

## 14.54 International Trade

### — Lecture 14: Heckscher-Ohlin Model of Trade (II) —

# Today's Plan

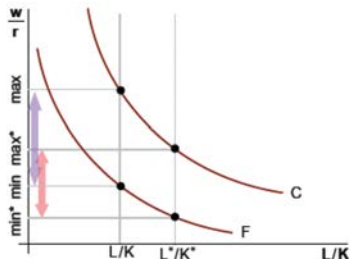
- ① Two-Country Equilibrium
- ② Trade and Welfare in the Long Run

Graphs on slides 4-12 are courtesy of Marc Melitz. Used with permission.

# Two Country Trade Equilibrium

- We now introduce a second country and study the free trade equilibrium
- Both countries share the same technologies for producing  $C$  and  $F$
- Consumers in both countries share the same homothetic preferences
  - (same world and country relative demand curves)
- The two countries differ in their relative factor abundance:
  - We assume that  $L^*/K^* > L/K$  (without loss of generality)
  - Note that this does not imply anything about absolute levels of factors!

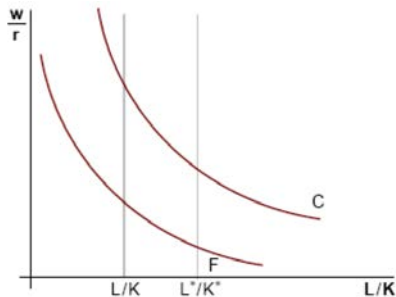
# Relative Factor Abundance and Factor Relative Demand Curves



- Differences in factor abundance induce differences in the range of possible equilibrium factor prices
- There is a range of free trade relative goods prices that is consistent with incomplete specialization in both countries
  - Recall that when both goods are produced in both countries, then free trade leads to factor price equalization across countries

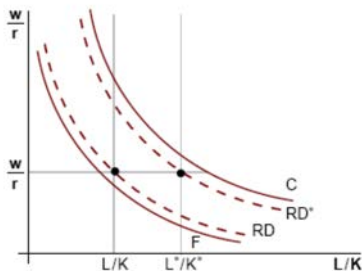
# Relative Factor Abundance and Factor Relative Demand Curves (Cont.)

- Whenever both goods are produced, differences in factor abundance then lead to differences in aggregate relative factor demand



# Relative Factor Abundance and Factor Relative Demand Curves (Cont.)

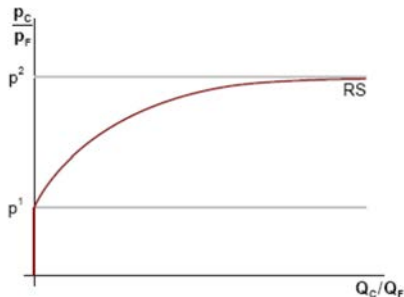
- Whenever both goods are produced, differences in factor abundance then lead to differences in aggregate relative factor demand



- At same  $w/r$ , the higher (relative) foreign supply of labor is employed by shifting production towards C (which is more labor intensive)

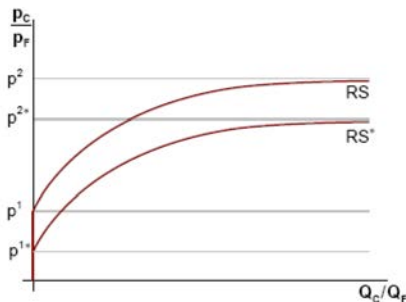
# Relative Factor Abundance and Relative Goods Supply

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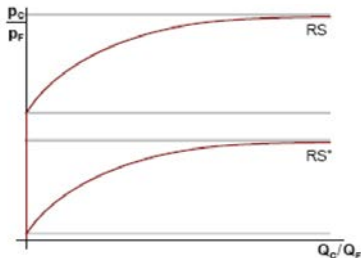


- These differences in relative supply (generated by differences in factor abundance) then generate a pattern of comparative advantage
  - The relatively labor abundant country will export the good that uses labor relatively more intensively (and vice-versa for the capital abundant country)
  - This is called the Heckscher-Ohlin Theorem



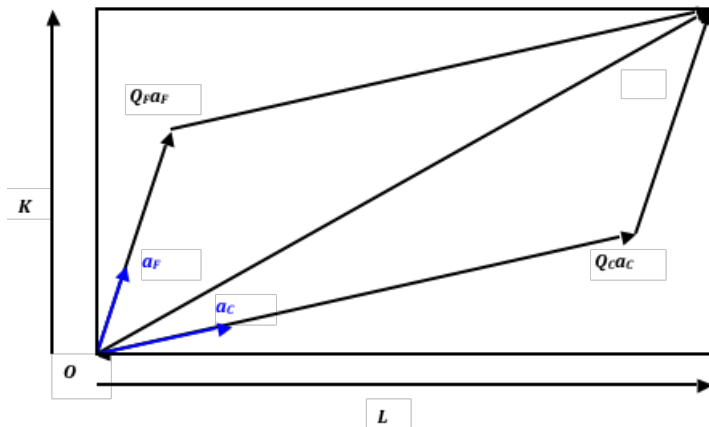
# Complete Versus Incomplete Specialization

