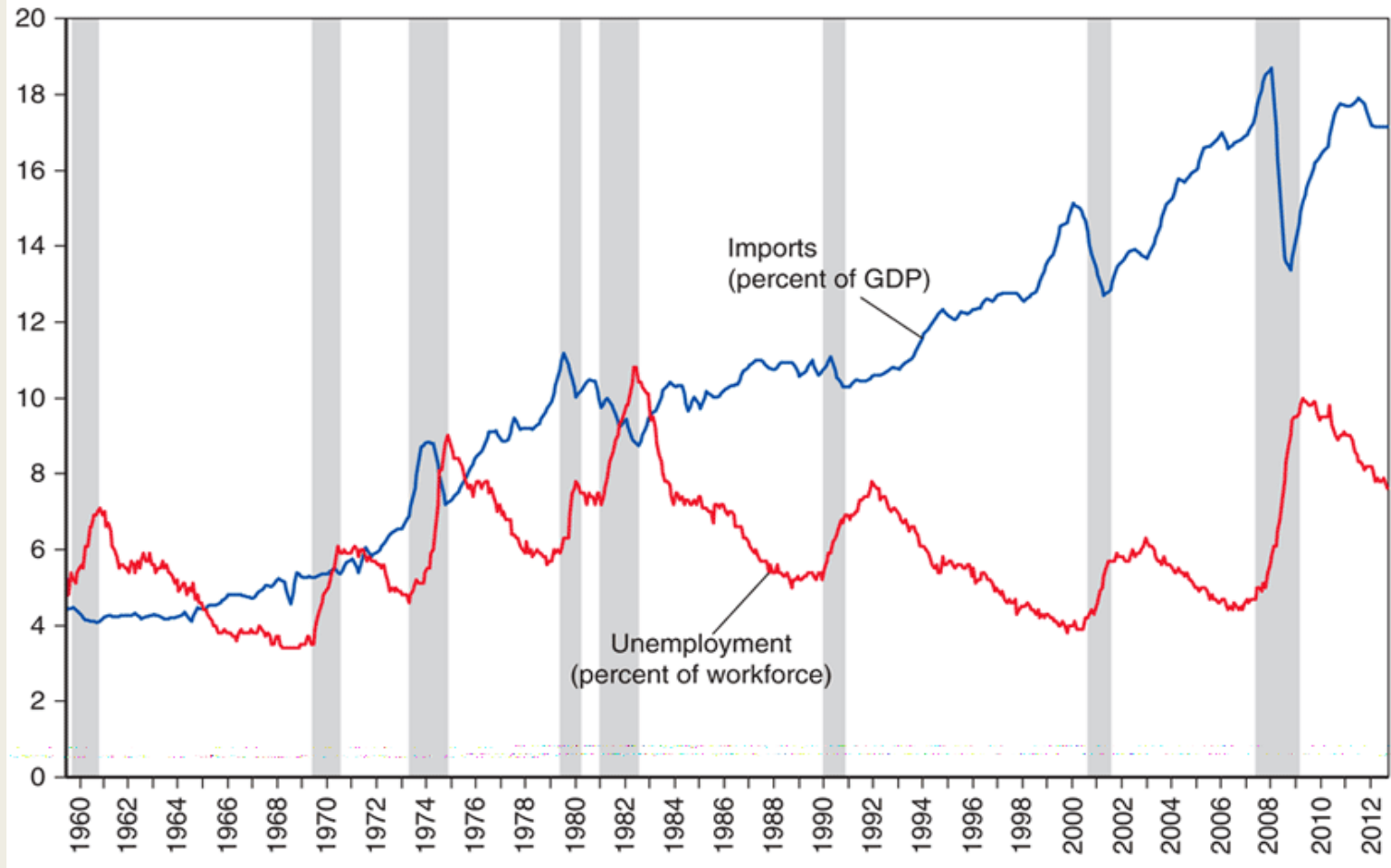
# Trade and Unemployment

- Trade shifts jobs from import-competing to export sector.
  - *Process not instantaneous – some workers will be unemployed as they look for new jobs.*
- How much unemployment can be traced back to trade?
  - *From 2001 to 2010, only about 2% of involuntary displacements stemmed from import competition or plants moved overseas.*

