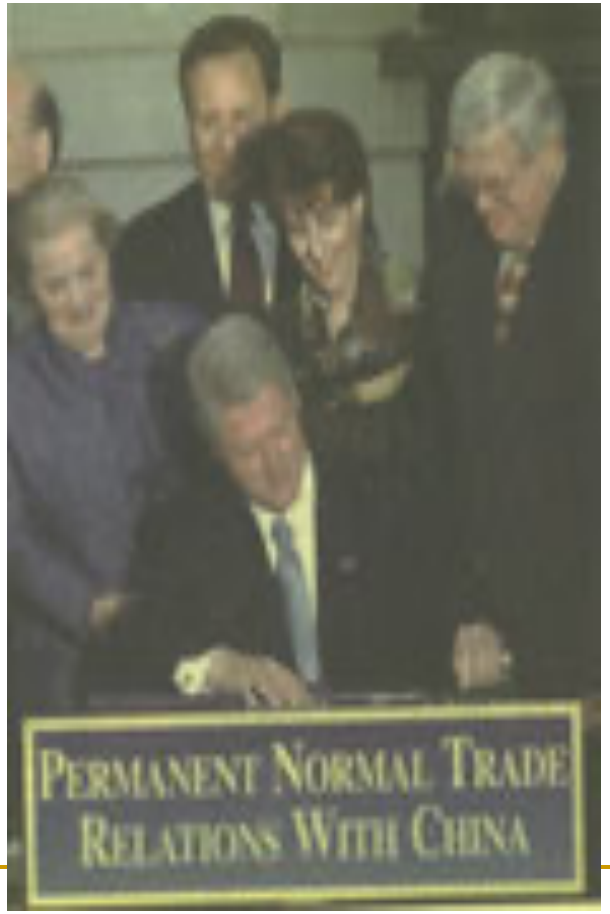
CHPT4 Extension of H-O Model

- Content:
- The Stolper-Samuelson Theorem
- The Factor-Price Equalization Theorem
- The Specialized-Factor Model

Barriers on China's Textile Export

Korean Farmers are against Import of Rice

Appeals on Permanent Normal Trade Relations With China From Some American's Interest Groups



Effect on Factor Price

Labor Revenue:

$$W = P * MP_L$$

Capital Revenue:

$$R = P * MP_K$$

P: Price of one specific product

MP_i (i = L, K) Marginal Product of one specific factor

收入的定义:

要素回报: 边际要素成本=边际收益产量

$$\frac{dTC}{dL} = MFC = MRP_L = \frac{\mathrm{d}TR}{dL} = \frac{\mathrm{dQ}}{dL}\frac{dTR}{d\mathrm{Q}} = MP_L \times MR$$

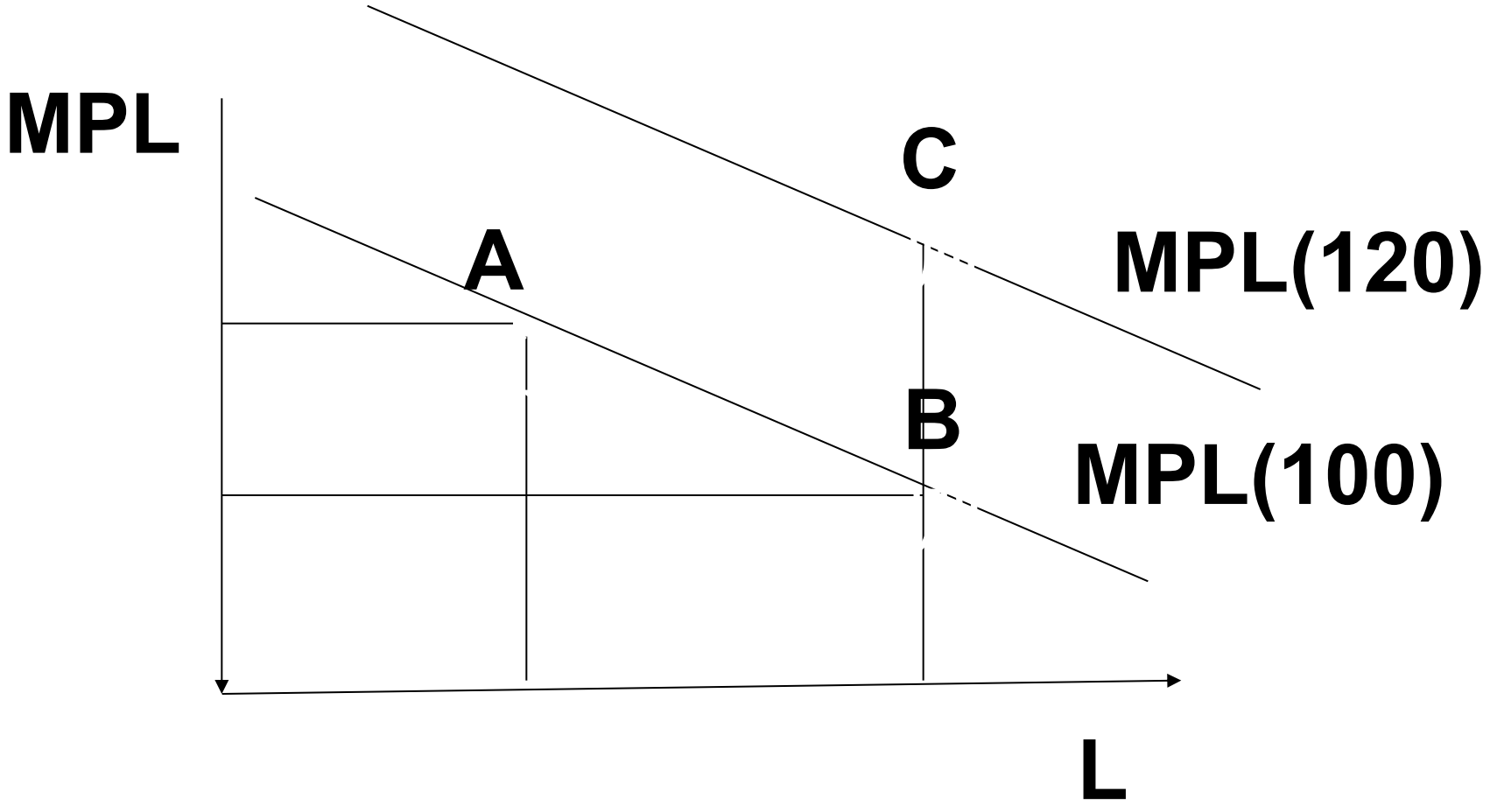
市场均为完全竞争市场时:

$$MFC = w$$

$$MRP_L = MP_L \times MR = MP_L \times P = VMP_L$$

劳动收入:$w = P \times MP_L$

资本收益:$R = P \times MP_K$


MPL
C
A
MPL(120)
B
MPL(100)
L

Short-Run Effects of Opening Trade

- For the short-run, gains and losses divided by output sector: All groups tied to rising sectors gain, and all groups tied to declining sectors lose

Long-Run Effects of Opening Trade

- Trade makes some people absolutely better off and others absolutely worse off in each of the trading countries. The gainers and losers in the short run are somewhat different from those in the long run.

- ***For Example: Country A is capital-abundant***

1F=8K+4L (?-Intensive)

1C=6K+2L (?-Intensive)

1 unit of food decrease will release 8K and 4L, but 2 units of clothing increase will demand 12K and 4L, that means if keeping full employment for labor, capital will be overdemanded. Or keeping capital in full use, then labor will be oversupply. So this will lower the price of labor and increase the price of capital.

