Economics 2
Fall 2024

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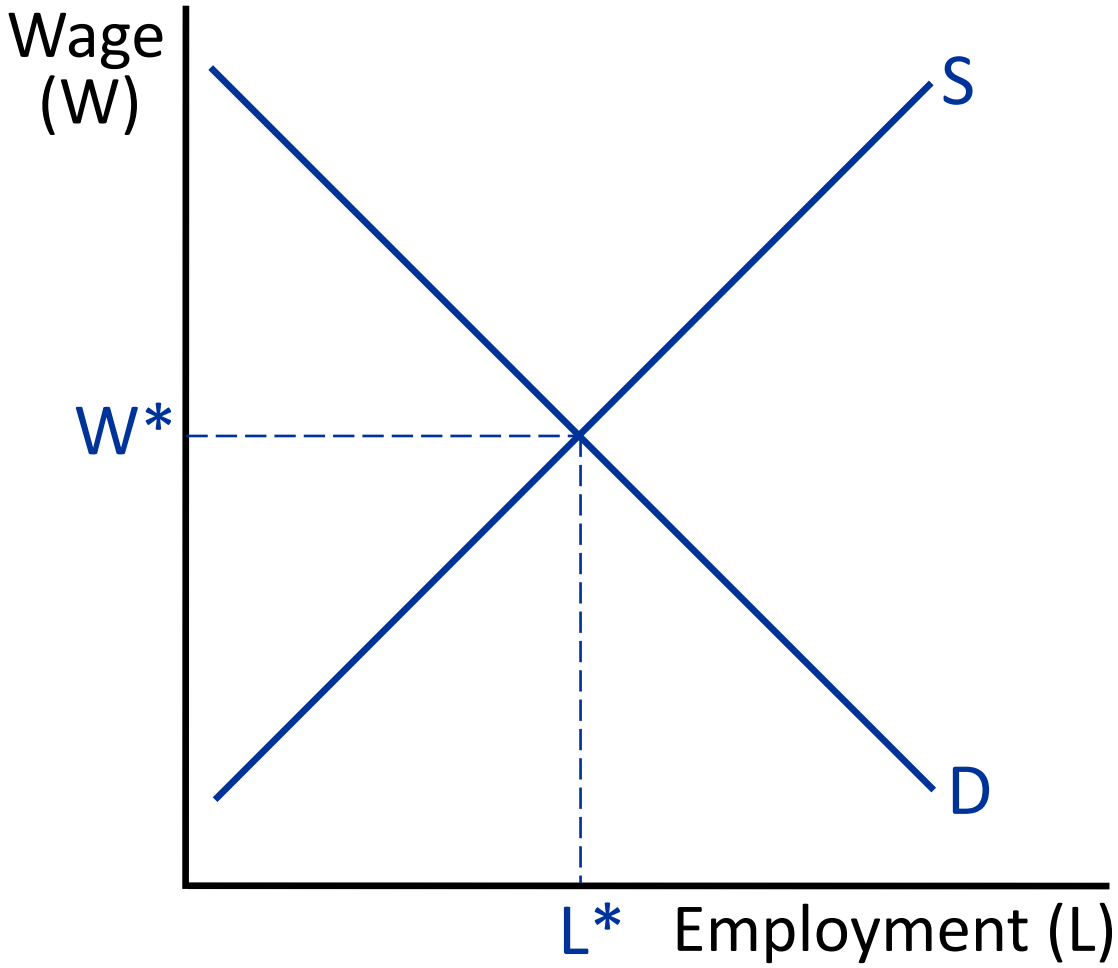
LECTURE 10
Labor and Wages

I. Overview

The Market for Inputs to Production

- Labor (workers) and capital (machines, buildings)
- Demand for labor comes from profit maximization of firms
- Supply of labor comes from utility maximization of workers
- Helps us to understand important economic issues and developments
- We start with competitive model of the labor market and discuss its (many) limitations later

Market for Labor



We can talk about the labor market at different levels:

- Market for labor for a particular occupation or industry (plumbers, software engineers, construction workers) in particular geographical area
- Market for workers with particular demographic characteristics (teenagers, prime age workers, single parents)
- Market for workers with particular skills (high-skilled and low-skilled, as valued by the market).

Why is the market for labor important?

- Wages and employment are fundamental to peoples' lives and happiness
- About ¾ of national income goes to workers (remaining ¼ goes to capital owners)
- Labor market analysis can help us to understand how developments will affect wages and employment
- It can also help explain rising inequality

II. Labor Demand

Labor Demand Comes from Profit Maximization

- What factors affect a firm's demand for labor?
  - Demand for the product it produces
  - Productivity of labor
  - The wage and other labor costs
- Profits are maximized where MR = MC
- For labor: Firms want to hire labor up to the point where the extra revenue generated by another worker is just equal to the extra cost.