# Trade and Unemployment (cont.)

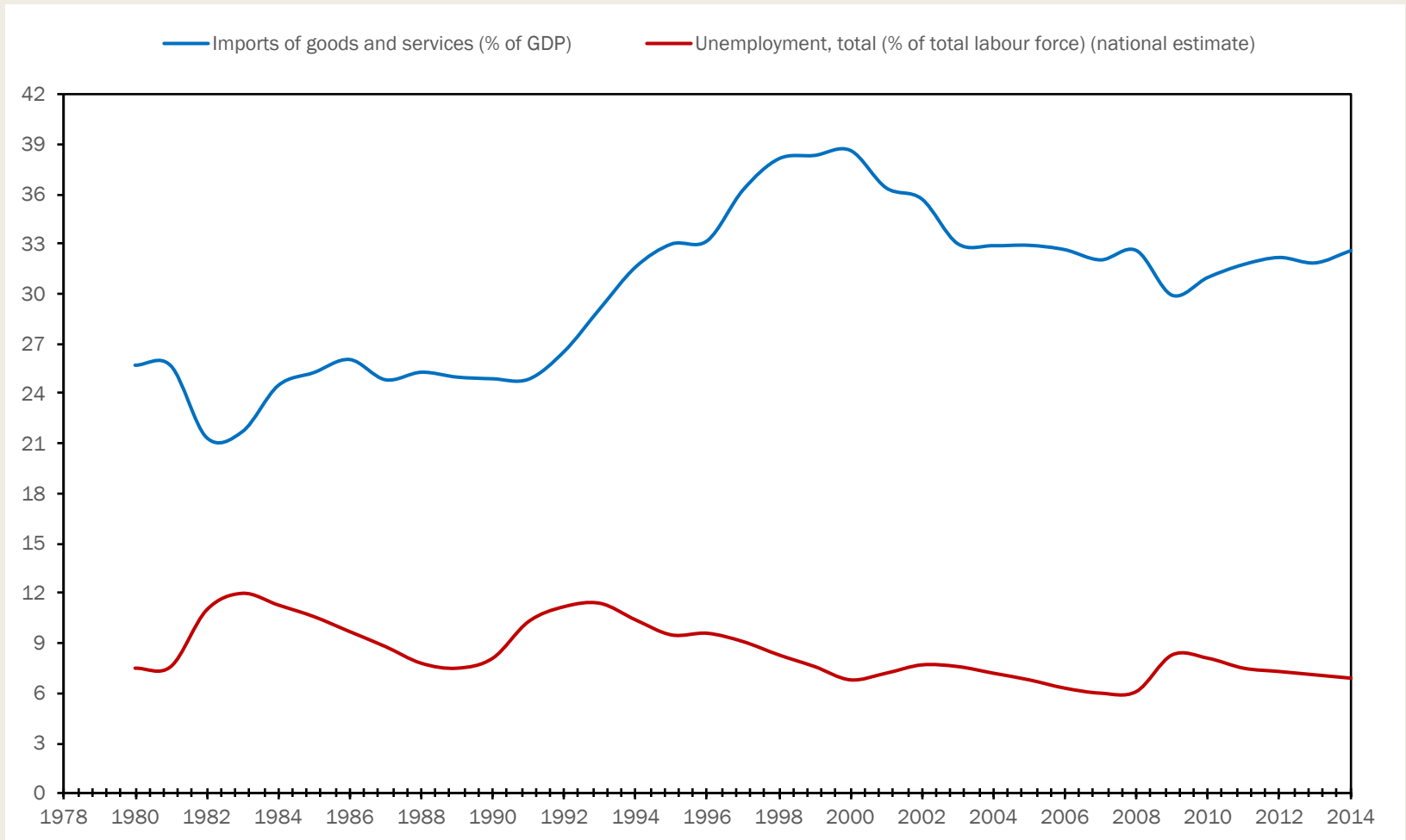
- Figure 4-12 shows that there is no obvious correlation between unemployment rate and imports relative to GDP for the U.S.
  - *Unemployment is primarily a macroeconomic problem that rises during recessions.*
  - *The best way to reduce unemployment is by adopting macroeconomic policies to help the economy recover, not by adopting trade protection.*

# Fig. 4-12: Unemployment and Import Penetration in the United States



Source: U.S. Bureau of Economic Analysis for imports and U.S. Bureau of Labor Studies for unemployment.