Free Trade Affects Income Distribution

	In the United States	In the Rest of the World
Initial prices:	Wheat cheap, cloth expensive	Wheat expensive, cloth cheap
		
Prices respond to trade.	P_{wheat} up, P_{cloth} down	P_{wheat} down, P_{cloth} up
Production responds to prices.*	Produce more wheat. Produce less cloth.	Produce less wheat. Produce more cloth.
Crucial step— National factor markets change.	For each yard of cloth sacrificed, many workers and few acres laid off; extra wheat demands few workers and much land.	For each bushel of wheat sacrificed, much land and few workers laid off; extra cloth demands many workers and little land.
National factor prices respond.	Wage rates fall and rents rise (in both sectors).	Wage rates rise and rents fall (in both sectors).
Long-run results:	Product prices equalized between countries. Net gains for both countries but different effects on different groups. Winners: U.S. landowners, foreign workers. Losers: U.S. workers, foreign landowners.	

The Stolper-Samuelson Theorem

- Given certain condition and assumptions, trade raises the real return to the factor used intensively in the rising-price (export) industry and it lowers the real return to the factor used intensively in the falling price (import-competing) industry.

Changes in prices of different products

↓

Factor flowage between different industries

↓

Different in factor intensity

↓

Non-equilibrium in factor supply and demand

↓

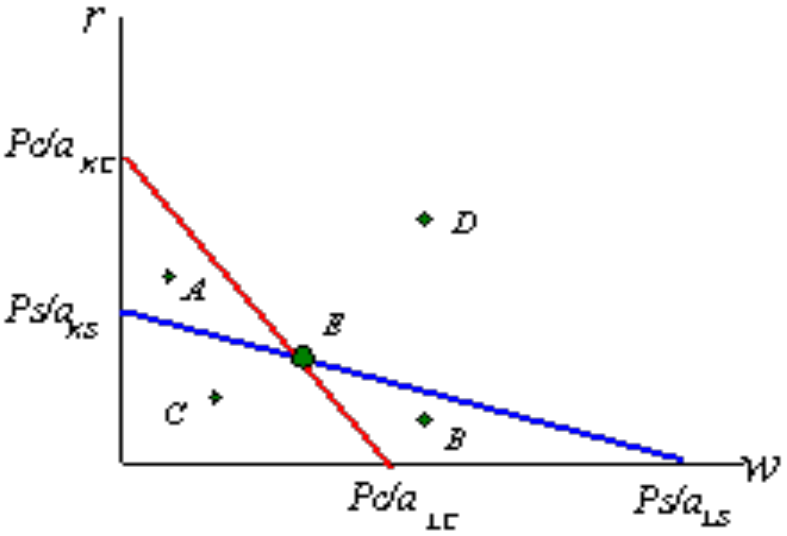
Changes in prices of fators

The Stolper-Samuelson Theorem

firms treat prices exogenously

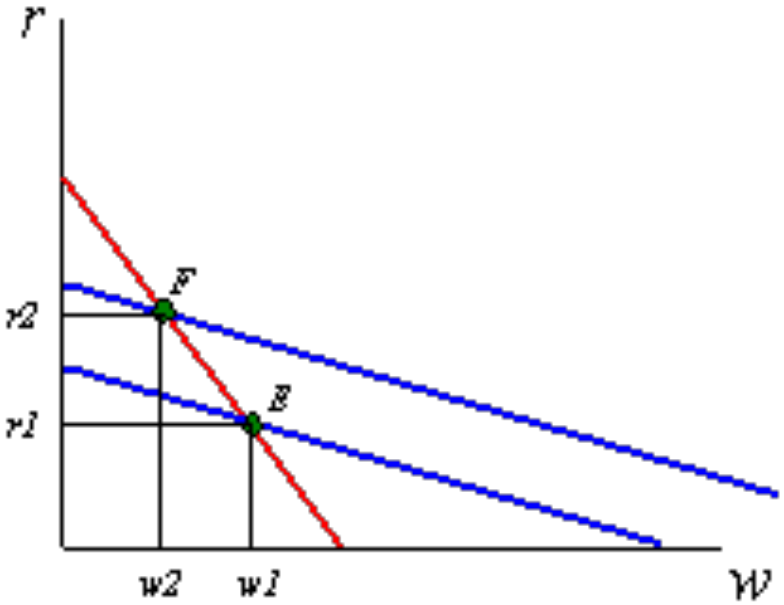
$$P_S = a_{LS}W + a_{KS}Y$$

$$P_C = a_{LC}W + a_{KC}Y$$



The only wage-rental combination that can simultaneously support zero profit in both industries is found at the intersection of the two zero-profit lines - point E

Say the price of steel, PS, rises.

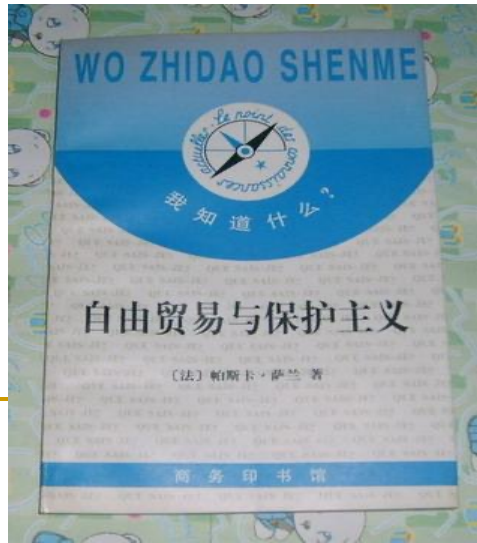


The equilibrium point will shift from E to F causing an increase in the equilibrium rental rate from r1 to r2, and a decrease in the equilibrium wage rate from w1 to w2. Only with a higher rental rate and lower wage can zero profit be maintained in both industries at the new set of prices.

- **Stolper-Samuelson theorem: An increase in the price of a good will cause an increase in the price of the factor used intensively in that industry and a decrease in the price of the other factor.**

Hints

- The groups who are endowed with relative abundant factor are incline to adopt free trade policy and those who are endowed with relative scarce factor tend to be strong backers of protection policy.



Magnification Effect

The magnification effect for prices is a more general version of the Stolper-Samuelson theorem. It allows for simultaneous changes in both output prices and compares the magnitudes of the changes in output and factor prices.

A Numerical Example.

$a_{LS} = 3$

$a_{KS} = 4$ $\quad P_S = 120$

$a_{LC} = 2$ $\quad a_{KC} = 1$ $\quad P_C = 40$

Zero-profit steel: $3w + 4r = 120$

Zero-profit clothing: $2w + r = 40$

Thus the initial equilibrium wage and rental rates are: w = 8 and r = 24

Suppose P_C rises from \$40 to \$60

Zero-profit steel: $3w + 4r = 120$

Zero-profit clothing: $2w + r = 60$

Thus the new equilibrium wage and rental rates are: w = 24 and r = 12

- The magnification effect for prices ranks the percentage changes in output prices and the percentage changes in factor prices. We'll denote the percentage change by using a ^ above the variable. (that is, $\hat{X}$ = % change in X).

$$\hat{P}_C = \frac{60 - 40}{40} \times 100 = +50\%$$

The price of clothing rises by 50%

$$\hat{w} = \frac{24 - 8}{8} \times 100 = +200\%$$

The wage rate rises by 200%.

$$\hat{r} = \frac{12 - 24}{24} \times 100 = -50\%$$

The rental rate falls by 50%.

$$\hat{P}_S = +0\%$$

The price of steel is unchanged

Magnification Effect

- **The rank order of these changes is the Magnification Effect for Prices**

$$\hat{w} > \hat{P}_C > \hat{P}_S > \hat{r}$$

The magnification effect for prices can be used to determine the changes in real wages and real rents whenever prices change in the economy. These changes would occur as a country moves from autarky to free trade and when trade policies are implemented, removed or modified.

The Factor-Price Equalization Theorem

- Given certain conditions and assumptions, free trade equalizes not only product prices but also the prices of individual factors between the two countries.With trade, laborers earn the same wage rate ,unit of land earn the same rental return, capital earn the same interest rate in both countries.

