

14.54 International Trade

— Lecture 15: Heckscher-Ohlin Model of Trade (III) —

Today's Plan

- ① Long Run Effects of Factor Accumulation
- ② Empirical Evidence on the Heckscher-Ohlin Model of Trade

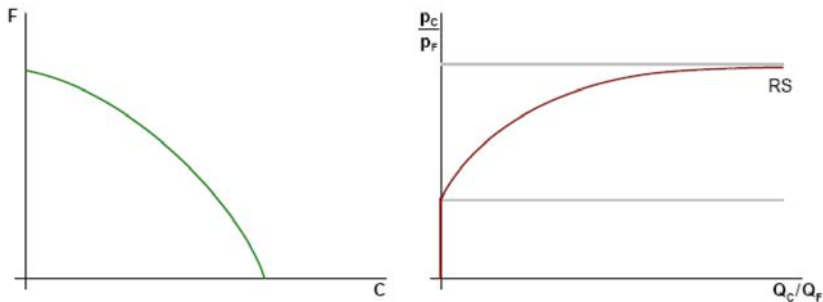
Graphs on slides 4, 5, 8, and 9 are courtesy of Marc Melitz. Used with permission.

Long Run Effects of Factor Accumulation

- What are the effects of immigration or foreign direct investment in the long run?
- Assume that the economy is small enough such that the world relative price p^T is unaffected by this factor accumulation
- Consider the case of immigration

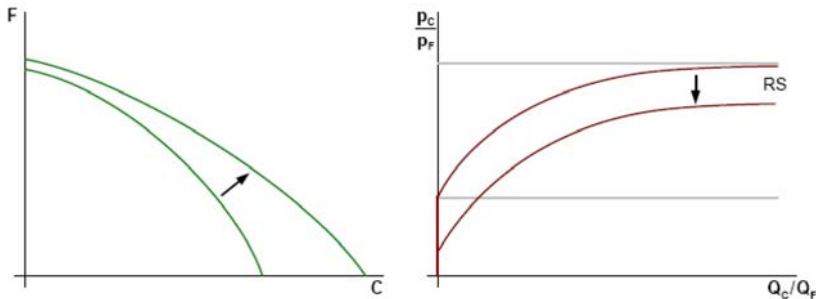
Factor Accumulation and the Production Response

- How does an increase in L (holding p^T fixed) affect a country's PPF and RS curve?



Factor Accumulation and the Production Response

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- Thus $Q_C/Q_F \nearrow$ when $L \nearrow$
 - But what happens to Q_C and Q_F ?
 - Could Q_F still increase?
 - Does Q_C increase by more or less than the increase in L ?

Factor Accumulation and the Production Response (Cont.)

- Recall that when $L/K \nearrow$, both capital and labor move to the labor intensive sector (C)
 - So $L_C/L, K_C/K \nearrow$ and $L_F/L, K_F/K \searrow$
- Can also determine this change from the weighted averages:

$$\frac{L}{K} = \frac{L_C}{K_C} \frac{K_C}{K} + \frac{L_F}{K_F} \frac{K_F}{K} \quad \frac{K}{L} = \frac{K_C}{L_C} \frac{L_C}{L} + \frac{K_F}{L_F} \frac{L_F}{L}$$

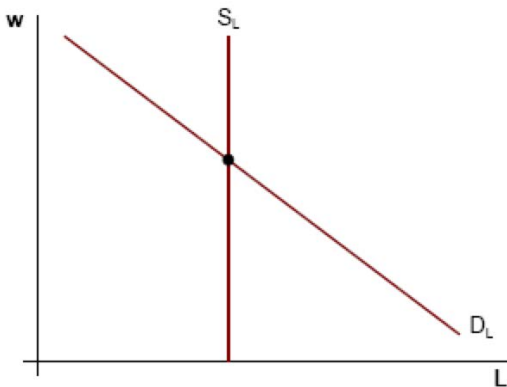
where $L_C/K_C > L_F/K_F$ both remain constant

- Since $L_C/L \nearrow$ and $L_C/K_C \longrightarrow$, both L_C and K_C must increase by more than L
 - Hence Q_C must also increase by more than L
- Since $K_F/K \searrow$ and $L_F/K_F \longrightarrow$, both L_F and K_F must decrease
 - Hence Q_F must decrease