# Fig. 4-12: Unemployment and Import Penetration in Canada



**Source:** World Bank national accounts data and OECD National Accounts data files for imports. International Labour Organization, Key Indicators of the Labour Market database for unemployment.

# International Labour Mobility

- Movements in factors of production include
  - *labour migration*
  - *the transfer of financial assets through international borrowing and lending*
  - *transactions of multinational corporations involving direct ownership of foreign firms*
- Like movements of goods and services (trade), movements of factors of production are politically sensitive and are often restricted.

# International Labour Mobility (cont.)

- Why does labour migrate and what effects does labour migration cause?
- Workers migrate to wherever wages are highest.
- Consider movement of labour across countries instead of across sectors.
- Suppose two countries produce one non-traded good (food) using two factors of production:
  - *Land cannot move across countries but labour can.*

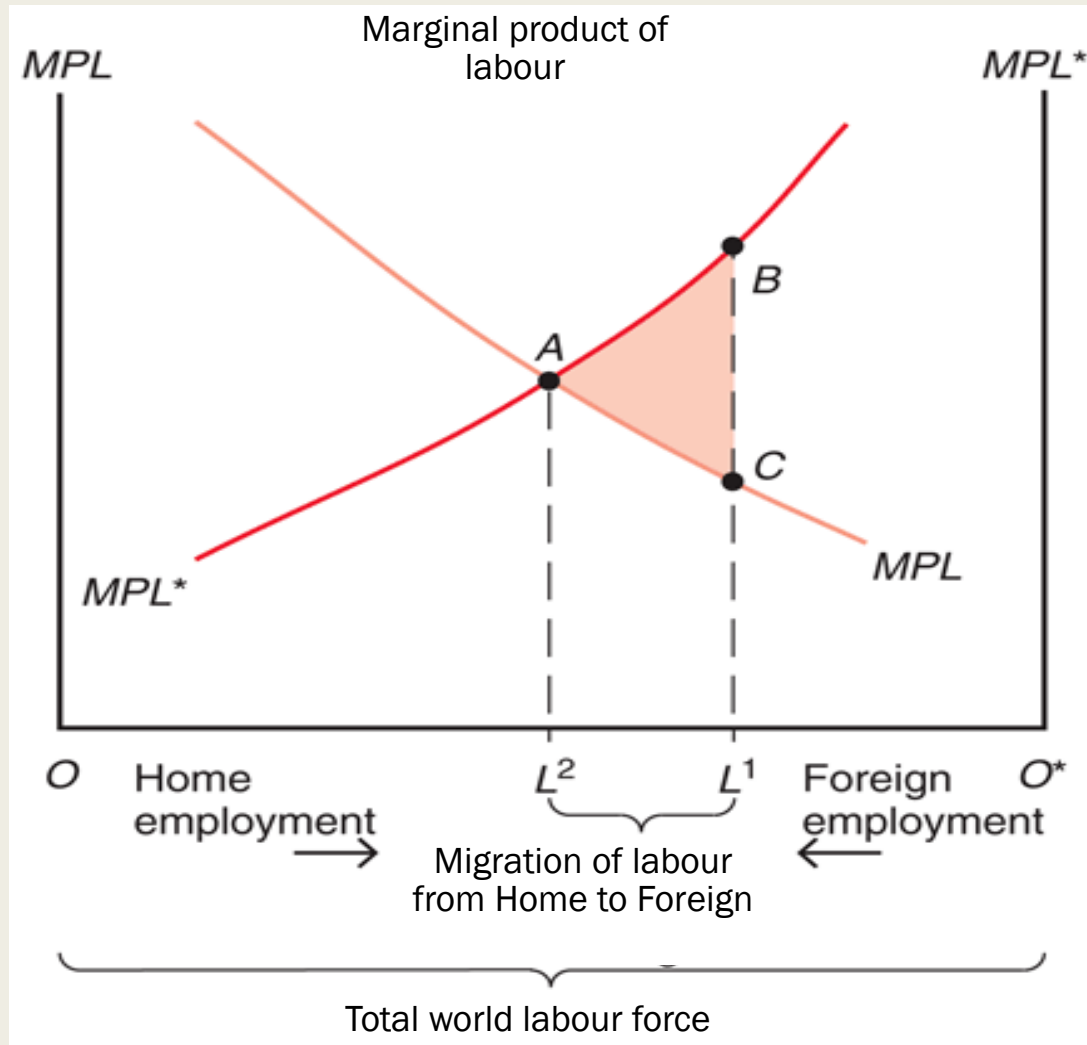
# International Labour Mobility (cont.)