International trade will bring about equalization in the relative and absolute returns to homogeneous factors across nations. As such, international trade is a substitute for the international mobility of factors.

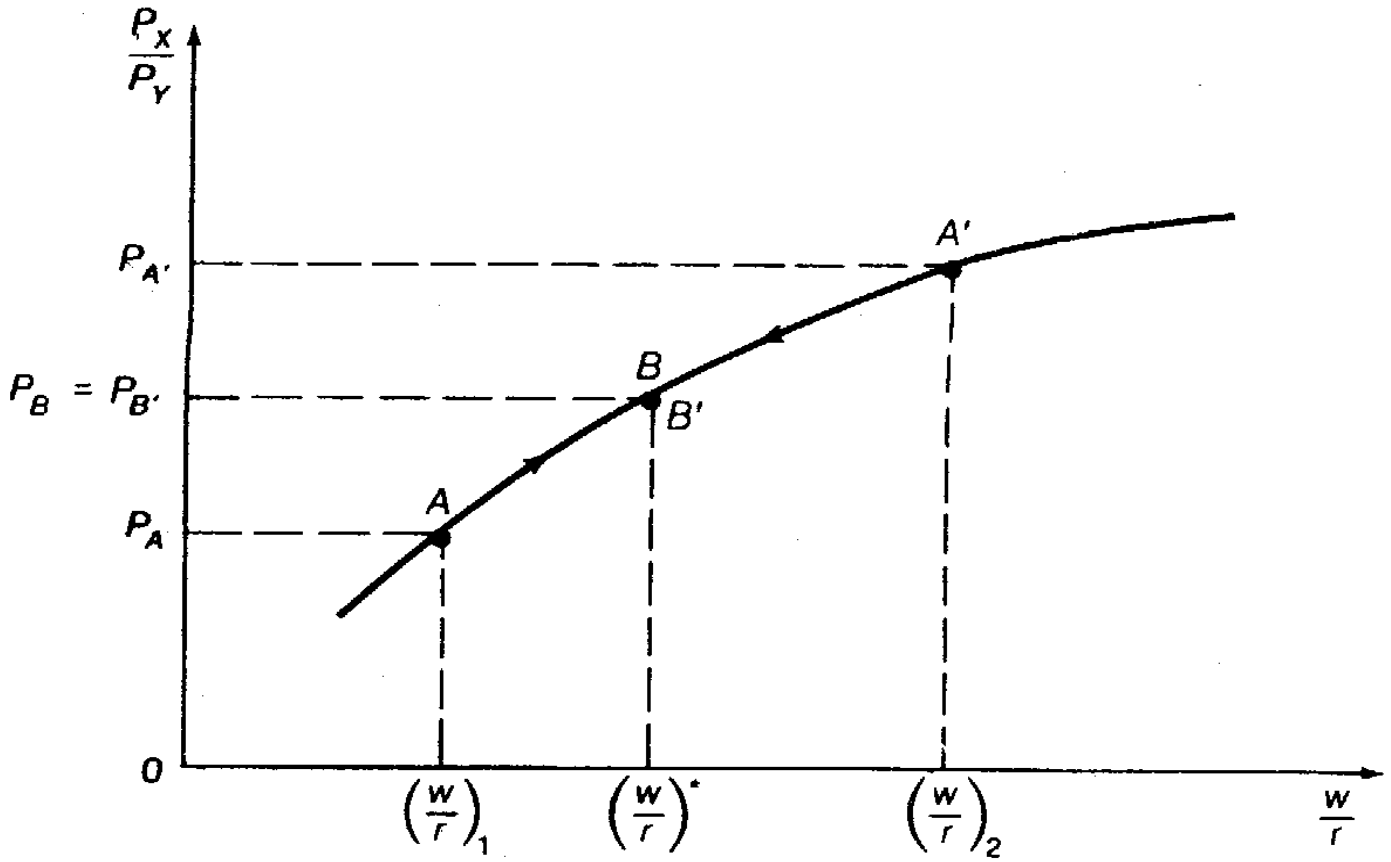


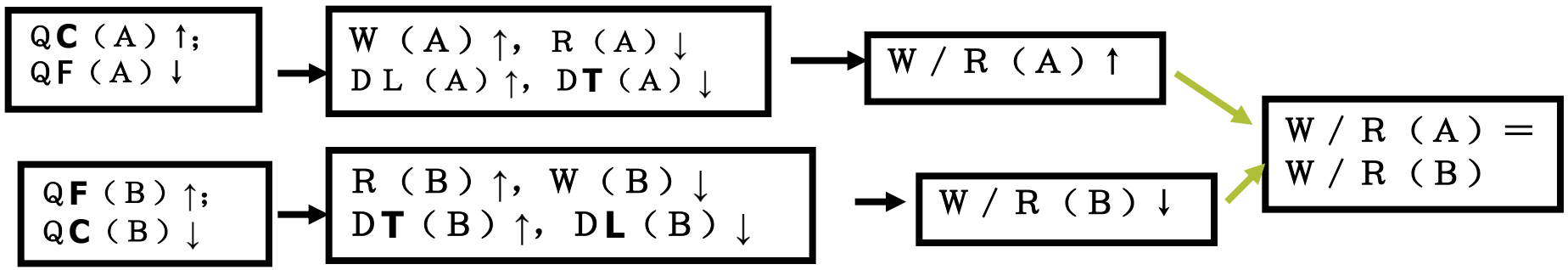
FIGURE 5-5. Relative Factor–Price Equalization

The horizontal axis measures w/r and the vertical axis P_X/P_Y. Before trade, Nation 1 is at point A, with $w/r = (w/r)_1$ and $P_X/P_Y = P_A$ while Nation 2 is at point A', with $w/r = (w/r)_2$ and $P_X/P_Y = P_{A'}$. Since w/r is lower in Nation 1 than in Nation 2, P_A is lower than $P_{A'}$ so that Nation 1 has a comparative advantage in commodity X. As Nation 1 specializes in the production of commodity X with trade and increases the demand for labor relative to capital, w/r rises. As Nation 2 specializes in the production of commodity Y and increases its relative demand for capital, r/w rises (i.e., w/r falls). This will continue until point $B = B'$, at which $P_B = P_{B'}$ and $w/r = (w/r)^*$ in both nations.

Before trade：

W / R（A）<W / R（B）→P（A）<P（B）→ 分工和贸易。

After the trade：



Real-World

- Has international trade equalized the returns to homogeneous factors in different countries in the real world?
  - Even casual observation clearly indicates that *it has not*.
    - Example: Wages are much higher for doctors, engineers, technicians, mechanics and laborers in the United States and Germany than in Korea and Mexico.
  - Under these circumstances, it is more realistic to say that international trade has *reduced*, rather than completely eliminated, the international difference in the returns to homogeneous factors.

