Request that you should not refuse

- PLEASE SWITCH OFF AND PUT AWAY YOUR CELL PHONES
- LAPTOPS OK IF WORK IS ACADEMIC
- REMOVE BAGS AND OTHER MATERIALS THAT CAN CAUSE DISTRACTION
- STOP HAVING SIDE CONVERSATIONS
- PARTICIPATE IN CLASS

Class 4
Immigration Economics
Behind the basic model: Demand for Labor
Calculating Immigration Surplus – Borjas
Nuanced Understanding of Immigration

- **<u>Read (3.1 & 2.2) for Upcoming Weekend and Monday's Class</u>**
  - **Read in the upcoming Weekend**
  - **2.2 - Effect of Immigration on Wages**
- **2.3 – Globalization and Immigration – Borjas (advanced)**
- **2.4 – Review of Borjas – David Card (advanced)**
  - **3.1 – Why are there so many jobs?**

Sushra B Saha

Who are immigrants?

US Context?

Legal Immigration

Aliens:
1) Visa Holdings: Non - immigrant
2) Resident: Green Card
Citizen:
1) Naturalized
2) Born

Illegal Immigration

1) Overstaying Visa
2) Fraud
3) Jumping Walls
4) Family Grounds

Do they get social security/welfare?
Yes, the question is how, and how many of them get it

Issues with Immigration

- Immigrants steal jobs of natives
- Immigrants agree to work for lower wage compared to natives
- Immigrants cannot assimilate with the natives
- Immigrants feast on welfare
- Immigrants pay taxes
- Immigrants enrich the economy

- Immigrants do jobs native americans do not do
- Immigrants pay taxes
- Immigrants enrich the economy – brings diversity
- Immigrants are a security risk

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The Short-Run Impact of Immigration When Immigrants and Natives Are Perfect Substitutes