- Figure 4-13 finds the equilibrium wage and labour allocation with migration across countries.
  - *Similar to how Figure 4-4 determined the equilibrium allocation of labour between sectors.*
- Start with  $OL^1$  workers in Home earning a lower real wage (point C) than the  $L^1O^*$  workers in Foreign (point B).
  - *Lower wage due to less land per worker (lower productivity).*
- Workers in the home country want to migrate to the foreign country where they can earn more.

# International Labour Mobility (cont.)

- If no obstacles to labour migration exist, workers move from Home to Foreign until the purchasing power of wages is equal across countries (point A), with  $OL^2$  workers in Home and  $L^2O^*$  workers in Foreign.
  - *Emigration from Home decreases the supply of labour and raises real wage of the workers who remain there.*
- Workers who start in the Home country earn more due to emigration regardless if they are among those who leave.
  - *Immigration into Foreign increases the supply of labour and decreases the real wage there.*
- Wages do not actually equalize, due to barriers to migration such as policies restricting immigration and natural reluctance to move.

# Fig. 4-13: Causes and Effects of International Labour Mobility



# International Labour Mobility (cont.)

- Labour migration increases world output.
  - *The value of foreign output rises by the area under its  $MPL^*$  curve from  $L^1$  to  $L^2$*
  - *The value of domestic output falls by the area under its  $MPL$  curve from  $L^2$  to  $L^1$*
  - *World output rises because labour moves to where it is more productive (where wages are higher).*
  - *The value of world output is maximized when the marginal productivity of labour is the same across countries.*

# International Labour Mobility (cont.)

- Workers initially in Home benefit while workers in Foreign are hurt by inflows of other workers.
  - *Landowners in Foreign gain from the inflow of workers decreasing real wages and increasing output.*
  - *Landowners in Home are hurt by the outflow of workers increasing real wages and decreasing output.*

# International Labour Mobility (cont.)

- Does migration lead to the wage changes predicted?
- Table 4-1 shows that real wages in 1870 were much higher in destination countries than in origin countries.
- Up until the eve of World War I in 1913, wages rose faster in origin countries than in destination countries (except Canada).
- Migration moved the world toward more equalized wages.

# Table 4-1

	Real Wage, 1870 (U.S. = 100)	Percentage Increase in Real Wage, 1870–1913
<b>Destination Countries</b>		
Argentina	53	51
Australia	110	1
Canada	86	121
United States	100	47
<b>Origin Countries</b>		
Ireland	43	84
Italy	23	112
Norway	24	193
Sweden	24	250

**Source:** Jeffrey G. Williamson, “The Evolution of Global Labor Markets Since 1830: Background Evidence and Hypotheses,” *Explorations in Economic History* 32 (1995), pp. 141–196.

