

14.54 International Trade  
— Lecture 23: Factor Mobility (I) —  
Labor Migration

# Today's Plan

- 1 One-Good Model of Migration
- 2 Two-Good Model of Migration
- 3 Empirical Evidence

Graphs on slides 5, 7-10, and 15 are courtesy of Marc Melitz. Used with permission.

# 1. One-Good Model of Migration

# A One-Good Model of Migration

- Consider a world economy with 2 countries: Home and Foreign
- There is only one good, "Output"
  - Hence, there is no trade in a free trade equilibrium
- The price of output is normalized to one
- Output is produced using two factors: capital,  $K$ , and labor,  $L$ :

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

- Labor can freely move across countries, whereas capital cannot

# Properties of Production Function

- Constant returns to scale:

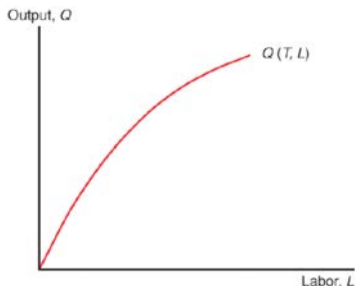
$$F(tK, tL) = tF(K, L) \text{ for any } t > 0$$

- Diminishing marginal returns to a single factor:

- $MPK = F^K(K, L)$  is  $\searrow$  in  $K$  and  $MPL = F^L(K, L)$  is  $\searrow$  in  $L$

- Factor complementarity:

- $MPK = F^K(K, L)$  is  $\nearrow$  in  $L$  and  $MPL = F^L(K, L)$  is  $\nearrow$  in  $K$



# Wages and Rental Rate of Capital

- Under perfect competition, wages must be such that

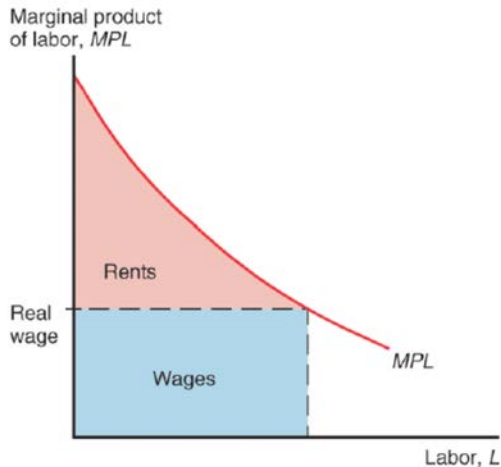
$$w = MPL$$

and rental rate of capital must be such that

$$r = MPK$$

- Diminishing marginal returns to labor imply that  $w \searrow$  in  $L$
- Factor complementarity implies that  $r \nearrow$  in  $L$

# Wages and Rental Rate of Capital (Cont.)

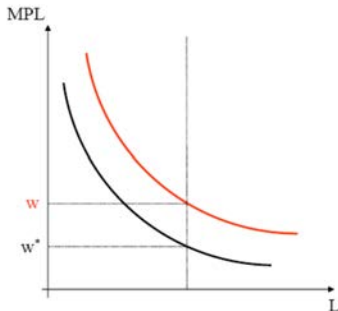


- Under perfect competition, zero profits imply:

$$Q = wL + rK$$

# Why Do Workers Migrate?

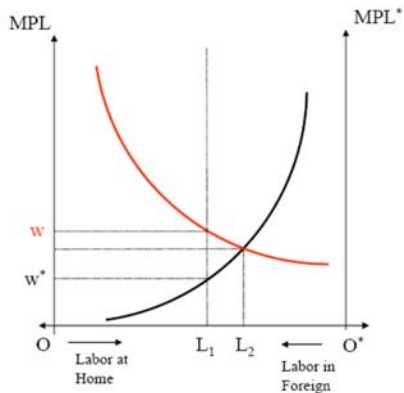
- If there are no costs associated with migration, workers should locate in the country where they can get highest possible utility
  - here, this is the country where they can get highest wage



- Because of factor complementarity, wages are higher in the capital-abundant country (Home)
- Workers have an incentive to migrate away from the labor-abundant country and toward the capital-abundant country

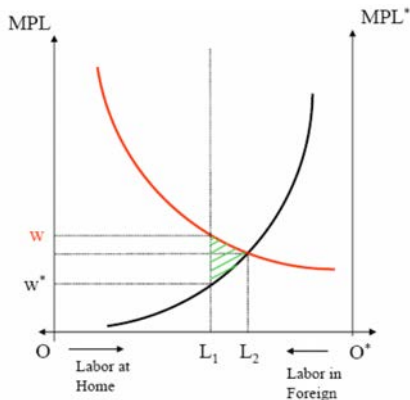


# How Many Workers Will Migrate?



- Workers will migrate away from the labor-abundant country until wages are equalized between the two countries