Wage

Supply

w_0

w_1

Demand

N_1 N_0 E_1
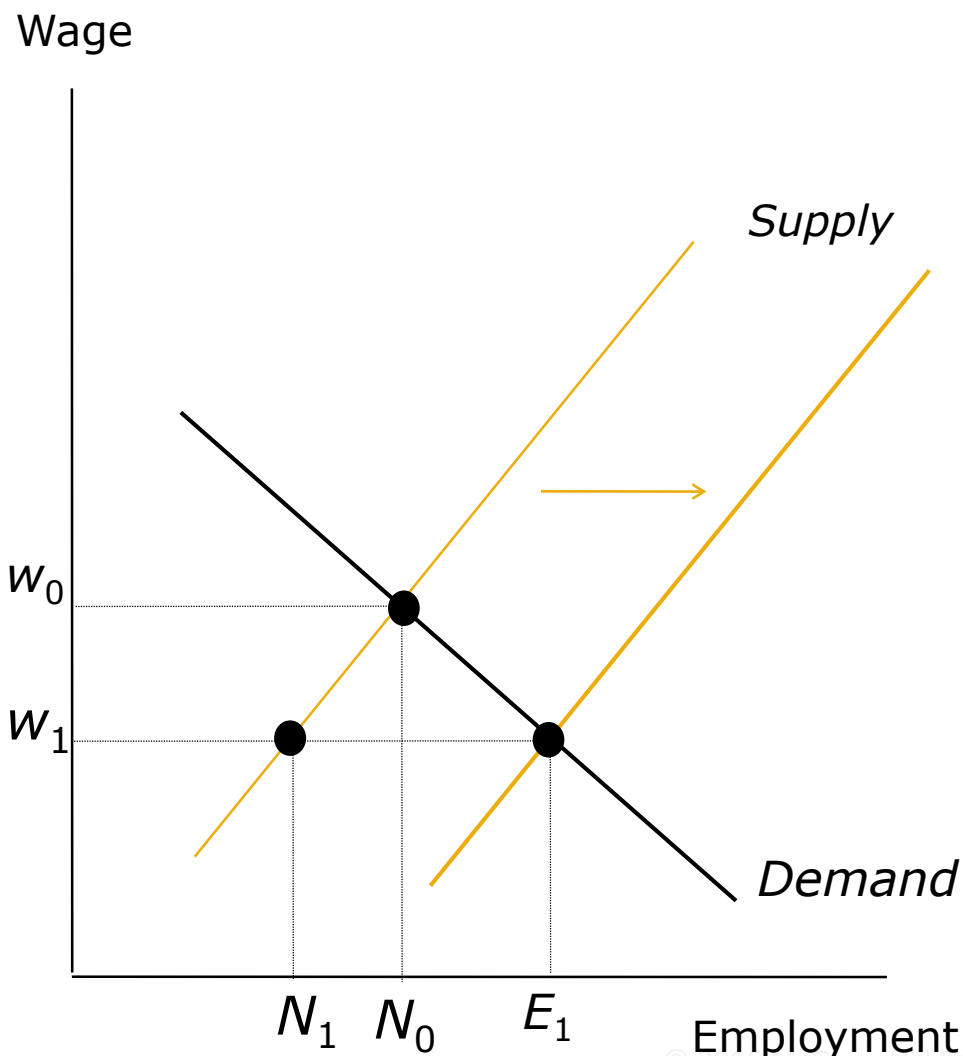
Employment

As immigrants and natives are perfect substitutes, the two groups are competing in the same labor market. Immigration shifts out the labor supply curve. As a result, the wage falls from w_0 to w_1, and total employment increases from N_0 to E_1. At the lower wage, the number of natives who work declines from N_0 to N_1.
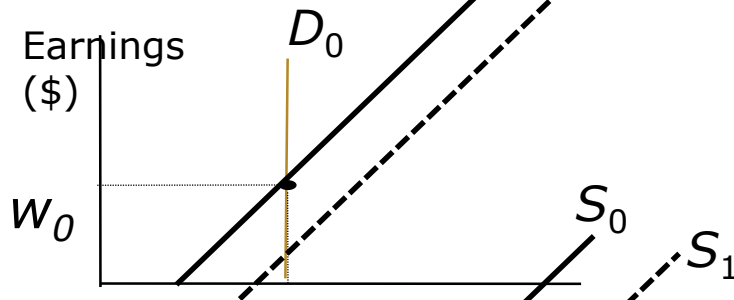
Impact of Immigration depend on DD Elasticity
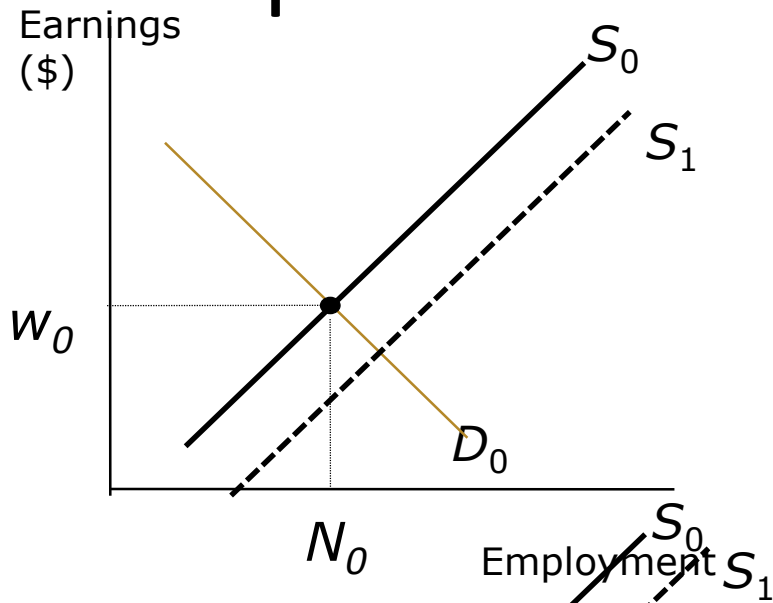
$$w = A - Bh^d \,...(1)$$

$$w = C + Dh^s \,...(2)$$

$$A \geq 0 \quad B \geq 0 \quad C \geq 0 \quad D \geq 0$$

$$\exists \; w = w_0 \ni h^d = h^s = N_0$$

Theoretically, immigration is the exogenous shock on the system. In practice, this is hard to determine because people and firms move.

To solve for elasticities, invert the supply and demand functions then take the first order conditions and solve for the values where the partial tends to infinite or zero

As elasticity tends to zero, inelastic
As elasticity tends to infinity, elastic

Dont forget to multiply by the proportionality factor to convert to percentage

- Using the parametric demand for labor equation, find out the condition (s) under which demand for labor is a horizontal line (infinite elasticity?) OR Vertical Line (Zero Elasticity)

- Using the parametric equation for supply of labor, find out the condition (s) under which supply of labor a horizontal line (infinite elasticity?) OR Vertical Line (Zero Elasticity)

What determines demand elasticity?

Analysis of Labor Demand

The technology the firm chooses determines the demand elasticity

Labor Demand in the Long-Run

p*q=q(E,K) [Production technology]
TC=wE+rK
Max (E,K) S.T. Total Cost function

Firm's problem

$$\max_{\{E,K\}} pf(E,K) - wE - rK$$

[as before, but now the firm chooses the level of labor *and* capital]

Equilibrium

The FOCs are $pf_E(E^*, K^*) = w$ and $pf_K(E^*, K^*) = r$, hence

$$\frac{f_E(E^*, K^*)}{f_K(E^*, K^*)} = \frac{w}{r}$$

i.e. the slope of the **isoquant** curve equals the slope of the **isocost** line

Duality: We get the same result from solving

$$\min \ wE + rK \ \text{s.t.} \ f_L(E, K) = q_0$$

Alternative production Technologies

The general idea for the production technologies is that we have inputs, plugged into some production tech, and then have outputs.

- General: $Q = Q(E, K)$ Typical unspecified general form

- Cobb-Douglas $Q = E^{\alpha} K^{\beta}; \alpha + \beta = 1$

- Constant Elasticity of Substitution (CES)

$$Q = \left(\delta_1 E^{\rho} + \delta_2 K^{\rho} \right)^{\frac{1}{\rho}}$$

Depends on the prices of the input, A general case of Cobb Douglas where the elasticity can take any value.

- Perfect Substitutes: $Q = \delta_1 E + \delta_2 K$

- Perfect Complements $Q = Min\{\delta_1 E, \delta_2 K\}$

Assumptions for Cobb Douglas and CES: Imperfectly substitutable factors

L=E^a*K^b+(lambda)[TC-wE-cK]