- The previous predictions are often referred to as the **Rybczynski Theorem**
- The Rybczynski Theorem states that in a small, incompletely specialized open economy, an increase in the endowment of one factor leads to:
 - an increase in the output of the good that uses that factor intensively
 - a decrease in the output of the other good
- This is the dual of the Stolper-Samuelson Theorem

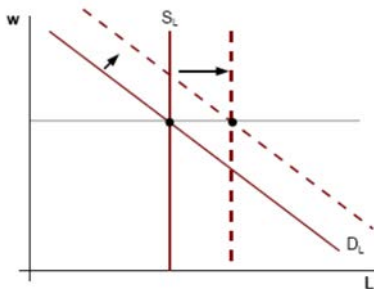
Implications for the Immigration and Wages Debate

- Does immigration necessarily reduce the wages of workers of the same skill level?



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- Partial equilibrium analysis does not take into account the increased demand for labor induced by a shift in production towards labor intensive sectors

Empirical Application: The Mariel Boat Lift

Figure 5-10 from *International Macroeconomics* removed due to copyright restrictions.

Factor Content of Trade: Heckscher-Ohlin Vanek Theorem

- **Idea:** if trade is driven by differences in relative factor abundance across countries then trade flows across these countries should also reflect those differences in factors
- **Definition:** Factor content of trade of country i is total amount of factors used to produce the observed trade flows

$$F^i \equiv AT^i$$

where $T^i \equiv \begin{pmatrix} Q_C - D_C \\ Q_F - D_F \end{pmatrix}$ and $A \equiv \begin{matrix} a_{LC} & a_{LF} \\ a_{KC} & a_{KF} \end{matrix}$

- **HOV Theorem:** Suppose that (i) technologies are identical around the world; (ii) factor price equalization prevails; and (iii) preferences are homothetic and identical around the world. Then:

$$F^i = V^i - \frac{Y^i}{Y^W} V^W$$

w/ $V^i \equiv \begin{pmatrix} L \\ K \end{pmatrix}$, $V^W \equiv \begin{pmatrix} L^W \\ K^W \end{pmatrix}$, Y^i and Y^W are country i and world GDP

First Empirical Test of the Factor Content of Trade

- This prediction was first tested for U.S. exports and imports by Leontief (1953), and then again by Baldwin (1971)

Table 4-2, 4-3, and 4-4 from *International Economics* removed due to copyright restrictions.

- Since the U.S. was relatively very capital abundant, these results were viewed as a paradox
- The subsequent work by Baldwin also showed that this paradox did not extend to other factors
- ... and this empirical paradox has disappeared since the 1970s

Extending the Factor Content of Trade to Multiple Factors and Countries

- Bowen, Leamer, Sveikaukas (1987) showed how this test can be extended to multiple factors and countries
 - HOV Theorem does not depend on number of countries, goods, factors
- For each factor and country, compute that country's endowment of the factor as a share of the world endowment
- If that share is greater than the country's share of world income, then that factor is relatively abundant in that country (relative to the world)
 - ... and the HOV Theorem predict that the country will be a net exporter of that factor

Empirical Measures of Factor Abundance

Figure 4.9 from *International Economics* removed due to copyright restrictions.

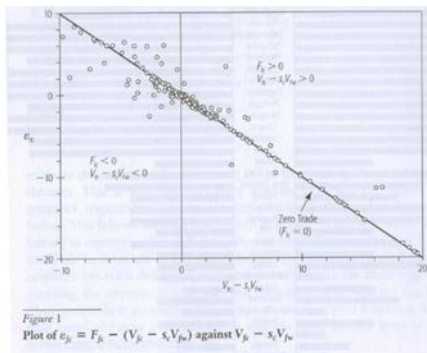
Extending the Factor Content of Trade to Multiple Factors and Countries (Cont.)

For every country-factor pair, Bowen, Leamer, Sveikaukas (1987) test whether the net factor content of trade is of the sign predicted by that country's relative factor abundance:

Table 4-2, 4-3, and 4-4 from *International Economics* removed due to copyright restrictions.

Predictions for the Volume of Trade

- One can also look at differences across countries in relative factor abundance to make predictions about the volume of trade
- Idea: bigger differences between countries in relative factor abundance should lead to relatively higher volumes of trade (holding everything else –especially overall country size –constant)
- This empirical prediction performs miserably!