# Convergence of Real Wages among Industrial Countries

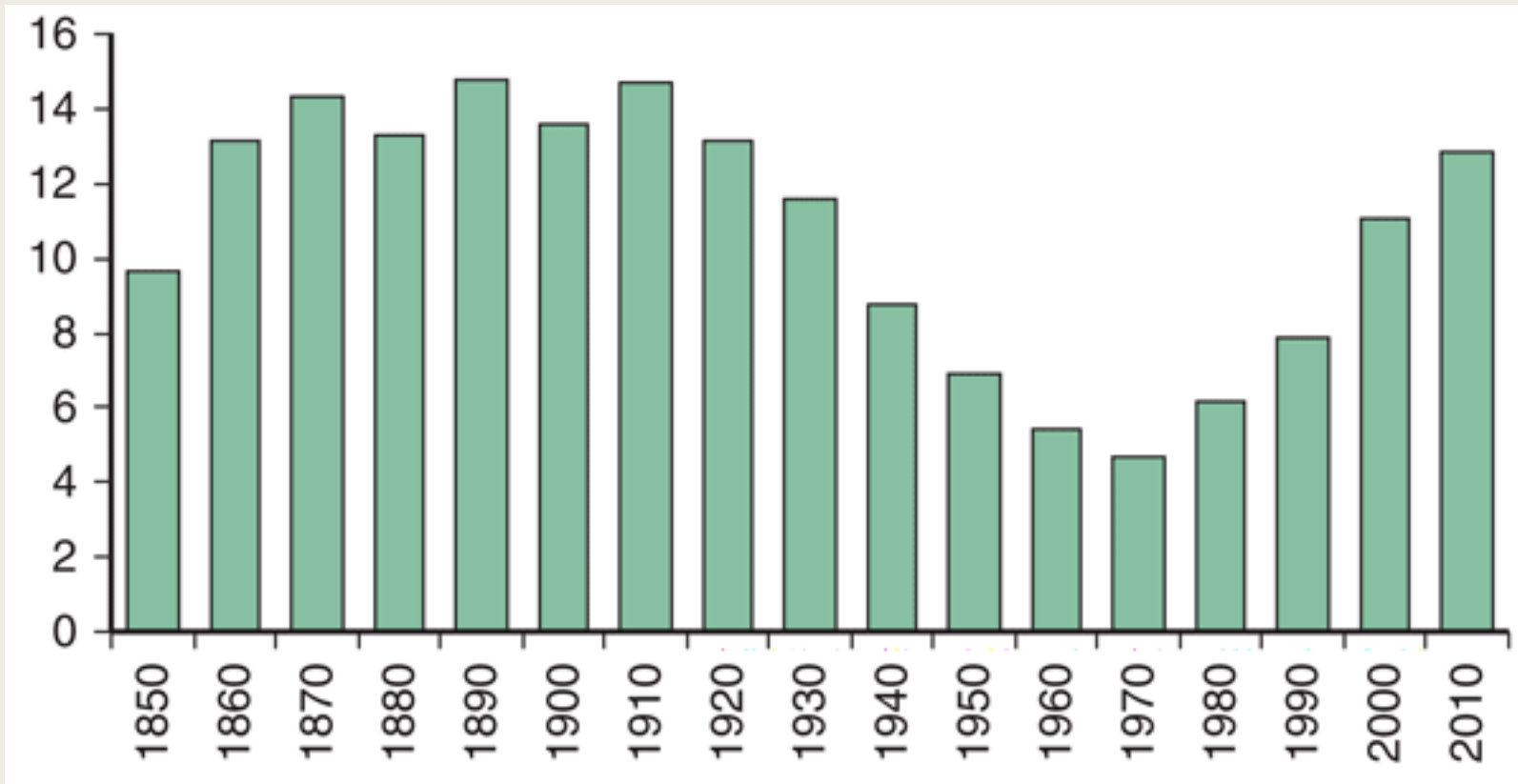
Country	1959	1983	1997	2007
Japan	11	24	97	92
Italy	23	42	85	96
France	27	41	108	117
United Kingdom	29	35	80	85
Germany	29	56	126	126
Canada	42	57	82	103
Unweighted average	27	43	96	103
United States	100	100	100	100

**Source:** International Economics, 11<sup>th</sup> edition, Dominick Salvatore, Wiley Publishing, pp130.

# International Labour Mobility (cont.)

- In the early 20<sup>th</sup> century, share of immigrants in the U.S. increased dramatically.
  - *Vast immigration from Eastern and Southern Europe.*
- Tight restrictions on immigration imposed in the 1920s.
  - *Immigrants were a minor force in the U.S. by the 1960s.*
- New wave of immigration began around 1970.
  - *Mostly from Latin America and Asia.*
- As of 2012, 16.1% of the U.S. labour force is foreign-born.