Take FOC wrt a,b,lambda
Solve system for lambdas

The Firm's Optimal Combination of Inputs
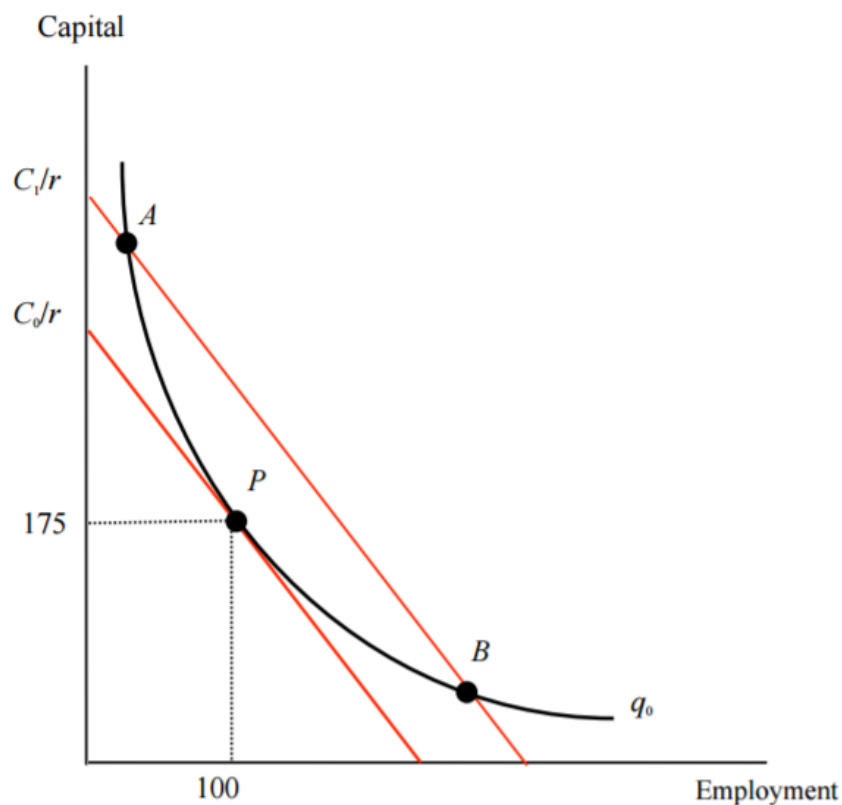
A firm minimizes the cost of producing q_0 units of output by using the capital-labor combination at point P, where the isoquant is tangent to the isocost. All other capital-labor combinations (such as those given by points A and B) lie on a higher isocost curve.
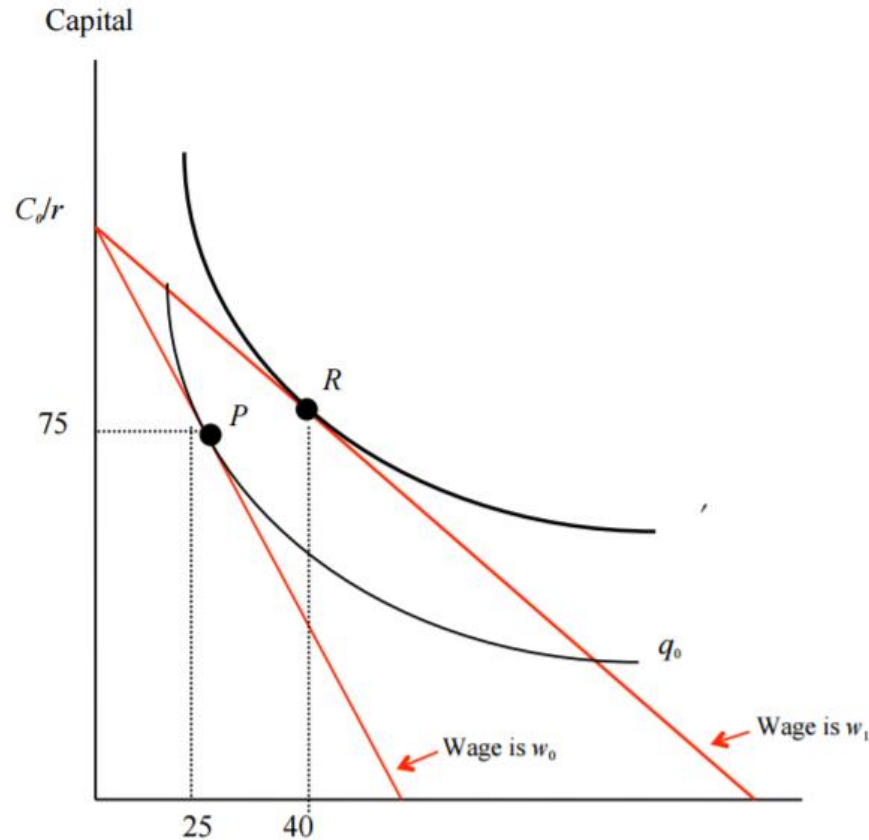
A wage reduction flattens the isocost curve. If the firm were to hold the initial cost outlay constant at C_0, the isocost would rotate around C_0 and the firm would move from point P to point R. A profit-maximizing firm, however, will not generally want to hold the cost outlay constant when the wage changes.

Short- and Long-Run Demand Curves
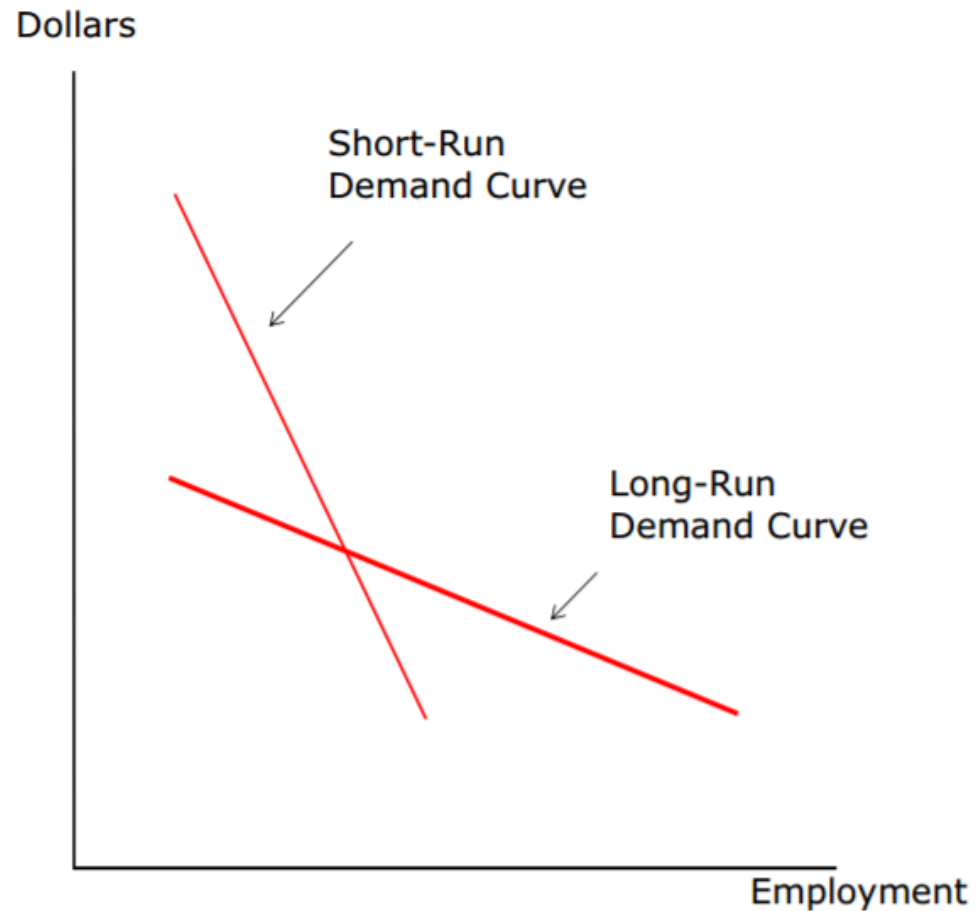
Elasticity of Substitution

All depends on the firms ability to switch between labor and capital

Steeper demand curves imply the firm is not flexible, cant substitute easily. Vice versa, more flexible means demand less steep.