# What are the Economic Benefits of Immigration?



- Green area captures the economic benefits from immigration
- Let  $w'$  be the wage under full migration:
  - Home wins because  $w'$  lower than  $MPL$  of migrants
  - Abroad wins because  $w'$  higher than  $MPL^*$  of migrants

# What are the Economic Benefits of Immigration? (Cont.)

- Focus on the Home country. Immigration surplus is given by

$$\Delta Q = \frac{1}{2} (w - w') (L_2 - L_1)$$

- This can be rearranged as

$$\frac{\Delta Q}{Q} = -\frac{1}{2} sem^2$$

where  $s$  is labor's share of national income;  $e$  is wage elasticity; and  $m = (L_2 - L_1) / L_2$  is foreign born fraction of workforce

- Borjas (1995):  $s = 70\%$ ,  $e = -0.3$ , and  $m = 10\%$ 
  - The benefit of migration is equal to 0.1% of GDP
  - Other calculations suggest benefits may be somewhat larger, e.g. Kremer and Watt (2006), around 1%

# Does that Mean that Immigration has a Small Impact?

- No! Immigration also has redistributive effects
- In the labor-scarce country, migration makes workers worse off and capitalists better off
- The converse is true in the labor-abundant country
- Net changes in income of native workers and capitalists are given by

$$\frac{\Delta w L_1}{Q} = sem(1 - m)$$
$$\frac{\Delta r K}{Q} = -sem\left(1 - \frac{1}{2}m\right)$$

- With Borjas (1995) numbers,  $\frac{\Delta w}{Q} = 1.9\%$  and  $\frac{\Delta r}{Q} = 2.0\%$ 
  - In a \$7 trillion economy, that's a transfer of \$133 billion from workers to capitalists!

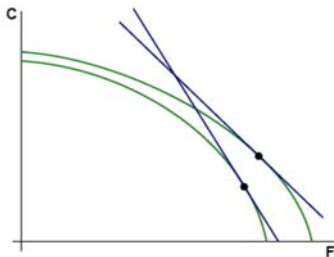
## 2. Two-Good Model of Migration

# Back to the Heckscher-Ohlin Model

- Suppose that 2 goods can be produced: Clothing ( $C$ ) and Food ( $F$ )
- Clothing is capital-intensive and Food is labor-intensive
- We analyze the impact of immigration under two polar assumptions:
  - 1 Closed economy
  - 2 Small open economy

# The Impact of Immigration in a Closed Economy

- In a closed economy, immigration acts like biased-growth towards the labor intensive sector, Food



- This will lead to:
  - ① An increase in the relative supply of Food
  - ② A decrease in the price of Food relative to Cloth (because relative demand is unchanged)
  - ③ A decrease in  $w/r$  (because of Stolper-Samuelson effect)
- In this scenario, real wages fall (in terms of both goods) and real rental rate of capital goes up

# The Impact of Immigration in a Small Open Economy

- In a small open economy,  $P_C/P_F$  is fixed
- Under incomplete specialization,  $P_C/P_F$  fixed implies  $w/r$  constant!
- As long as immigration does not lead to complete specialization in sector  $F$ , it has no effect on factor prices
  - Instead it affects output levels in the 2 sectors (Rybczynski effect)
- **Bottom line:**  
Very different conclusions can be reached (in theory) about the impact of immigration depending on whether or not trade in good is allowed



### 3. Empirical Evidence

# Wage Convergence in the Age of Mass Migration

Wage convergence table from *International Economics* removed due to copyright restrictions.

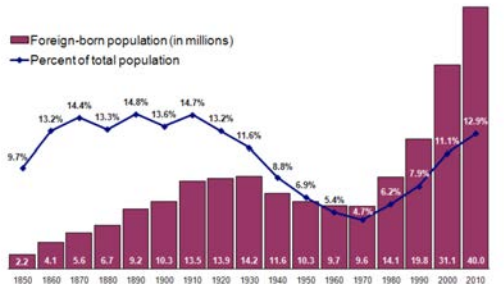
- Two observations:
  - ① Wages were higher in destination than in origin countries
  - ② Wages grew faster in origin than in destination countries

# Wage Convergence in the Age of Mass Migration

Figure 5-3 from *International Trade* removed due to copyright restrictions.