# Fig. 4-14: Foreign-Born Population as a Percentage of the U.S. Population



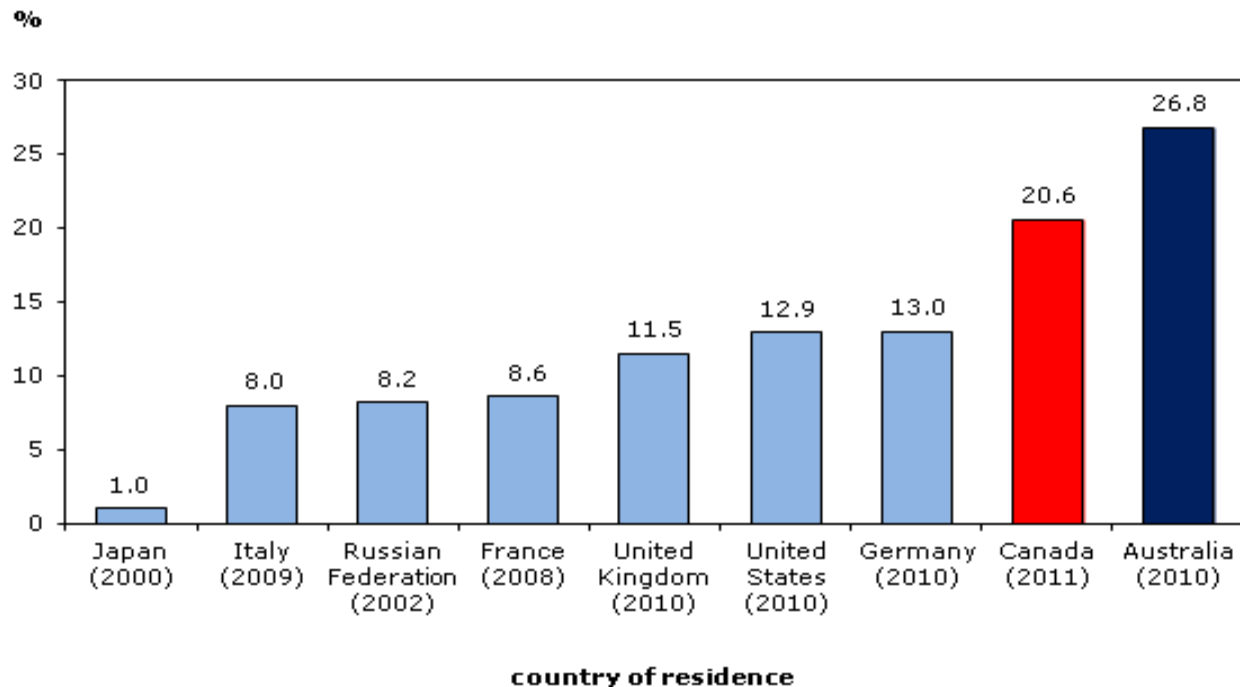
Source: U.S. Census Bureau

# Immigration and the U.S. Economy

- The largest increase in recent immigration occurred among workers with the lowest education levels, making less educated workers more abundant.
  - *possibly reduced wages for native-born workers with low education levels while raising wages for the more educated*
  - *widening wage gap between less educated workers and highly educated workers.*