The elasticity of substitution

Elasticity of substitution effects the slope of the demand curve as well. For perfectly substitutable inputs, you are flexible. For leonteif tech, you are less flexible.
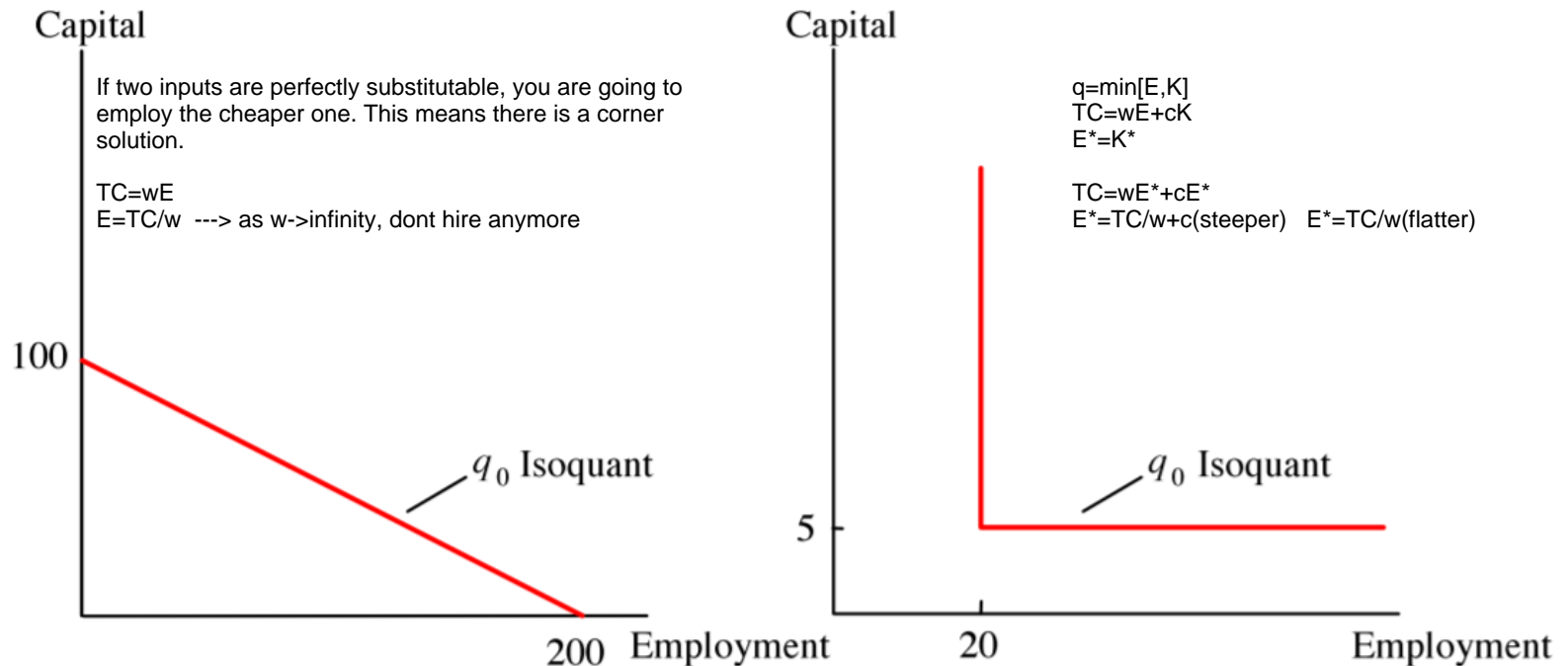
$$\sigma = \left[\frac{\Delta(K/E)}{K/E}\right] / \left[\frac{\Delta(w/r)}{w/r}\right]$$

i.e. the percentage change in the capital to labor ratio given a percentage change in the price ratio (wages to real interest).

- Interpret as the percentage change in the capital–labor ratio given a 1% change in the relative price of labor to capital
- Example: If the elasticity of substitution is 5, then a 10% increase in the ratio of wages to the price of capital would result in the firm increasing its capital-to-labor ratio by 50%.

Elasticity of Substitution: The Extreme Cases

Capital

If two inputs are perfectly substitutable, you are going to employ the cheaper one. This means there is a corner solution.

TC=wE
E=TC/w ---> as w->infinity, dont hire anymore

100

q_0 Isoquant

200 Employment

Capital

q=min[E,K]
TC=wE+cK
E*=K*

TC=wE*+cE*
E*=TC/w+c(steeper)   E*=TC/w(flatter)

q_0 Isoquant

5

20   Employment

Capital and labor are perfect substitutes ($\sigma = \infty$) if the isoquant is linear (two workers can always be substituted for one machine). The two inputs are perfect complements ($\sigma = 0$) if the isoquant is right-angled (the firm then gets the same output when it hires 5 machines and 20 workers as when it hires 5 machines and 25 workers)

Marshall's Rules of Derived Demand

Long-run elasticity of labor demand

$$\delta_{LR} = \frac{\Delta E_{LR}/E_{LR}}{\Delta w/w} = \frac{\Delta E_{LR}}{\Delta w} \times \frac{w}{E_{LR}}$$

Marshall's Rules: Labor Demand is more elastic (δ_{LR} larger) when

- elasticity of substitution is greater (see above)

- elasticity of demand for firm's output is greater
  (higher wages lead to higher prices $\rightarrow$ elastic demand means large cut in output $\rightarrow$ firms cut employment heavily)

- the labor's share in total costs of production is greater
  (if production is labor intensive, even a small increase in wages substantially increases marginal cost of production)