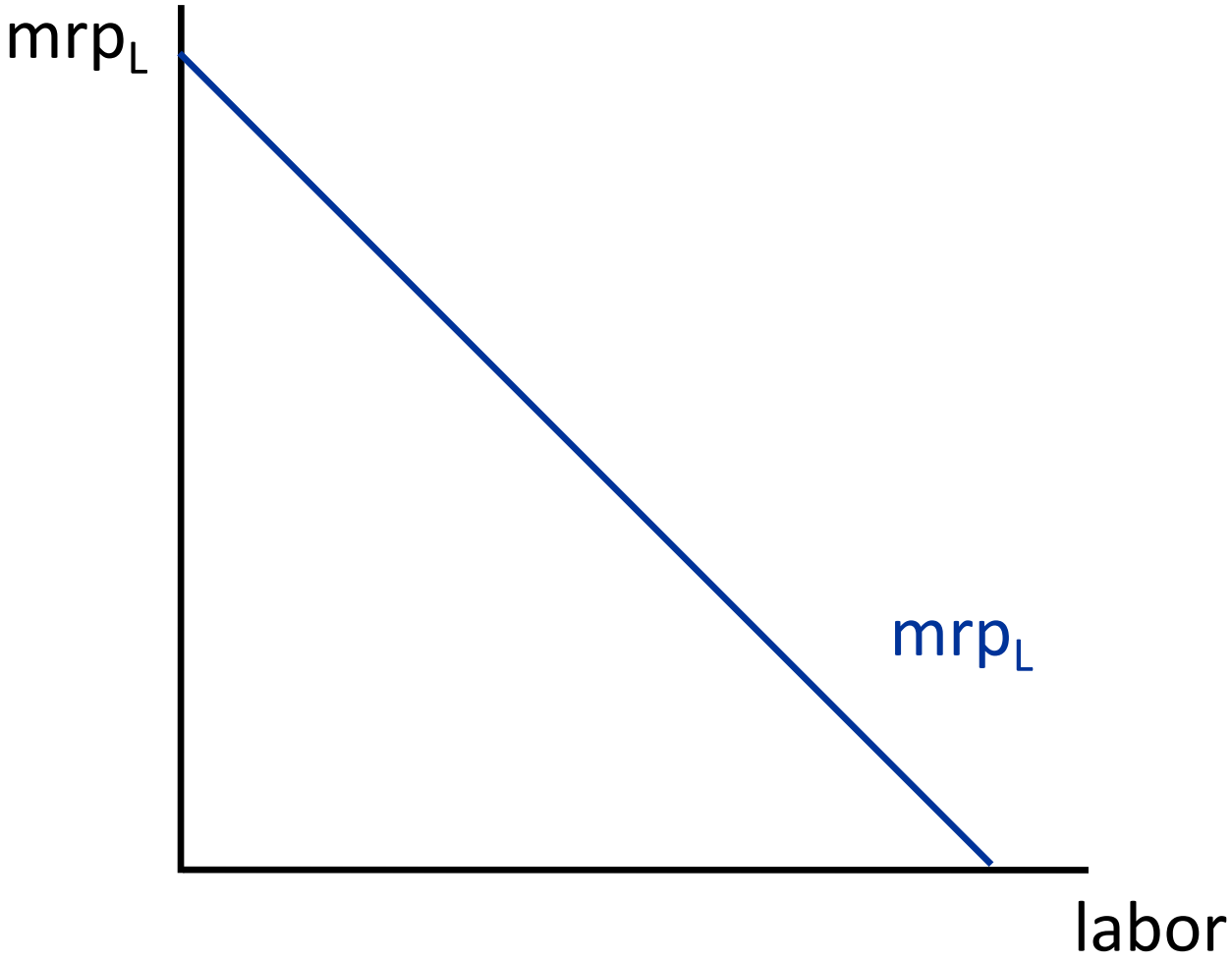
Marginal Revenue Product of Labor (mrp_L)

- The extra revenue generated by one more worker.
- It is composed of two pieces:
  - Marginal product of labor (mp_L): The extra output produced by one more worker.
  - Marginal revenue (mr): The extra revenue from selling one more unit.
- $mrp_L = mp_L \bullet mr$
- For competitive firms: $mr = P \Rightarrow mrp_L = mp_L \bullet P$.

mrp_L Declines as L Increases

- Recall: $mrp_L = mp_L \bullet mr$.
- mp_L declines because of diminishing returns
  - extra workers in the firm become less useful without scaling capital as well
- mr is either constant (for a competitive firm) or declining (for an imperfectly competitive firm).
- So mrp_L is declining.