《华盛顿邮报》对具有一定代表性的各阶层美国人年收入作了一次调查：

漫画家：2500万美元；建筑工人：2.6万美元；

摇滚歌星：1000万美元；奶牛场工人：1.5万美元；

体育明星：700万美元；电车售票员：0.8万美元；

银行职员：16万美元；街道清洁工：0.9万美元；

大学教授：18万美元；宾馆侍应：1.2万美元；

环保工程师：6万美元；喜剧小丑：1.3万美元；

药剂师：5万美元；女打字员：0.6万美元；

中学教师：3.2万美元；按摩女：1.9万美元；

警察：3.8万美元；女电梯工：0.65万美元；

记者：3.5万美元。

《国际金融报》 (2000年08月06日第二版)

Country	Hourly compensation of production workers, 2000
United States	100
Germany	121
Japan	111
Spain	55
South Korea	41
Portugal	24
Mexico	12
Sri Lanka*	2

*1969

Source: Bureau of Labor Statistics, *Foreign Labor Statistics Home Page.*

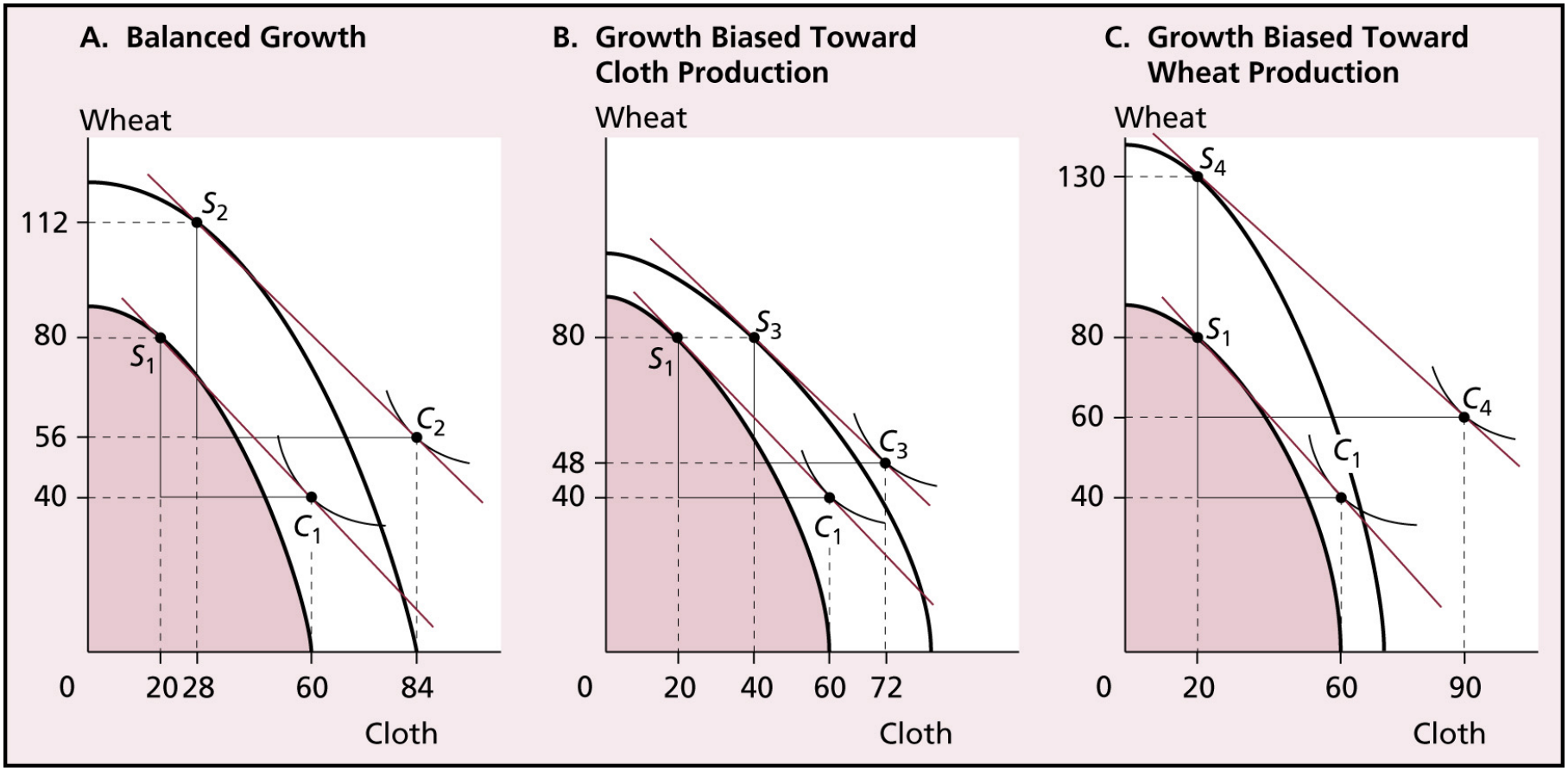
Economic Growth and International Trade

- Balanced Growth: in which the PPC shifts out proportionately so that its relative shape is the same.
- Biased Growth: the shift in the PPC will be skewed toward the faster-growing product.
- Growth Resources:

✓ Increase in the country's endowment

✓ Improvement in production technology

Balanced and Biased Growth



Balanced Versus Biased Growth

Export Expansion Growth (EE) :

Faster growth in export industry

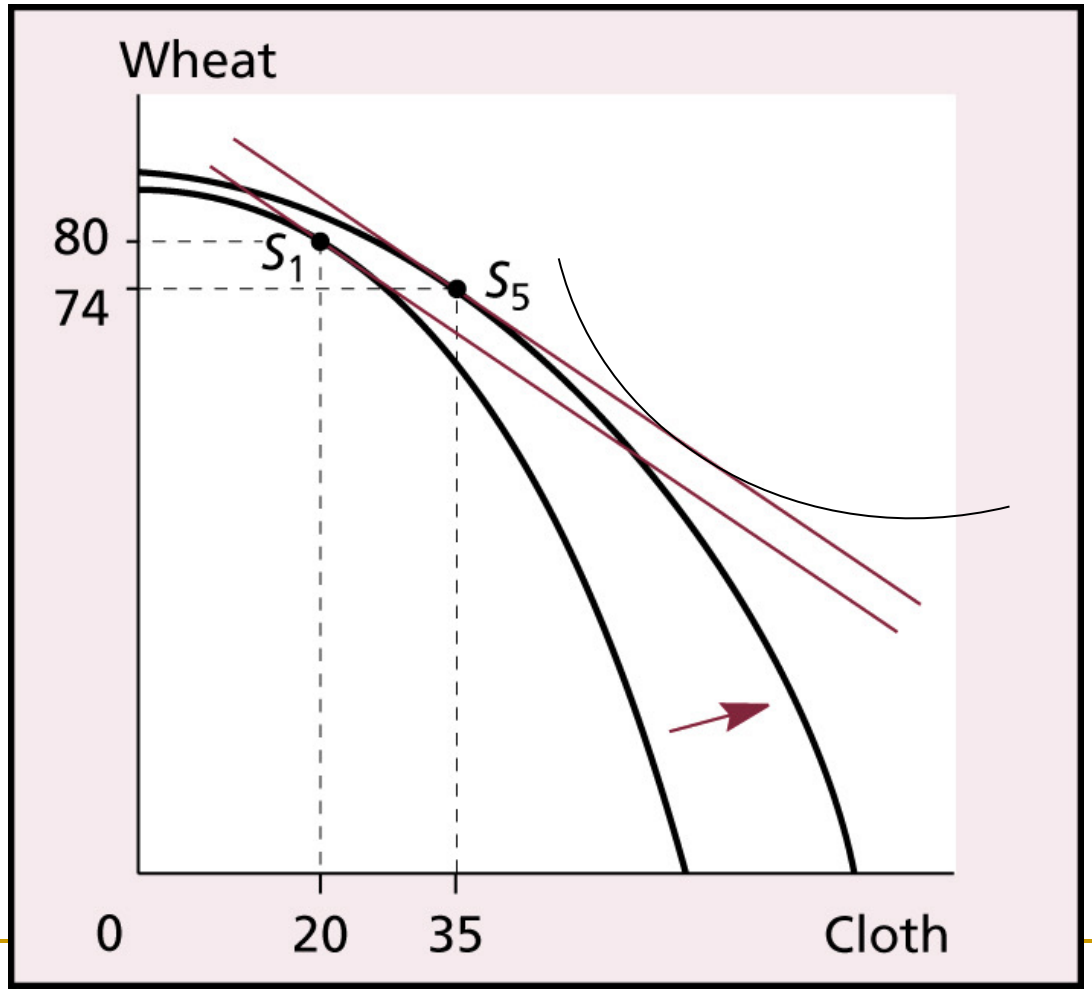
Import Replacing Growth (IR):

Faster growth in import-competing industry so that domestic producing can replace import on some degree.