- the supply elasticity of other factors of production is greater
  (more expensive to substitute workers to capital if the price of capital is very responsive to demand for capital)

$$A \geq 0 \quad B \geq 0$$
$$C \geq 0 \quad D \geq 0$$

$$w = A - Bh^d \ldots (1)$$
$$w = C + Dh^s \ldots (2)$$

w=(AD+BC)/B+D
N=(A-C)/B+D

w1=(AD+B(C-K))/B+D
N1=A-(C-K)/B+D

w+A=Bh
w=(C-K)+Dh
w1=C+DN1
AD+B(C-K)/B+D=C+DN1 ----> AD+B(C-K)/B+D) - C =DN1
= AD-BK-CD/B+D=DN1

--->N0-BK/(B+D)=N1<--------
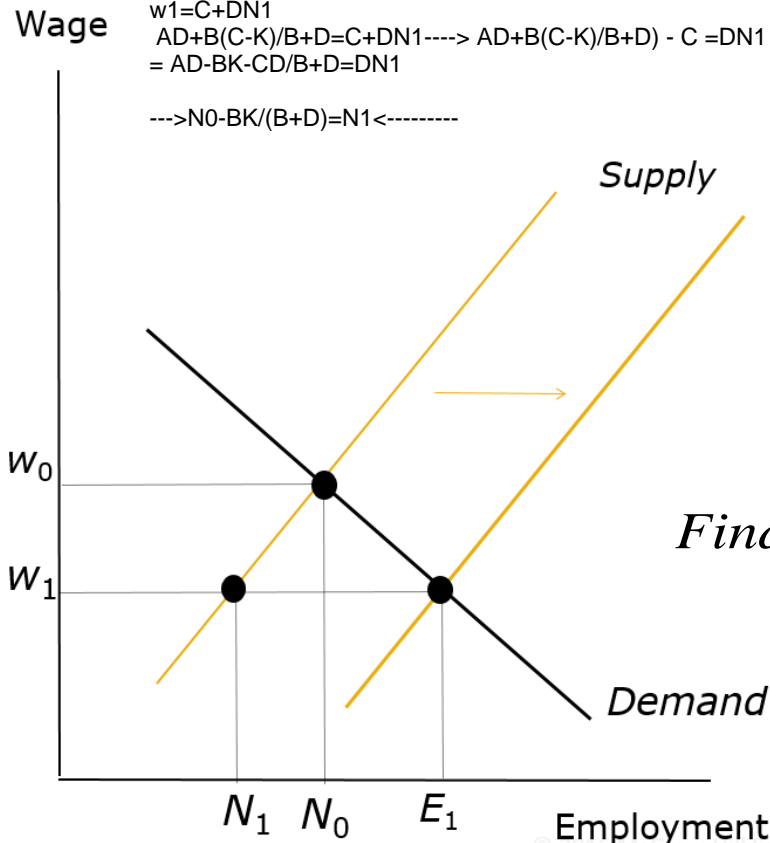
$$\exists \; w = w_0 \ni h^d = h^s = N_0$$

$$Find \; Parametric \; \exp ressions \; for \; w_0 \, \& \, N_0$$

Suppose **K** (legal & naturalized) immigrants move into this industry from a foreign city.

$$w = C - K + Dh^s \ldots (3)$$

$$\exists \; w = w_0 \ni h^d = h^s = E_1$$

$$Find \; Parametric \; \exp ressions \; for \; w_1 \; N_1 \, \& \, E_1$$

Under what condition will N1-N0?

Under what condition will w1=w0?

Wage

Supply

w_0

w_1

Demand

$N_1 \quad N_0 \quad E_1$ Employment

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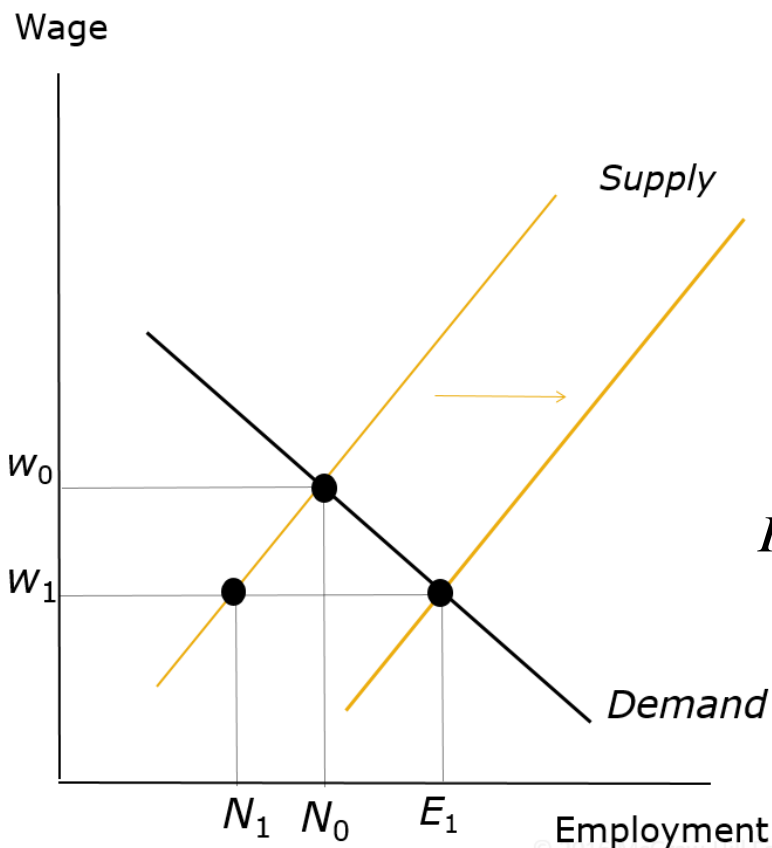
$$A = 100 \quad B = 1$$
$$C = 20 \quad D = 1$$

$$w = A - Bh^d \dots (1)$$
$$w = C + Dh^s \dots (2)$$

$$\exists \; w = w_0 \ni h^d = h^s = N_0$$

$$Find \; Parametric \; \exp ressions \; for \; w_0 \; \& \; N_0$$

Suppose **K=10** (legal & naturalized) immigrants move into this industry from a foreign city.