mrp_L for a Particular Firm

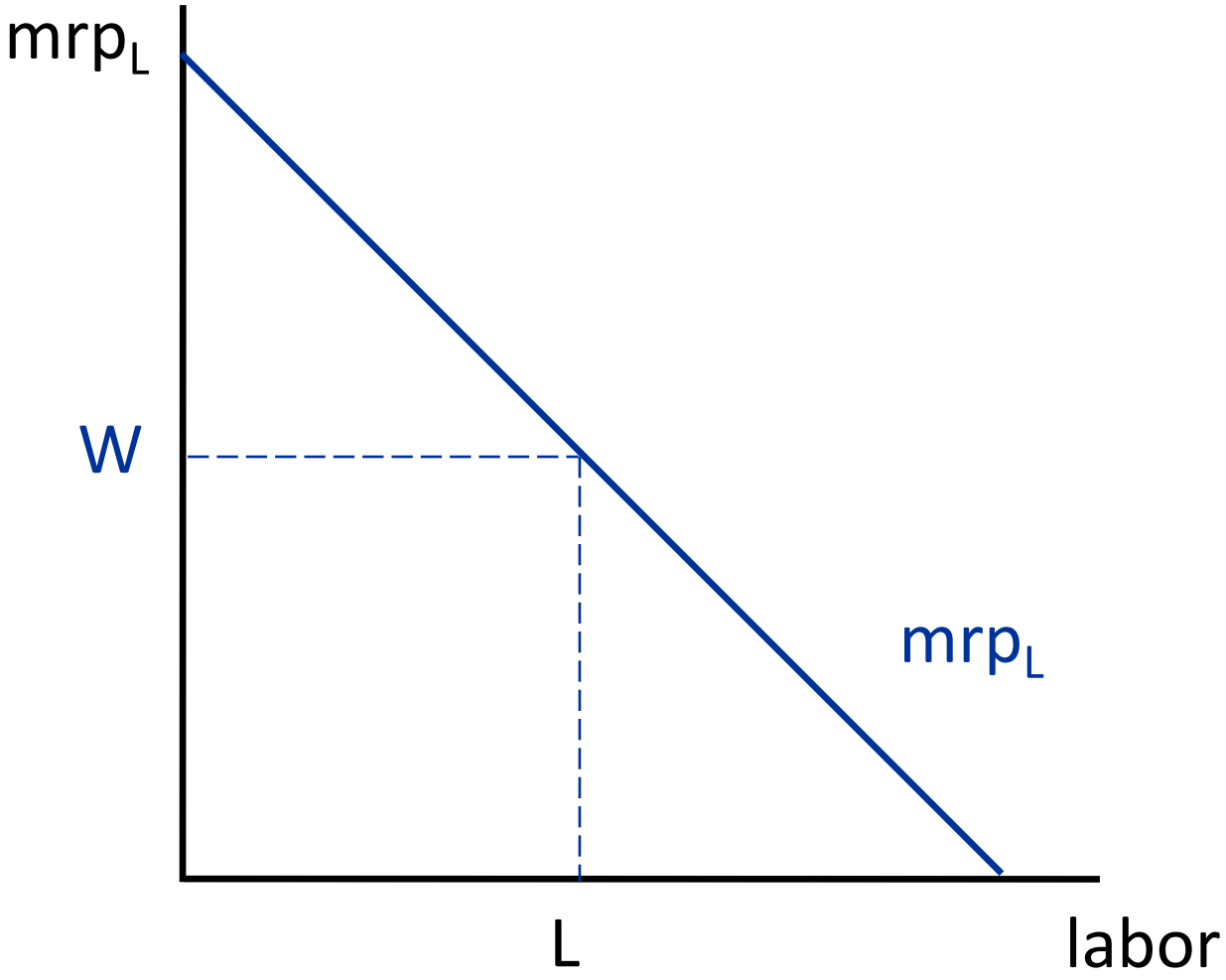


An employer gets diminishing value of employing workers as adding extra workers brings less and less mrp_L

Profit Maximization Implies:

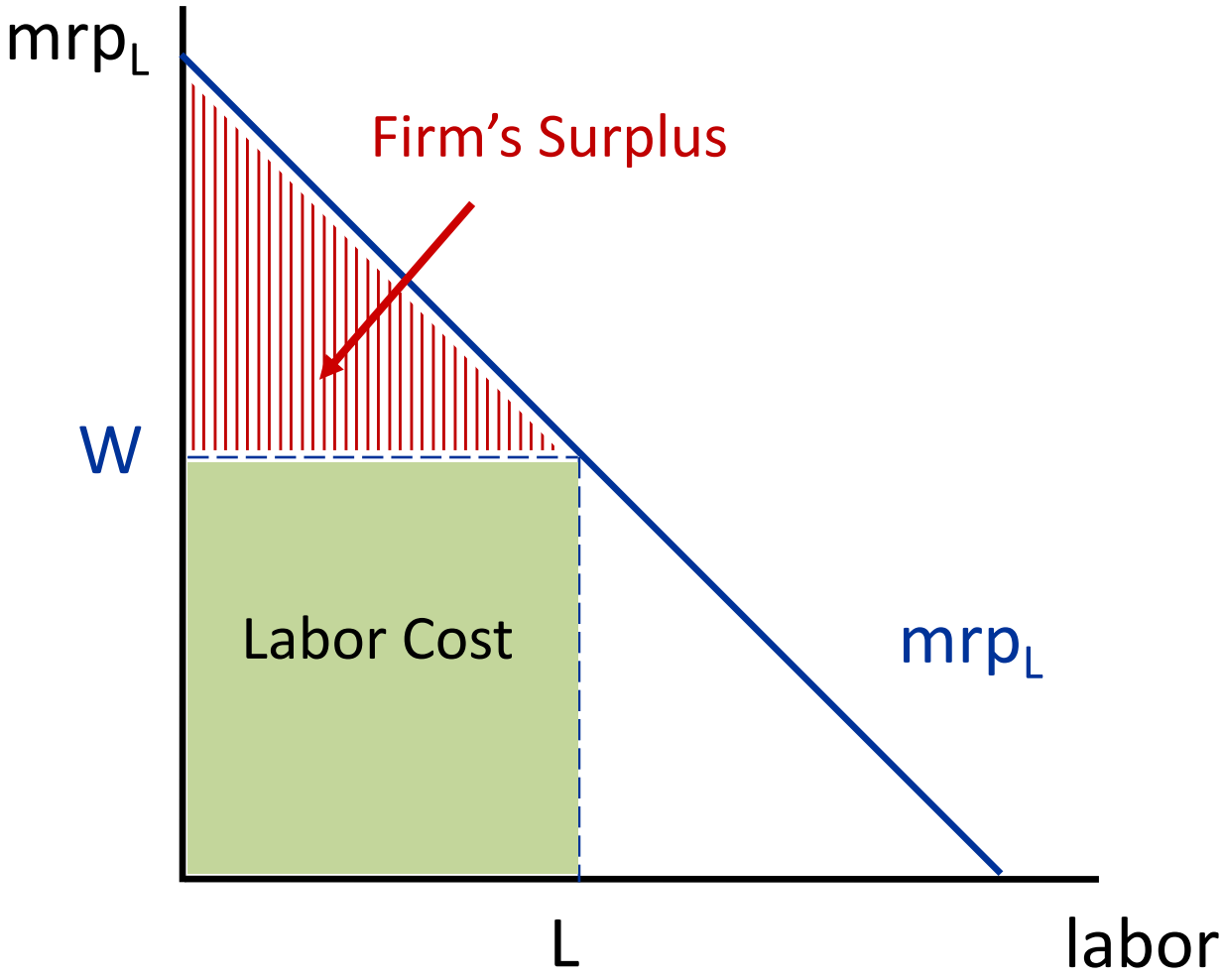
- In competitive labor market model: each individual firm takes W as given
- Firms want to hire labor up to the point where: $mrp_L = W$.
- For a given wage level, a firm wants to hire whatever quantity of labor has a mrp_L equal to that wage.
- Market level demand for labor: horizontal sum of all the individual firms demand for labor