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Can We Reconcile Heckscher-Ohlin Model with Data?

- In part, poor performance due to the fact that developed countries with similar factor abundance engage in a high proportion of overall world trade
- In other part, this is due to some of the additional assumptions imposed on the Heckscher-Ohlin model:
 - Common technology across countries
 - No transport/trade costs so countries face same goods prices
 - ... which does not allow for non-traded goods/services
 - There is also substantial evidence on firm-level fixed costs of exports (so firm size and potential export market size matters)
 - Non-homothetic preferences (to a much lesser extent)

Evidence on Technology Differences

- There are massive differences in overall productive efficiency (that affect all factors of production) across countries
- ... as well as differences in the productivity of various factors:

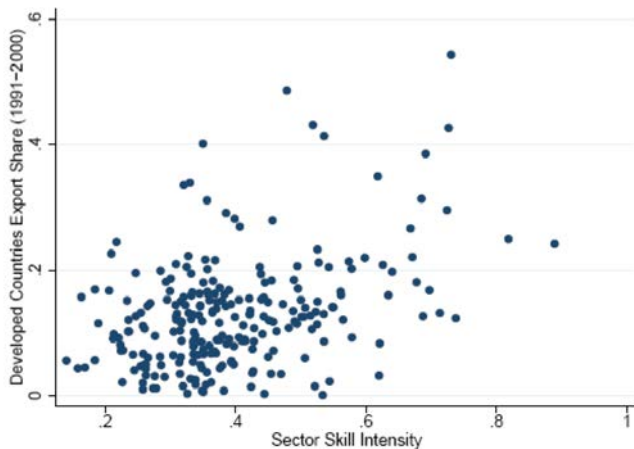
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Predictions for North-South Trade

- Nonetheless, the Heckscher-Ohlin model does a very good job of predicting the composition of North-South trade:

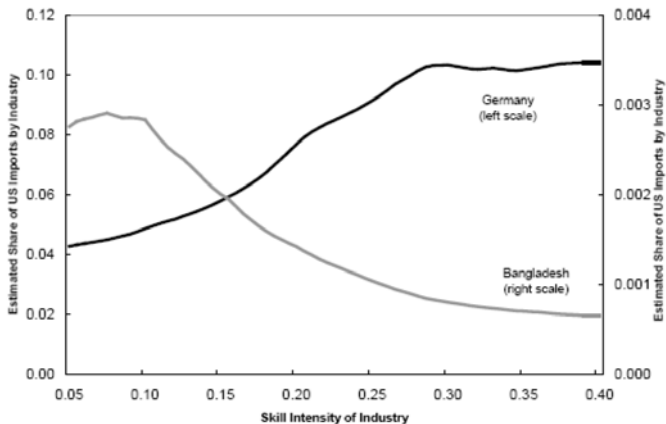
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Predictions for North-South Trade (Cont.)



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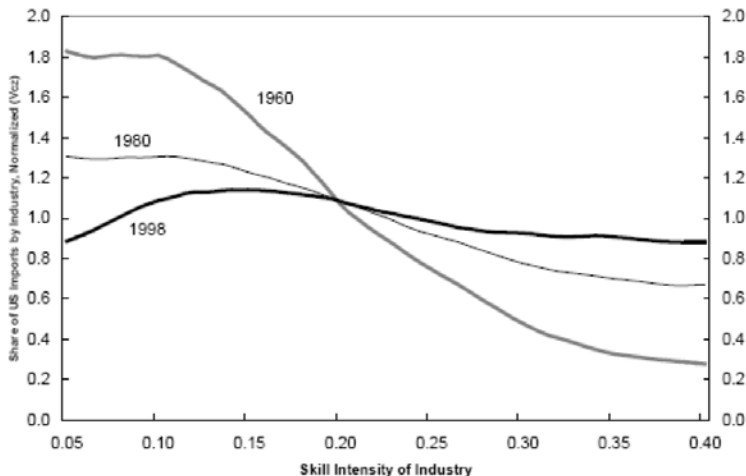
Predictions for North-South Trade (Cont.)



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Predictions for Growth and Human Skill Accumulation

Figure 2: Rybczynski Effect for the Asian Miracle Economies*
Combined US Import Shares 1960-1998
(*Singapore, Hong Kong, Taiwan, Korea)



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