$$w = C - K + Dh^s \dots (3)$$

$$\exists \; w = w_0 \ni h^d = h^s = E_1$$

$$Find \; Numerical \; values \; for \; w_1 \; N_1 \; \& \; E_1$$

**Find Firm Surplus before and after immigration**

Borjas

Immigration Surplus

Assumptions

- The production technology: Labor and Capital : Perfect Substitutes (no skill differences)

- CRS production function (worker and firm surplus goes to the respective players)

- Competitive input markets: wage = marginal product of labor; rent =marginal product of capital

- Natives own capital: have shares in the companies

- Capital is available inelastically

- Labor Supply is vertical

Figure 1
The Immigration Surplus

Dollars

A

B

w_0

C

w_1

D

MP_L

Employment

0

N $L = N + M$
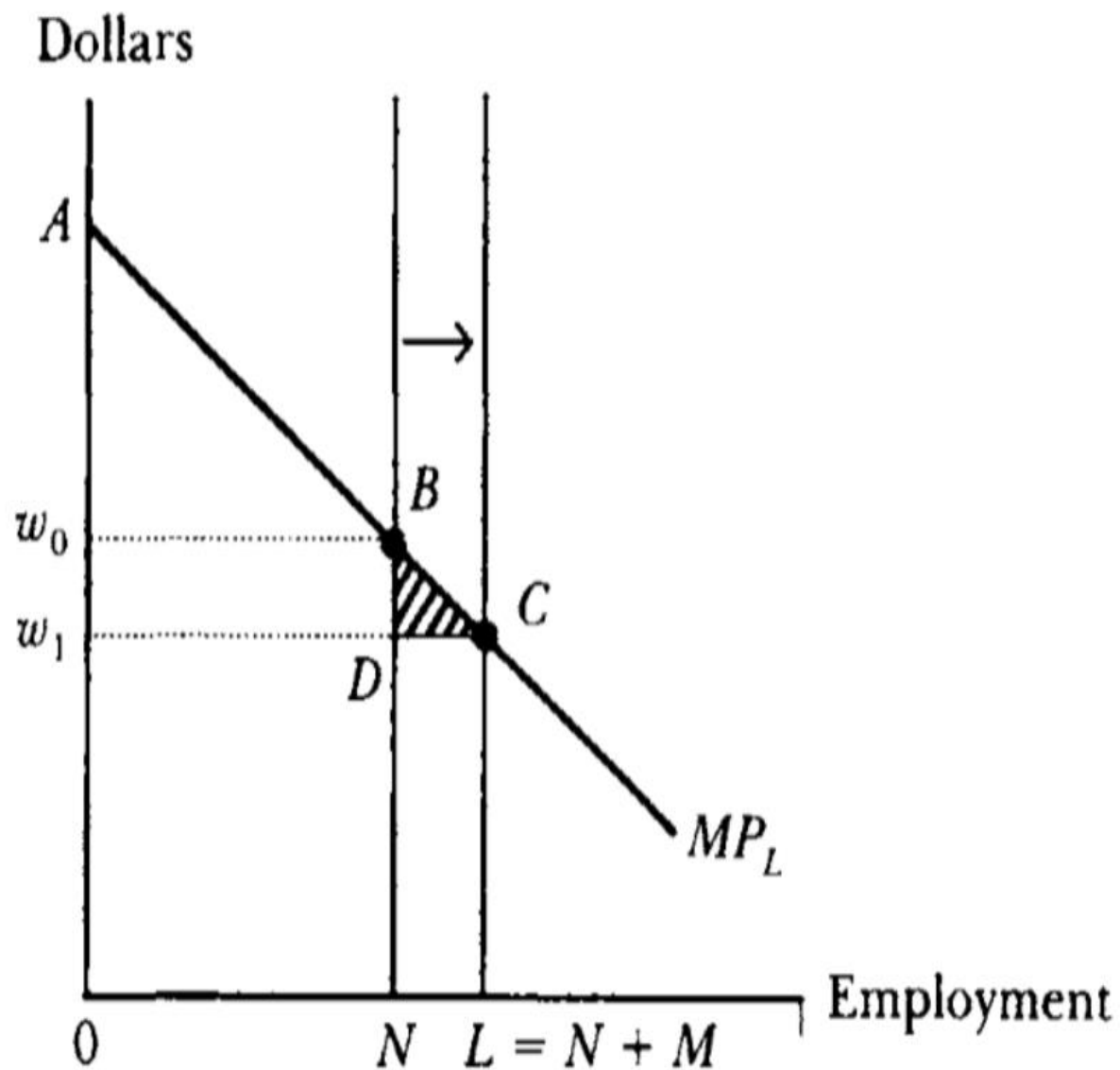
$$\text{Im}\,migration\ Surplus = -\frac{1}{2}\,sem^2 \times Q (= GDP)$$

- s: labor's share in national income
- e: % change in wage from 1% change in labor force
- M: share of immigrants in the total population
- GDP = 7 trillion

$$s = .7; e = -.3; m = .1$$
$$\text{Im}\,migration\ Surplus = 7.35\ Billion$$
$$s = .7; e = -1; m = .1$$
$$\text{Im}\,migration\ Surplus \approx 25\ Billion$$

With horizontal demand curve, all gains go to immigrants i.e. firm surplus =0

If wages do not drop in the new equilibrium, natives do NOT get any benefit from immigration

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With vertical demand curve, all gains go to natives

If wages drop in the new equilibrium, natives get benefits from immigration

Redistribution of wealth: wages decrease because of immigration: wealth goes from labor to capital owners

This is why a lot of grumbling happens from native workers: not all of them hold capital in real life

Assumptions Relaxed

- Immigrants augment capital stock of a country: Investor Green Card: My experience with this

- No External Effect: having more immigrants does not create new knowledge & hence enhances productivity: This is hotly debated. Works by Bill Kerr