- It is also possible for one of the countries to be completely specialized
  - If a country is specialized, it must specialize in the good in which it has a comparative advantage
  - When is such complete specialization more likely? A country is much more likely to be completely specialized when there are large differences in relative factor abundance and its trading partner is relatively much larger
  - Is it possible for both countries to be completely specialized? Yes, if there are very large differences in relative factor abundance:



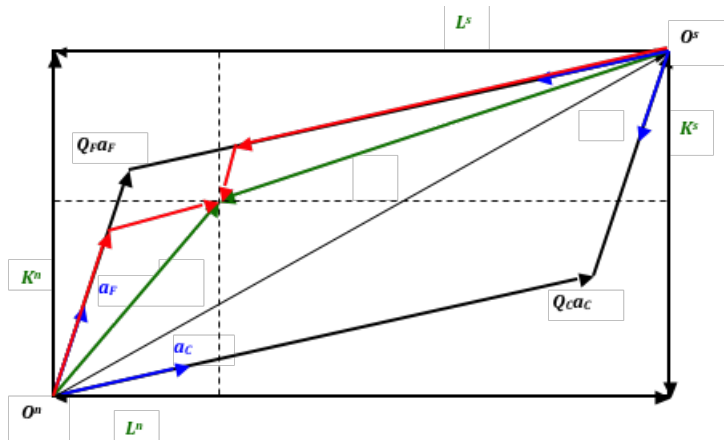
# Alternative Proof of the Heckscher-Ohlin Theorem

Integrated equilibrium ( $L$  = World labor endowment,  $K$  = World capital endowment)



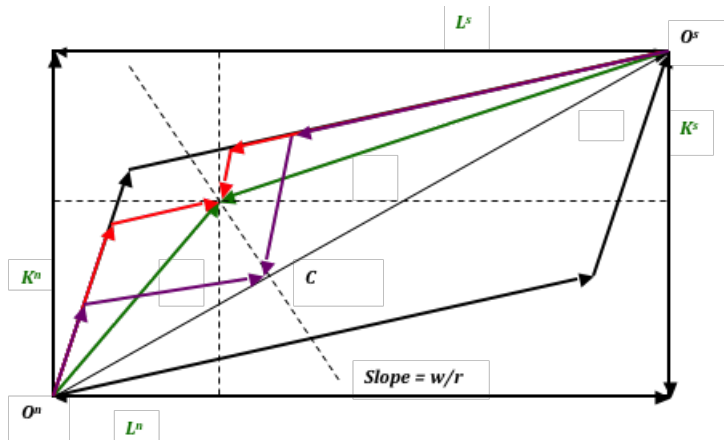
# Alternative Proof of the Heckscher-Ohlin Theorem

The "Parallelogram" ( $n$ =Home,  $s$ =Foreign)



# Alternative Proof of the Heckscher-Ohlin Theorem

Comparing the factor content of production and consumption ( $n$ =Home,  $s$ =Foreign)



# Trade and Welfare in the Long Run

- Changes in the world trading environment lead to long run changes in relative factor rewards
- Thus, one potential concern for developed economies (relatively capital & skill abundant) is that increased trade with developing countries will increase the return to skill and capital –thereby increasing income inequality
- However, if relative factor abundance differences are too extreme, then countries will specialize in different types of good –breaking a direct connection between relative goods prices and relative factor prices

## Trade and Welfare in the Long Run (Cont.)

- What can be said about the effects of changes in relative goods prices (driven by changes in the world trading environment) on the absolute welfare levels of factors?
  - Do factors that experience relative declines in their factor prices still gain from increased trade due to aggregate gains from trade?
- As an example, when  $p^T \searrow$  then  $w/r \searrow$ , so what happens to  $w/p_C$ ,  $w/p_F$ ,  $r/p_C$ ,  $r/p_F$ ?
- A famous theorem (due to Stolper-Samuelson) shows that  $r/p_C$ ,  $r/p_F \nearrow$  while  $w/p_C$ ,  $w/p_F \searrow$
- In words, an increase in the relative price of a good always increases the welfare of the factor that is used relatively more intensively to produce that good –and decreases the welfare of the other factor

# The Stolper-Samuelson Theorem

- **Stolper-Samuelson Theorem** *An increase in the relative price of a good will increase the real return to the factor used intensively in that good, and reduced the real return to the other factor*
- **Proof:** Suppose that (i)  $a_{LC} / a_{KC} > a_{LF} / a_{KF}$  and (ii)  $\hat{p}_F > \hat{p}_C$ . Differentiating the zero-profit condition, we get

$$\hat{p}_i = \theta_{Li} \hat{w} + (1 - \theta_{Li}) \hat{r}, \quad (1)$$

where  $\hat{x} = d \ln x$  and  $\theta_{Li} \equiv wa_{Li} / c_i$ . Equation (1) + (ii) imply

$$\hat{w} > \hat{p}_F > \hat{p}_C > \hat{r} \text{ or } \hat{r} > \hat{p}_F > \hat{p}_C > \hat{w}$$

By (i),  $\theta_{LF} < \theta_{LC}$ . So (ii) further requires  $\hat{r} > \hat{w}$ . Combining the previous inequalities, we get

$$\hat{r} > \hat{p}_F > \hat{p}_C > \hat{w}$$

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