# Immigration and the U.S. Economy

**Foreign-Born Population and Percentage of Total Population, for the United States: 1850 to 2010**



Source: U.S. Census Bureau, Census of Population, 1850 to 2000, and the American Community Survey, 2010.



Courtesy of the United States Census Bureau.

# Immigration and the U.S. Economy (Cont.)

With differences across skilled groups

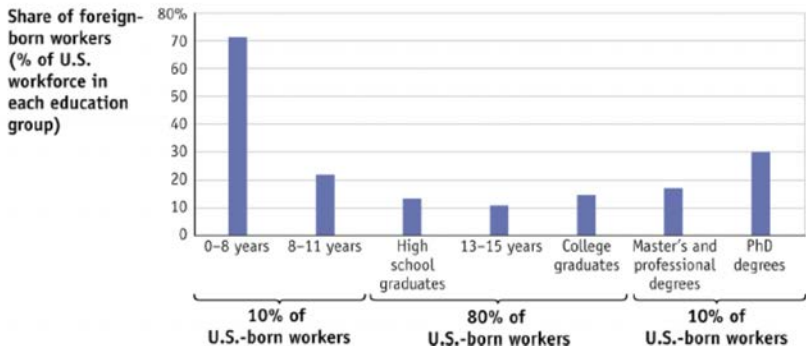
TABLE 3—EFFECTS OF IMMIGRATION AND TRADE ON LABOR SUPPLY BY EDUCATION, 1980–1990

Education group	<i>IIN</i>		<i>TIN</i>		$\Delta \ln\left(1 + \frac{I+T}{N}\right)$
	1980	1990	1980	1990	1980–1990
Dropouts (<12)	0.122	0.262	0.006	0.029	0.135
High school (12)	0.044	0.061	-0.001	0.005	0.021
Some college (13–15)	0.058	0.069	0.000	-0.005	0.005
College (16+)	0.075	0.097	0.005	-0.008	0.009
High-school plus (12+)	0.055	0.073	0.001	-0.001	0.015
High-school equivalents	0.065	0.094	0.001	0.007	0.031
College equivalents	0.072	0.091	0.004	-0.007	0.008

Courtesy of George J. Borjas, Richard B. Freeman, Lawrence F. Katz, and the American Economic Association. Used with permission.

# Immigration and the U.S. Economy (Cont.)

- Immigration in the United States has a U-shape pattern (Peri 2006)



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# What is the Impact of Immigration on U.S. Wages?

Borjas, Freeman and Katz (1996)

- Empirical Strategy: Use variation across U.S. regions in the share of migrants by education group
- Baseline model:

$$\ln w_{ijk} = \alpha AGE_i + \beta EDUC_i + \gamma (I/N)_{jk} + e_{ijk}$$

where  $i$  is individual,  $j$  is education group,  $k$  is region, and  $I/N$  is the ratio of immigrants to natives in region  $k$  and education group  $j$

# What is the Impact of Immigration on U.S. Wages?

Borjas, Freeman and Katz (1996) (Cont.)

TABLE 1—CROSS-SECTIONAL IMPACT OF IMMIGRATION ON NATIVE WAGE [DEPENDENT VARIABLE =  $\ln(\text{WEEKLY WAGE})$ ]

Independent variable	Regression coefficients			
	Male natives		Female natives	
	1980	1990	1980	1990
Relative number of immigrants in metropolitan area $j$ ( $I_j/N_j$ )	-0.0173 (0.0813)	0.2869 (0.0721)	0.4525 (0.0941)	0.5588 (0.1059)
Relative number of immigrants in metropolitan area $j$ and education group $k$ ( $I_{jk}/N_{jk}$ )	-0.0119 (0.0410)	0.1346 (0.0293)	0.2876 (0.0621)	0.2865 (0.0622)
Sample size	312,446	299,202	268,649	288,620

Courtesy of George J. Borjas, Richard B. Freeman, and Lawrence F. Katz. Used with permission.

- Results are unstable:  $\gamma$  may be positive or negative
  - but if migrants tend to locate in high wage regions, then  $\gamma$  overestimated
- Looking at changes over time get around this problem
  - It gives negative estimates (though not always)
  - Still problem of endogenous movements of natives and capital



# What is the Impact of Immigration on U.S. Wages?

Card (1990)

- Empirical strategy: Use a natural experiment
- The Mariel Boat Lift: From May to September 1980, 125,000 Cubans migrants (relatively unskilled) arrived in Miami
- Question: Did this exogenous increase in Miami labor supply ↘  
Miami wages relative to comparable cities?
- Answer: Virtually no effect

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