- Immigrant Skills: Higher skills get higher surplus

The Short-Run Impact of Immigration when Immigrants and Natives are Complements

Wage

Supply

w_1

w_0

Demand

N_0 N_1 Employment
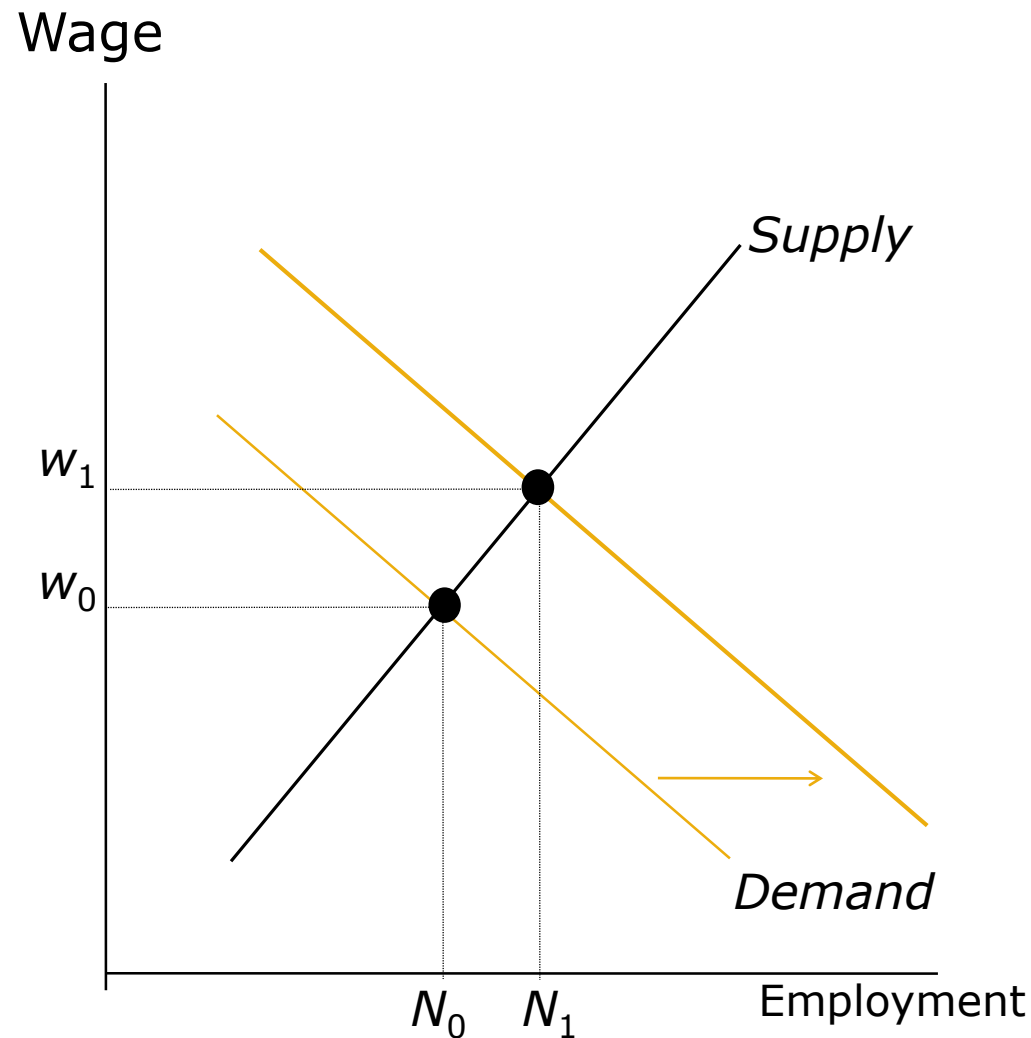
If immigrants and natives are complements, they do not compete in the same labor market. The labor market here denotes the supply and demand for native workers. Immigration makes natives more productive, shifting out the labor demand curve. This leads to a higher native wage and to an increase in native employment.

The Long-Run Impact of Immigration When Immigrants and Natives Are Perfect Substitutes
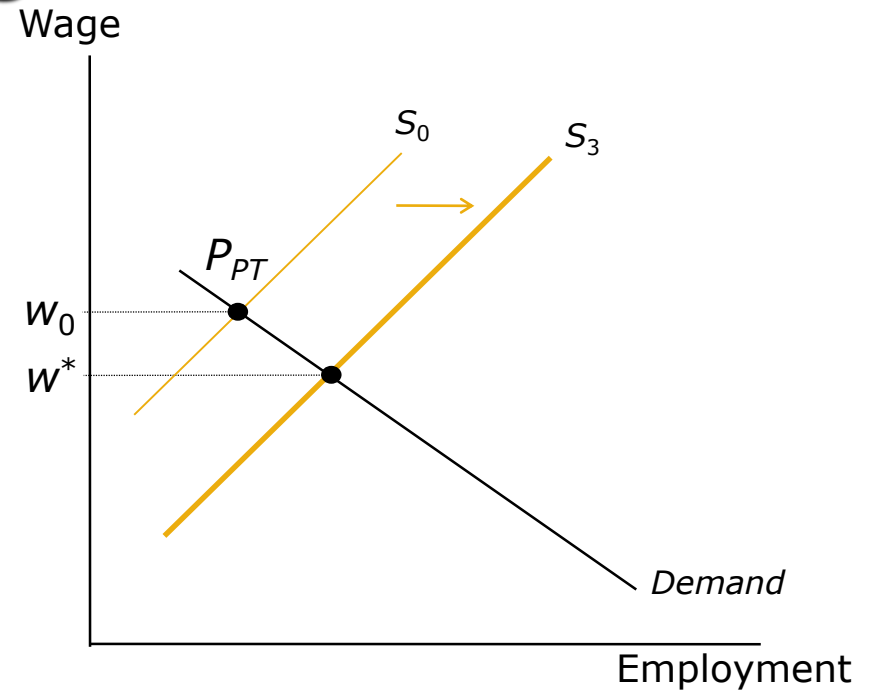
Wage