Labor demand for the firm in competitive labor market where wage W is given



For a given wage W, employer hires labor L up to the point where marginal worker has mrp$_L$ equal to W

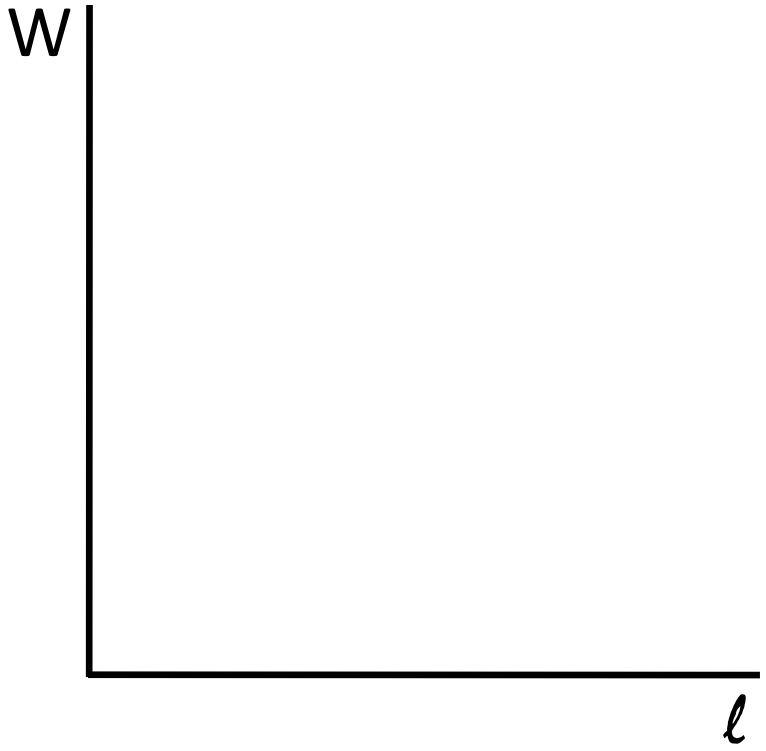
Firm surplus from hiring workers and labor cost



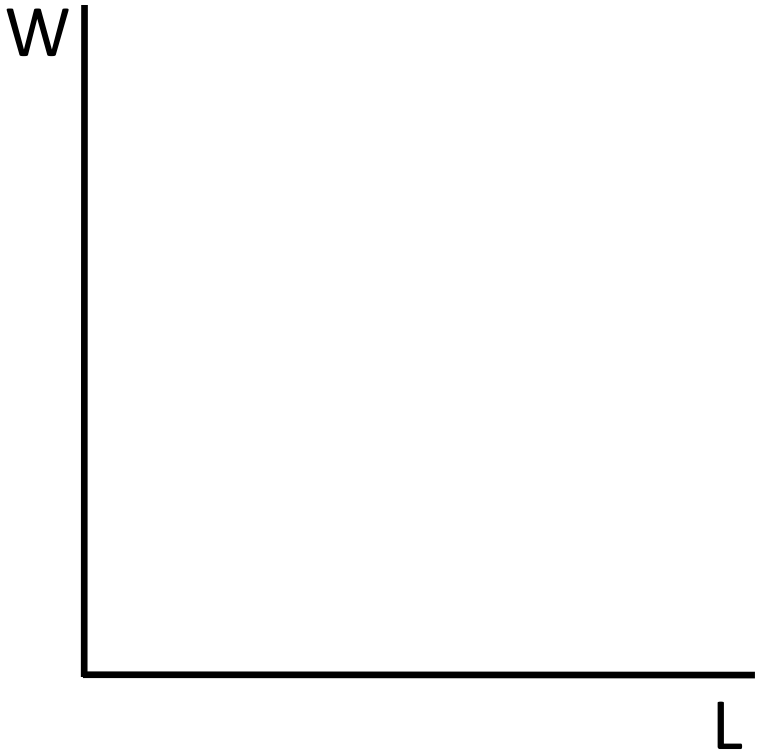
Employer surplus is red triangle below mrp$_L$ and above wage line W
Labor cost paid out to workers is the green rectangle W×L.