Rybczynski Theorem

- In a two-good world, **and assuming that product prices are constant**, growth in the country's endowment of one factor of production, with the other factor unchanged, has two results:
- ✓ An increase in the output of the good that uses the growing factor intensively
- ✓ A decrease in the output of the other good

Rybczynski Theorem (IR Growth in Small Country)



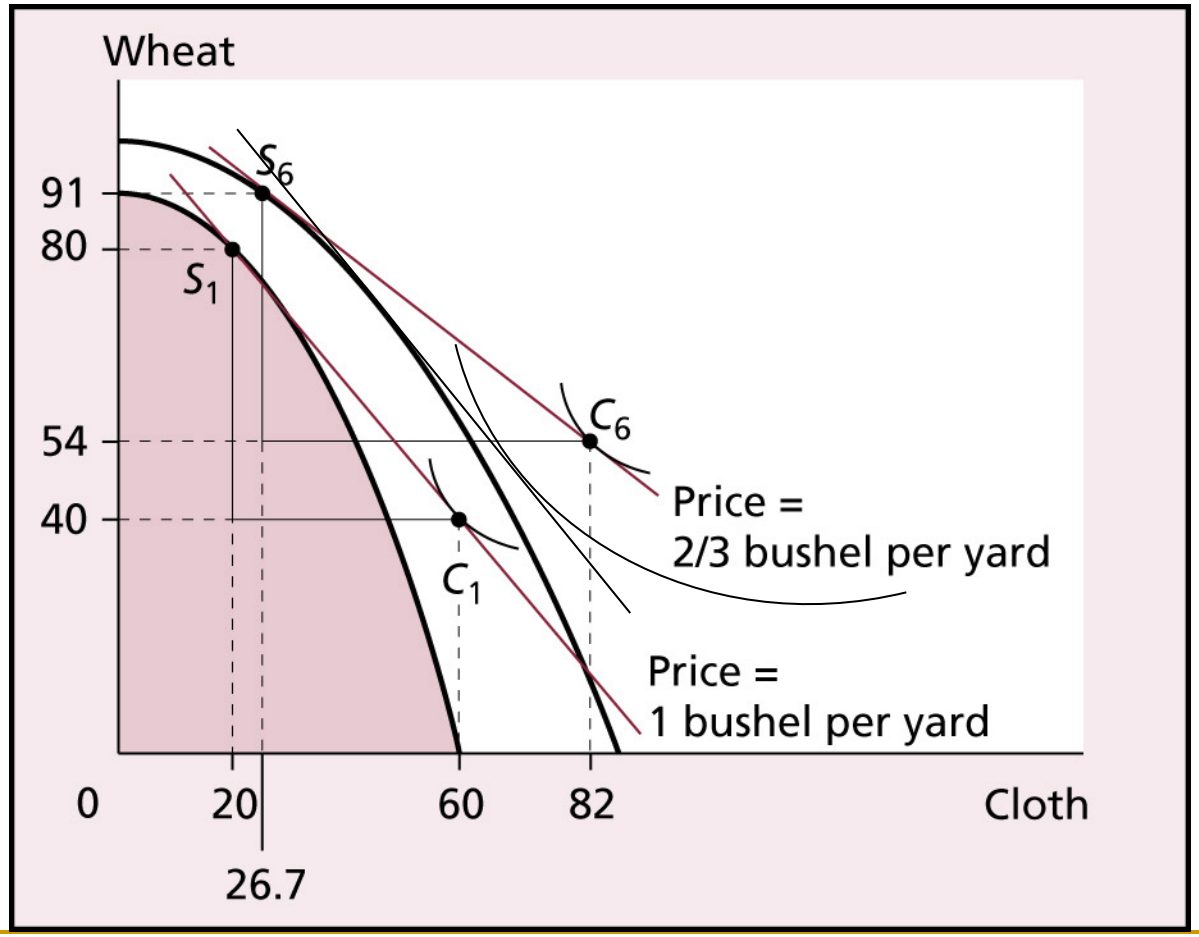
The Dutch Disease

- In which a new production of a natural resource results in a decline in production of manufactured products (deindustrialization).

Effects on the country's terms of trade

- **Small Country**: Its trade has no impact on international price ratio
- **Large Country**: Changes in its willingness to trade affects the equilibrium international price ratio.

Import-Replacing Growth in a Large Country



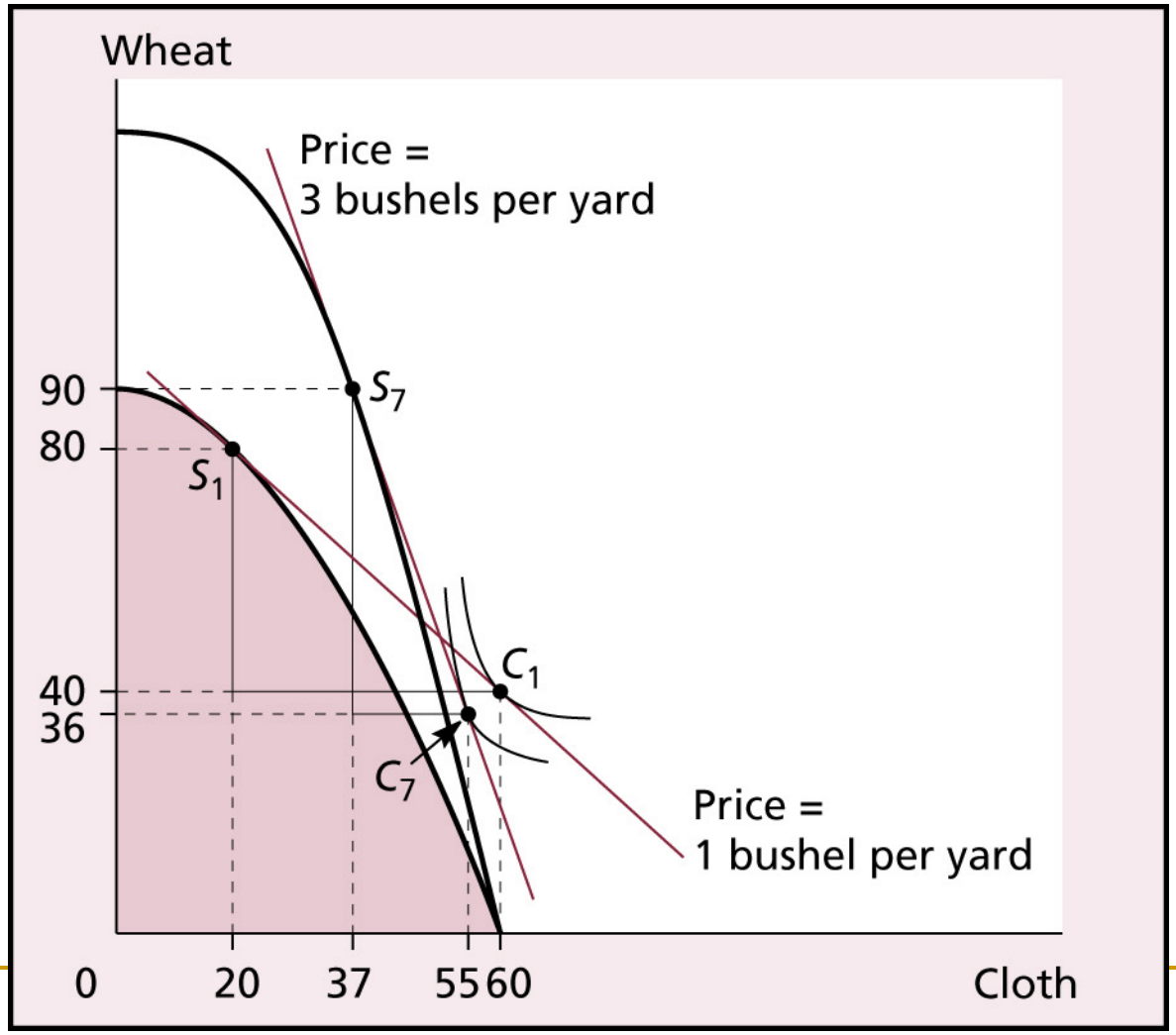
Immiserizing Growth

- Growth that expands the country's willingness to trade can result in such a large decline in the country's terms of trade that the country is worse off.