Supply

w_0

w_1

Demand

N_0 N_0 + Immigrants   Employment
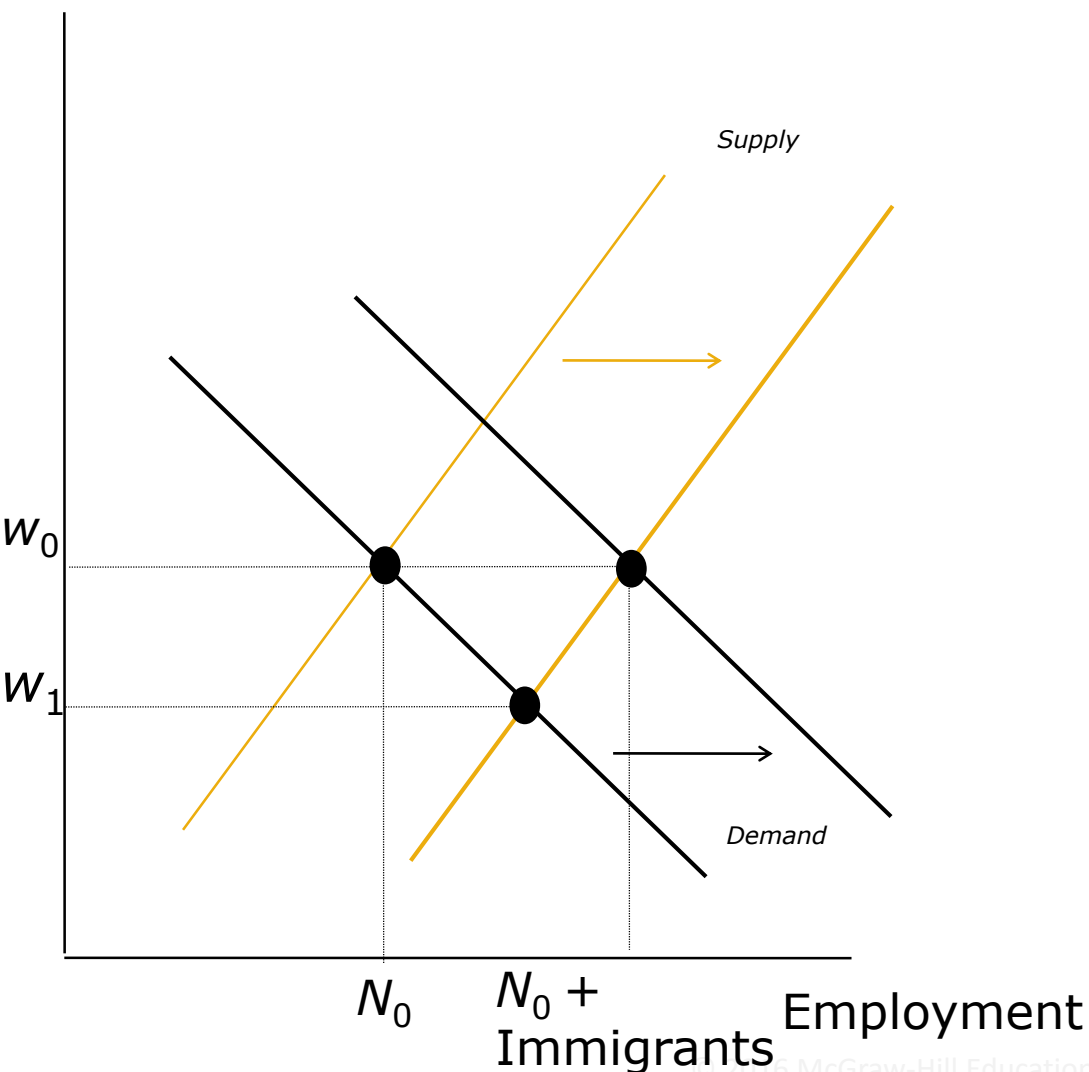
Immigration initially shifts out the labor supply curve so the wage falls from w_0 to w_1. Over time, capital expands as firms take advantage of the cheaper workforce, shifting out the labor demand curve and restoring the original wage and level of native employment.

The Native Labor Market's Response to Immigration
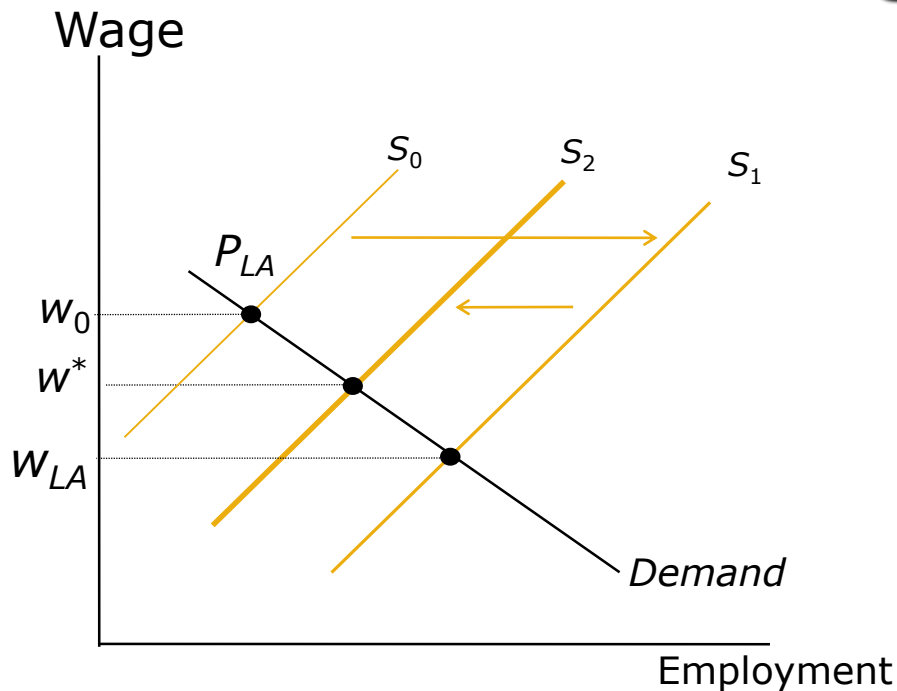
(a) Los Angeles

(b) Pittsburgh

Originally, both markets pay equilibrium wages of w_0. After immigration into Los Angeles, both markets eventually converge to a new equilibrium wage at w^*, which is less than w_0.

California's Population, 1950-1990
(% U.S. Population Living in California)