Labor Demand Curves

Individual Firm

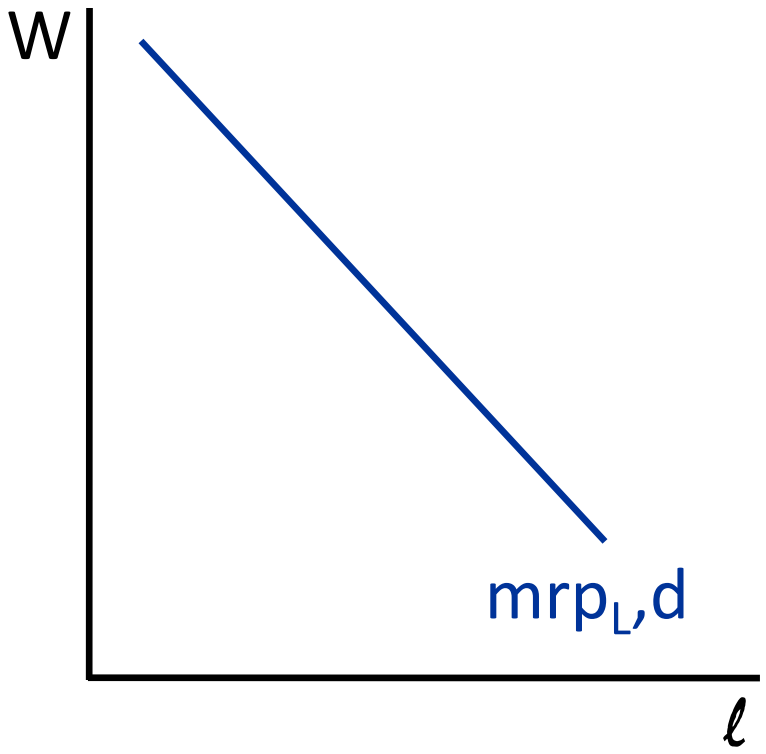


Market

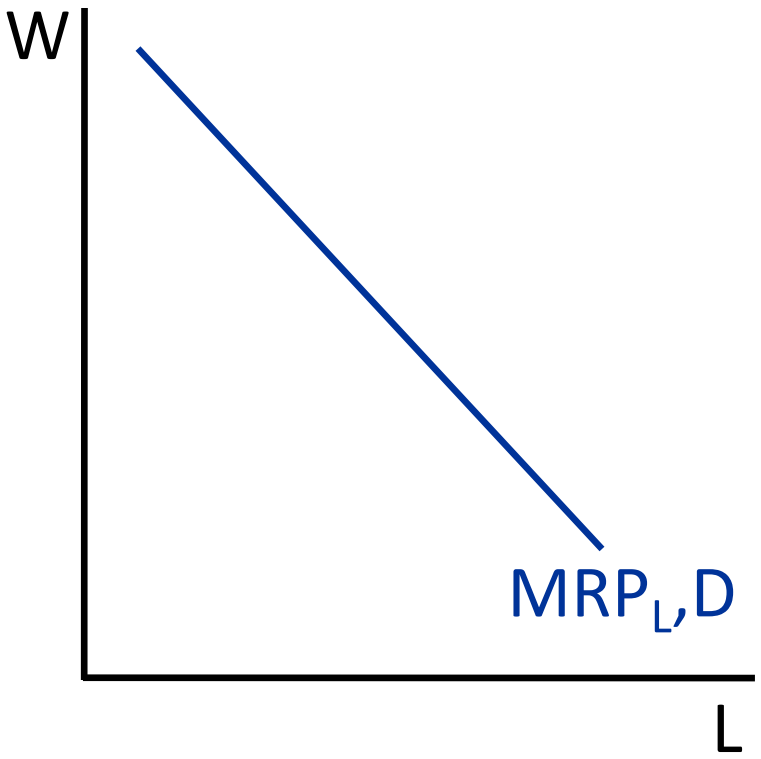


Labor Demand Curves

Individual Firm



Market



Quiz:

Question: Why is the demand for labor declining with the wage?

- A. Because workers prefer higher wages
- B. Because extra workers become less and less useful for each firm
- C. Because we are considering the competitive case.
- D. Because consumers' always have demand curves declining with prices
- E. All of the above

Quiz:

Question: A given firm hires L (identical) workers all paid the same wage W. Which one below is true?

- A. Each worker gets paid its marginal contribution to revenue of the firm
- B. The firm gets more from its workers that what it pays them
- C. All workers (but one) get paid less than their contribution to the revenue of the firm
- D. All of A, B, C are true
- E. None of A, B, C are true

III. Labor Supply and Equilibrium in the Labor Market

Poll on labor supply

- Poll: Suppose you have a paying job at UC Berkeley (e.g., library attendant or work study) 10 hours/week to help support yourself. Suppose the wage goes up from current $20/hour up to $25/hour. How would this affect your hours of work choice?