Immiserizing Growth

- Three Conditions:
- Export expansion growth in large country
- Demand for export must be price inelastic
- Heavily engaged in trade

Immiserizing Growth



The Specialized-Factor Model

Assumptions

Factor Inputs:

mobile factor: L

immobile factor: K T

Products: Steel (Qs)

Rice (Q_r)

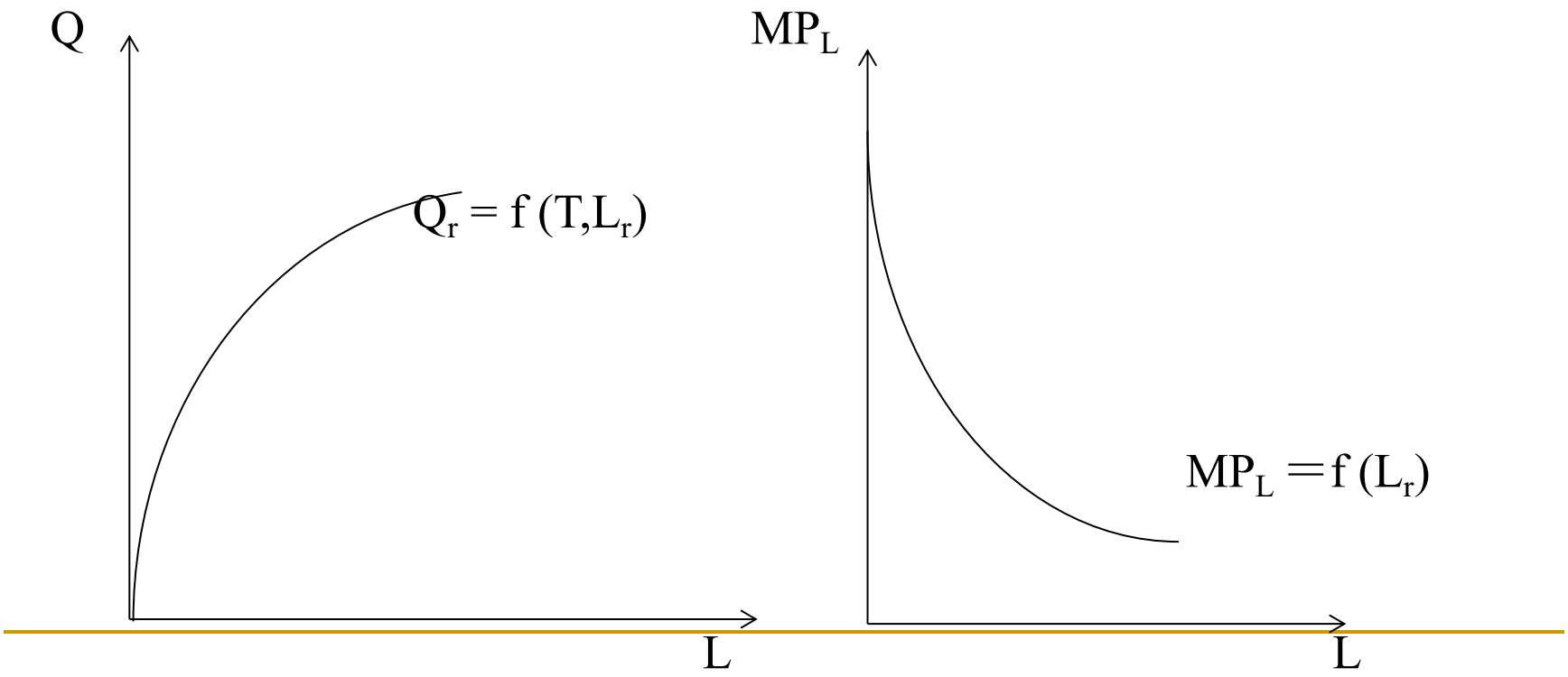
Production Function: $Q_s = f(K, L_s)$

$Q_r = f(T, L_r)$

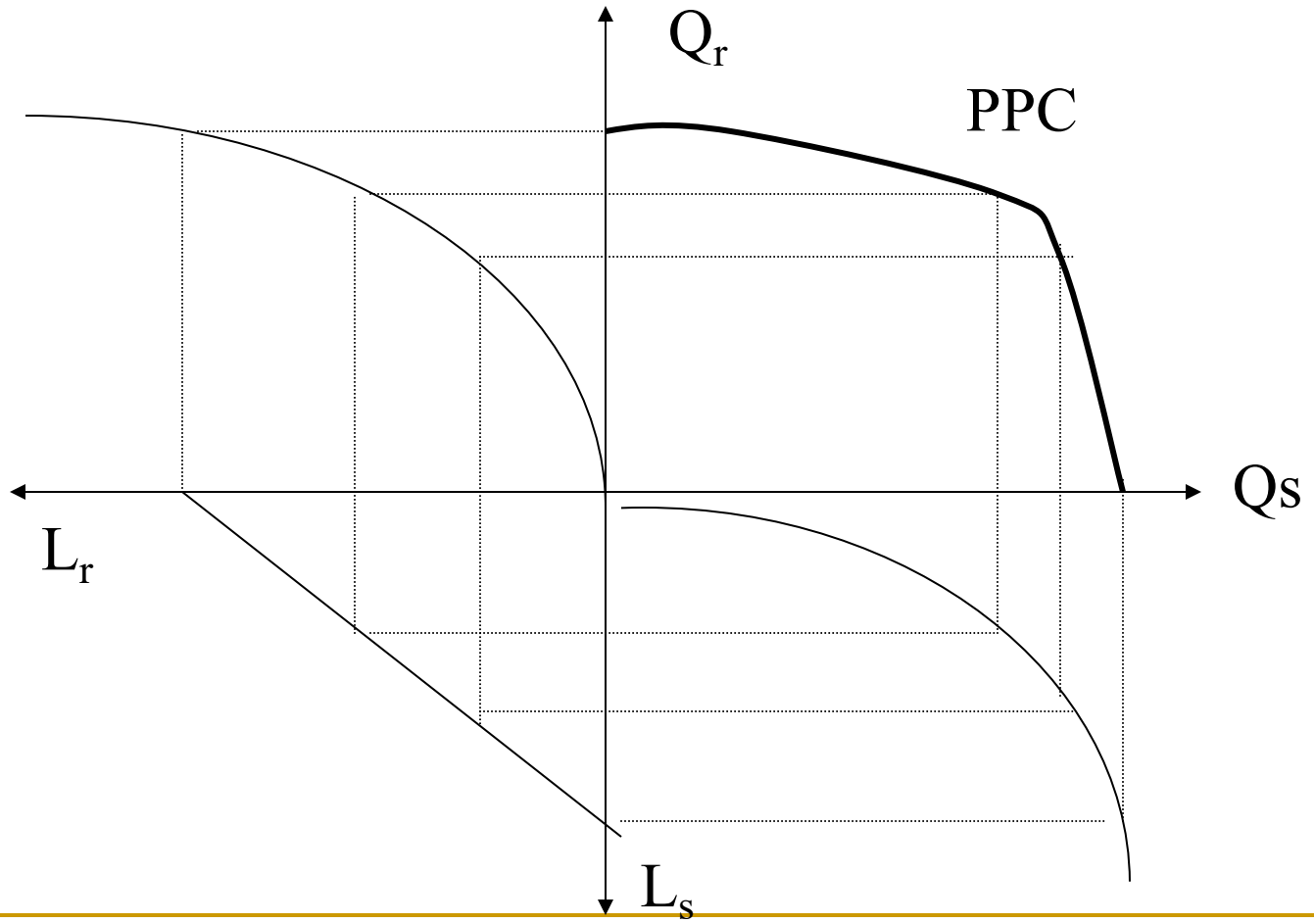
Full employment: $L_s + L_r = L$

complete competition; costant return to scale

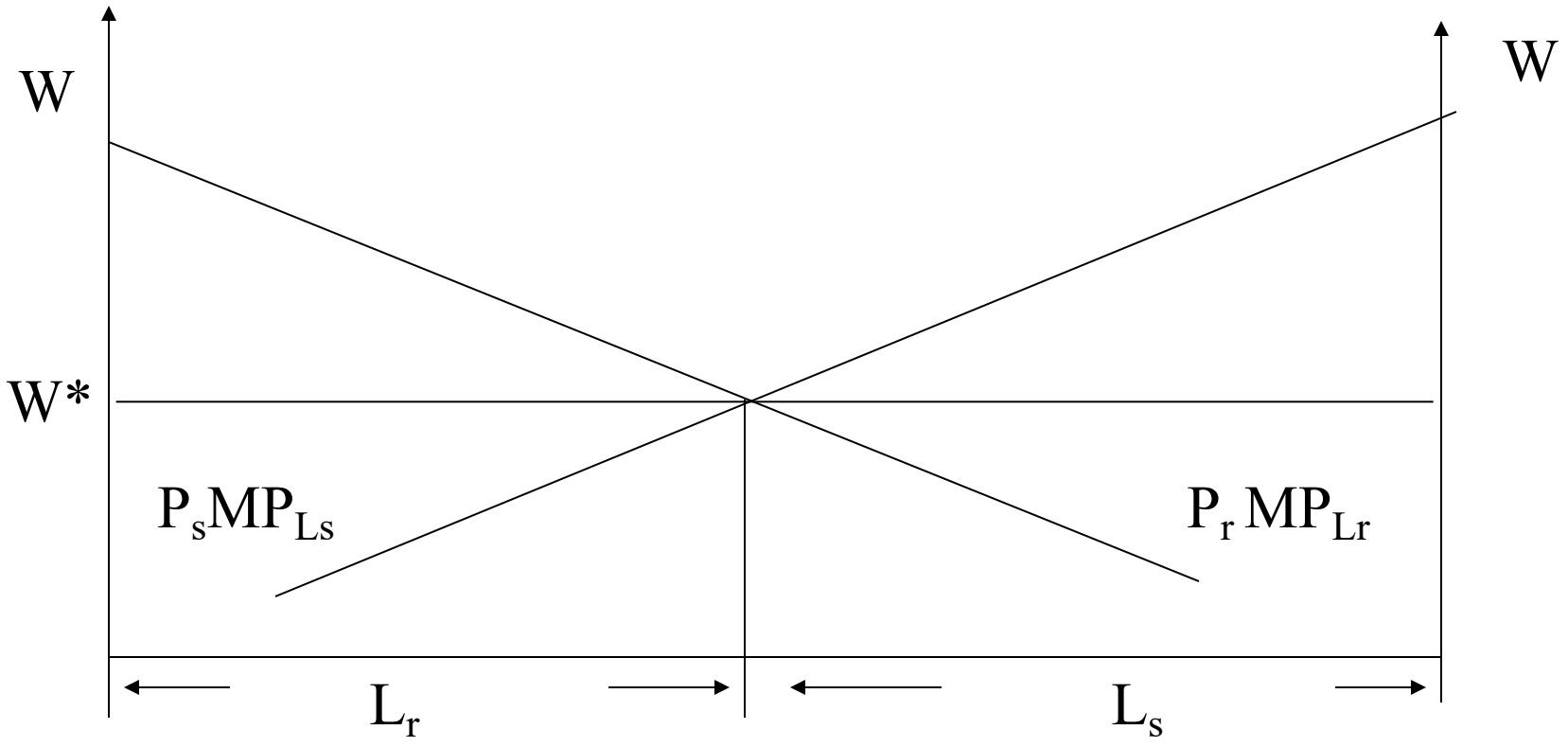
PPC in special-factor model:



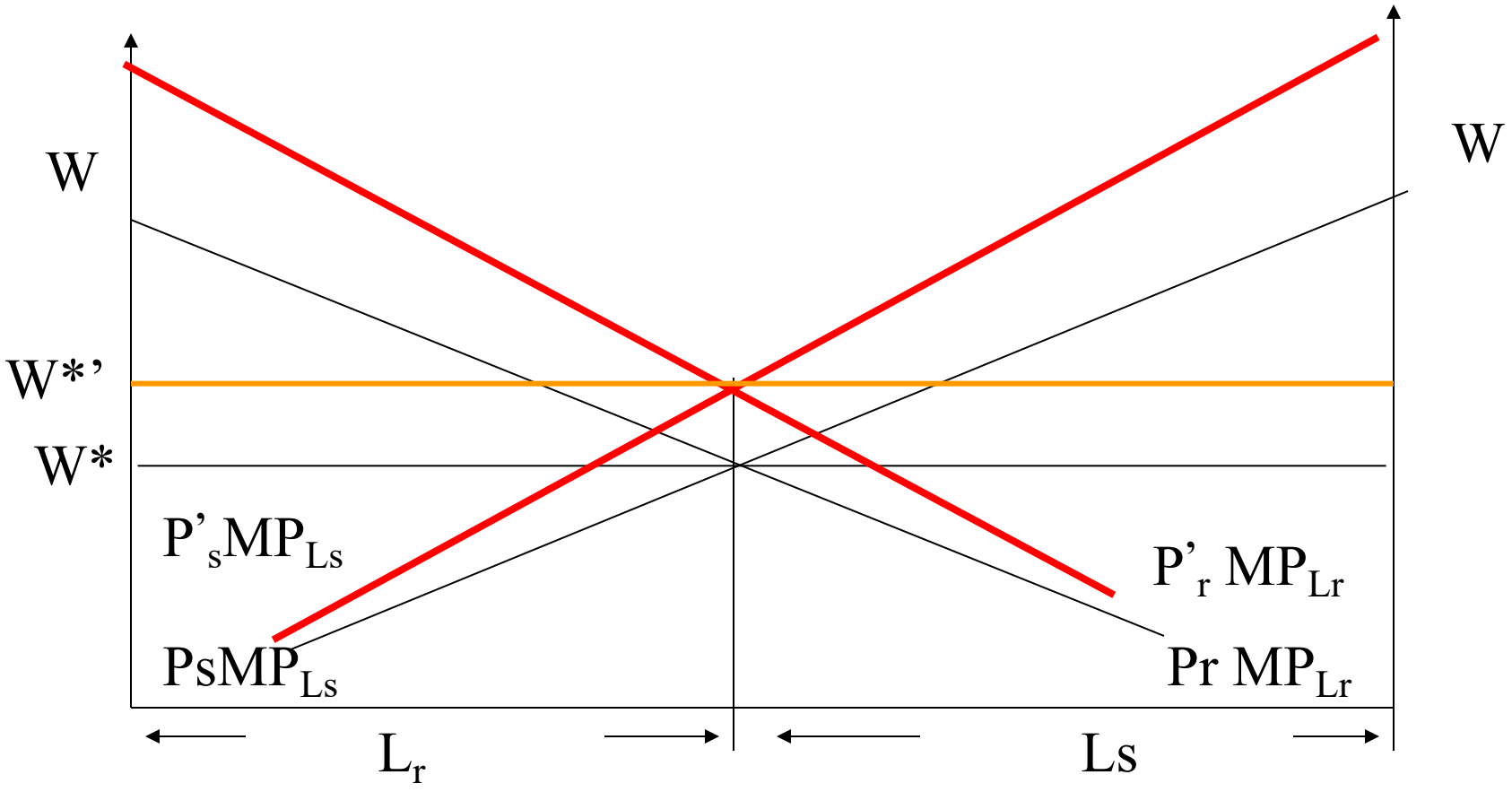
PPC



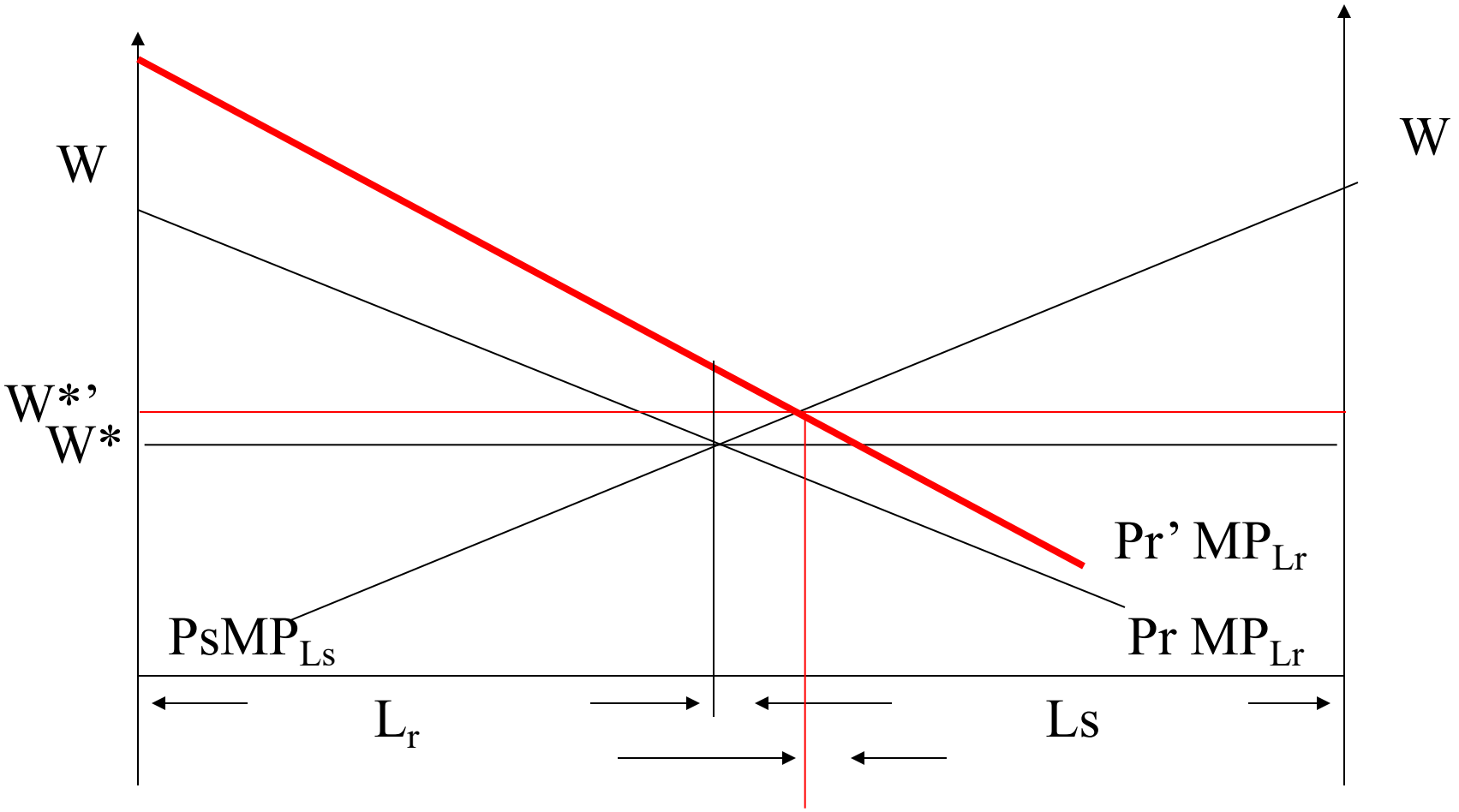
Allocation of mobile factor in two sectors



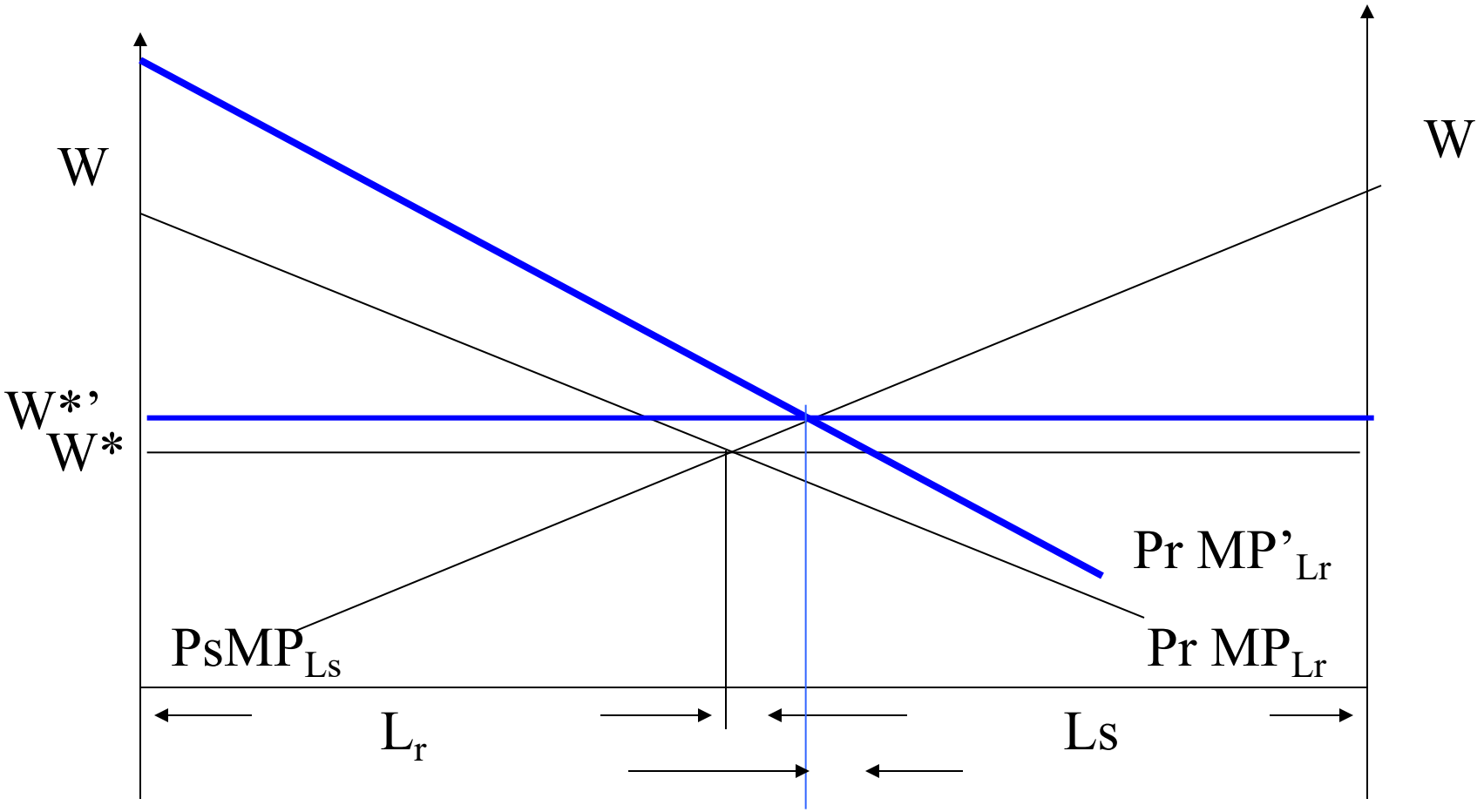
Changes in product price (same change in two product)



changes in relative price (for say Pr 10% ↑



Economic Growth ↑



Increase in Mobile Factor