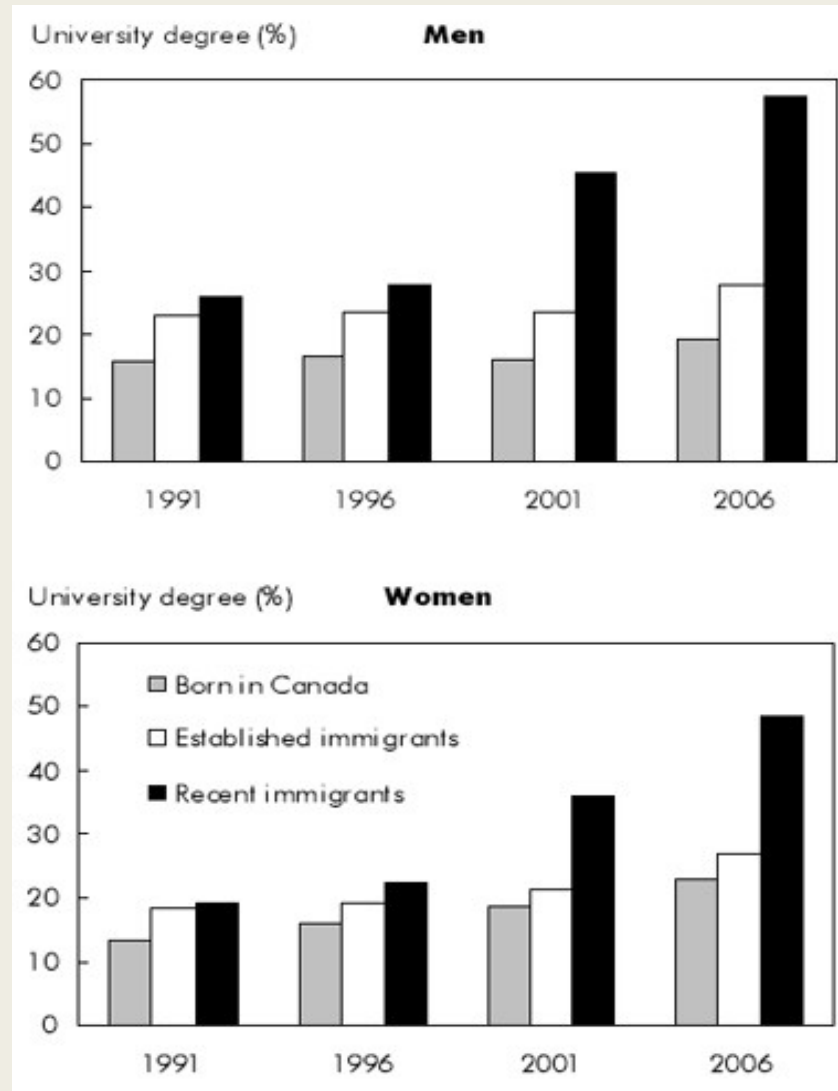
# Foreign-born population, as a proportion of the total population, G8 countries and Australia

**Figure 1**  
Foreign-born population, as a proportion of the total population, G8 countries and Australia



**Sources:** Organization for Economic Cooperation and Development, International Migration Outlook 2012, OECD Publishing, 2012 and Statistics Canada, National Household Survey, 2011.

# Canadian Immigrant Education Levels



Source: Statistics Canada, <http://www.statcan.gc.ca/pub/75-001-x/2008112/charts-graphiques/10766/c-g000b-eng.htm>

# Summary

1. International trade often has strong effects on the distribution of income within countries - produces losers as well as winners.
2. Income distribution effects arise for two reasons:
  - *Factors of production cannot move costlessly and quickly from one industry to another.*
  - *Changes in an economy's output mix have differential effects on the demand for different factors of production.*

# Summary (cont.)

3. International trade affects the distribution of income in the specific factors model.
  - *Factors specific to export sectors in each country gain from trade, while factors specific to import-competing sectors lose.*
  - *Mobile factors that can work in either sector may either gain or lose.*

# Summary (cont.)

4. Trade nonetheless produces overall gains in the sense that those who gain could in principle compensate those who lose while still remaining better off than before.
5. Most economists would prefer to address the problem of income distribution directly, rather than by restricting trade.
6. Those hurt by trade are often better organized than those who gain, causing trade restrictions to be adopted.

# Summary (cont.)

7. Labour migrates to countries with higher labour productivity and higher real wages, where labour is scarce.
  - *Real wages fall due to immigration and rise due to emigration.*
  - *World output increases.*
  
8. Real wages across countries are far from equal due to differences in technology and due to immigration barriers.