A. I would want to work longer hours.

B. I would want to work the same

C. I would want to work shorter hours.

Labor supply behavior comes from utility maximization on the part of households

- Households not only like goods and services, they like leisure (=time not working in the market for pay) to sleep and rest, family, chores, study (if student), plus all other true leisure activities
- The $mu_{Leisure}$ declines as the quantity of leisure increases.
- $P_{Leisure}$ is the wage: getting 1 hour extra of leisure means cutting work by 1 hour and losing 1 hour of wage.
- Think of a household choosing between leisure and everything else.

Condition for Utility Maximization

$$\frac{mu_{Leisure}}{P_{Leisure}} = \frac{mu_{Goods\ and\ Services}}{P_{Goods\ and\ Services}}$$

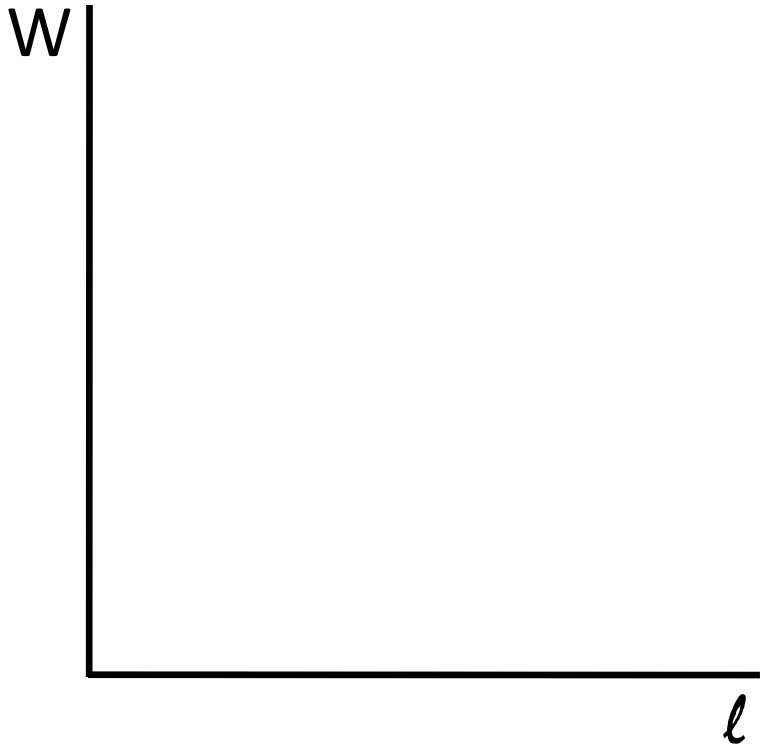
Effect of an Increase in the Wage = $P_{Leisure}$

$$\frac{mu_{Leisure}}{P_{Leisure}} < \frac{mu_{Goods\ and\ Services}}{P_{Goods\ and\ Services}}$$

- Substitution Effect: When the wage rises, the consumer wants to substitute away from leisure (so work more).
- Income Effect: When the wage rises, the consumer is richer and wants more leisure (so work less) and goods
- Unlike consumer goods where income and substitution go in the same direction, here the effects go in opposite directions
- Which effect dominates is an empirical matter (see poll).

Labor Supply Curves

Individual Household



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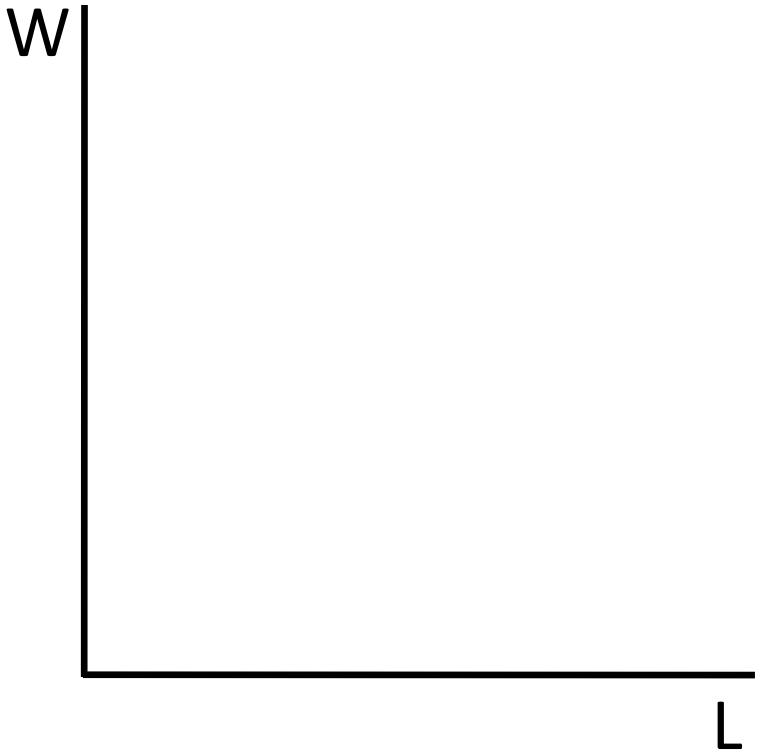
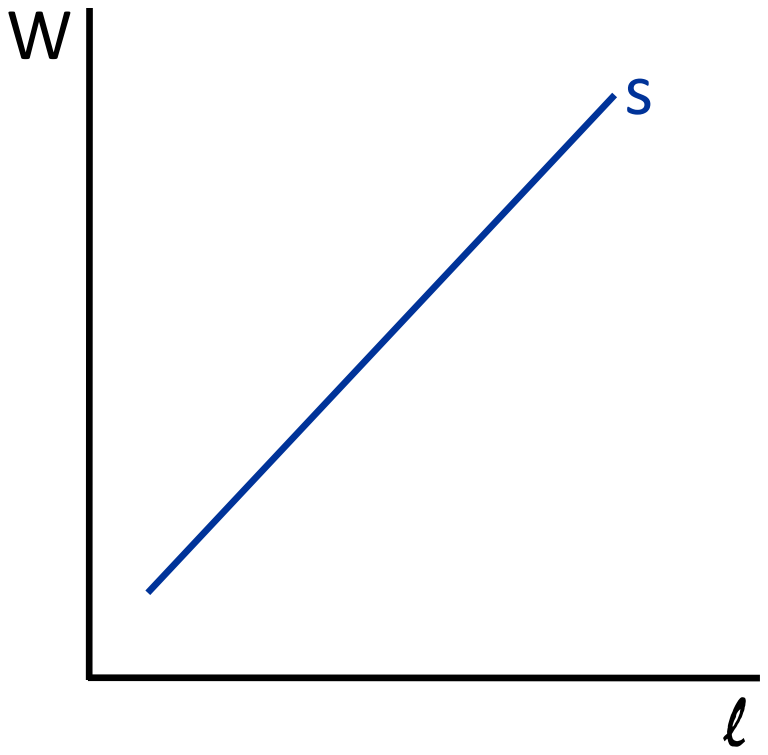
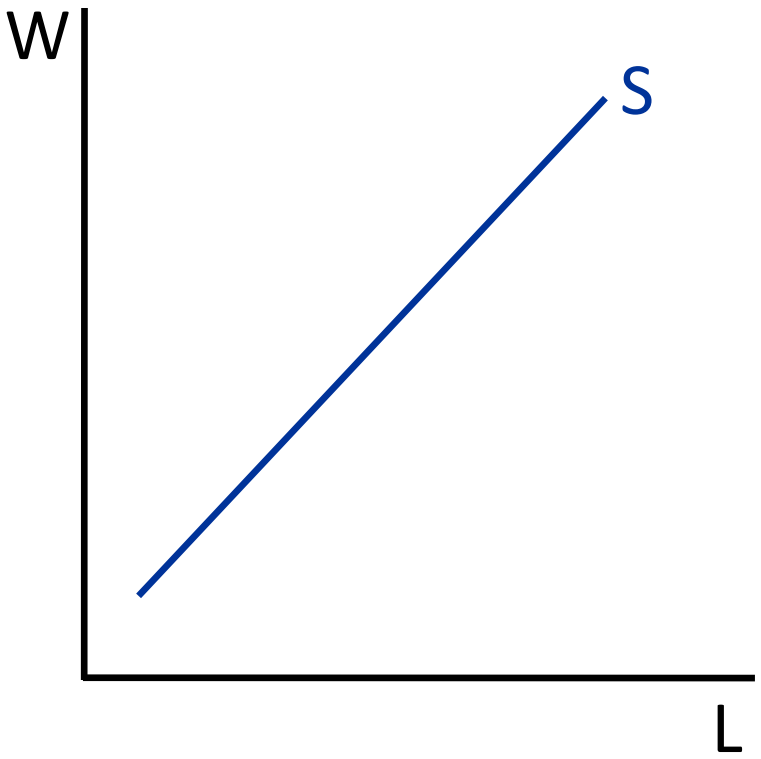


Labor Supply Curves

Individual Household

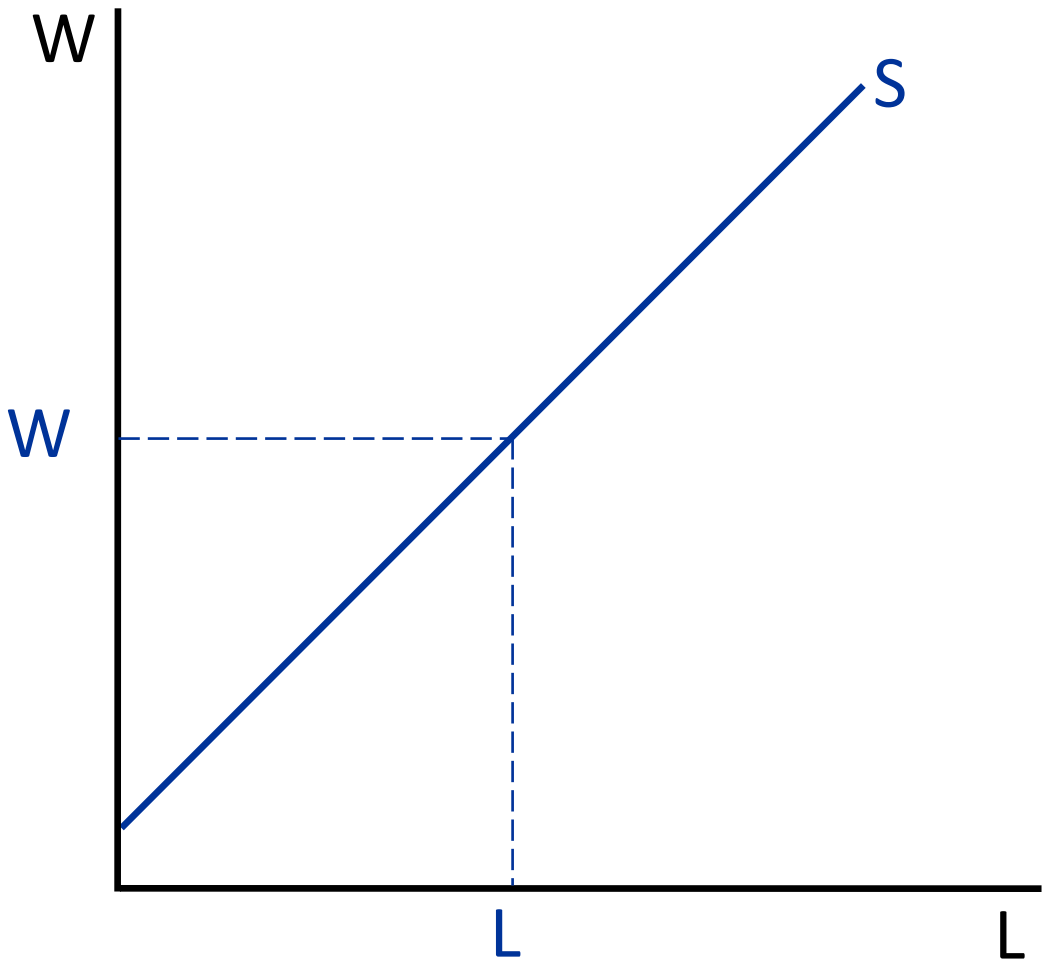


Market



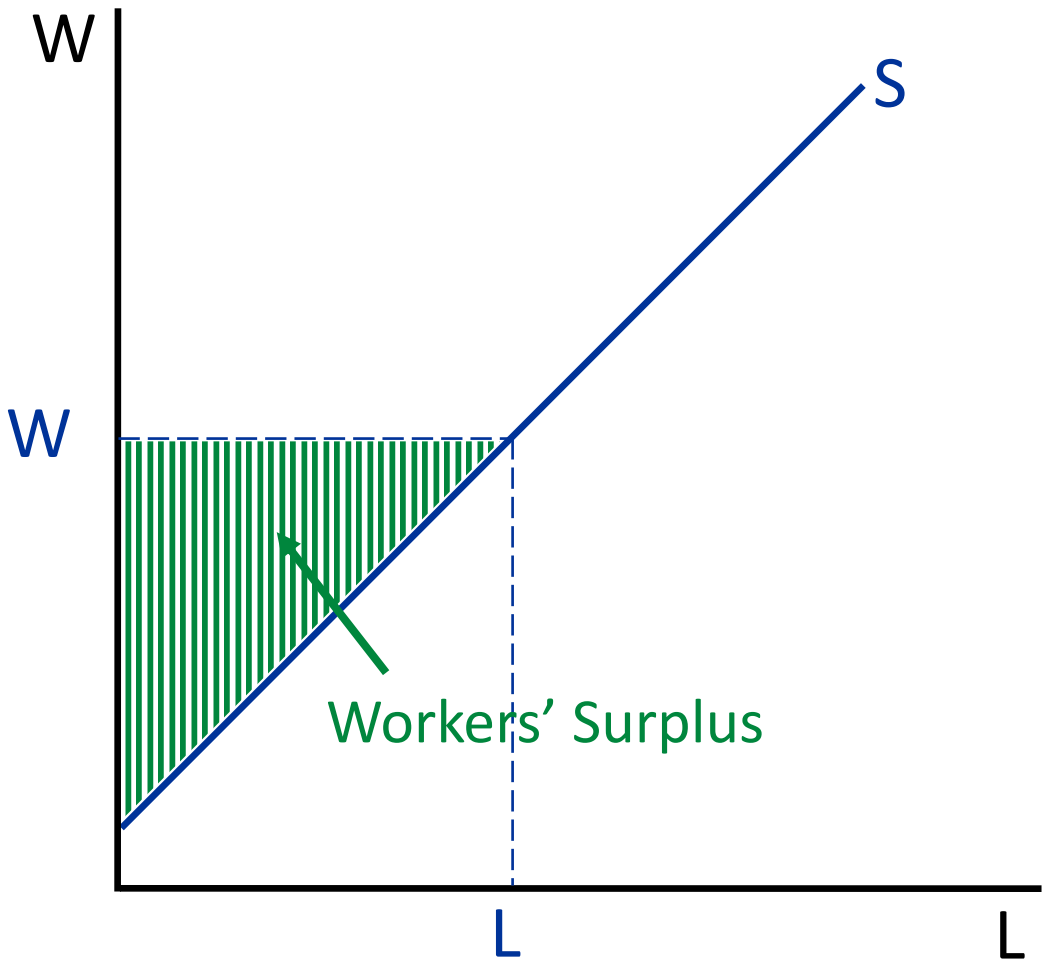
We assume here that labor supply ℓ increases with W but empirically, it could also decrease especially when W becomes very high. Market labor supply L is the **horizontal** sum of all individual labor supply curves.

Labor Supply in Competitive labor market where W is taken as given



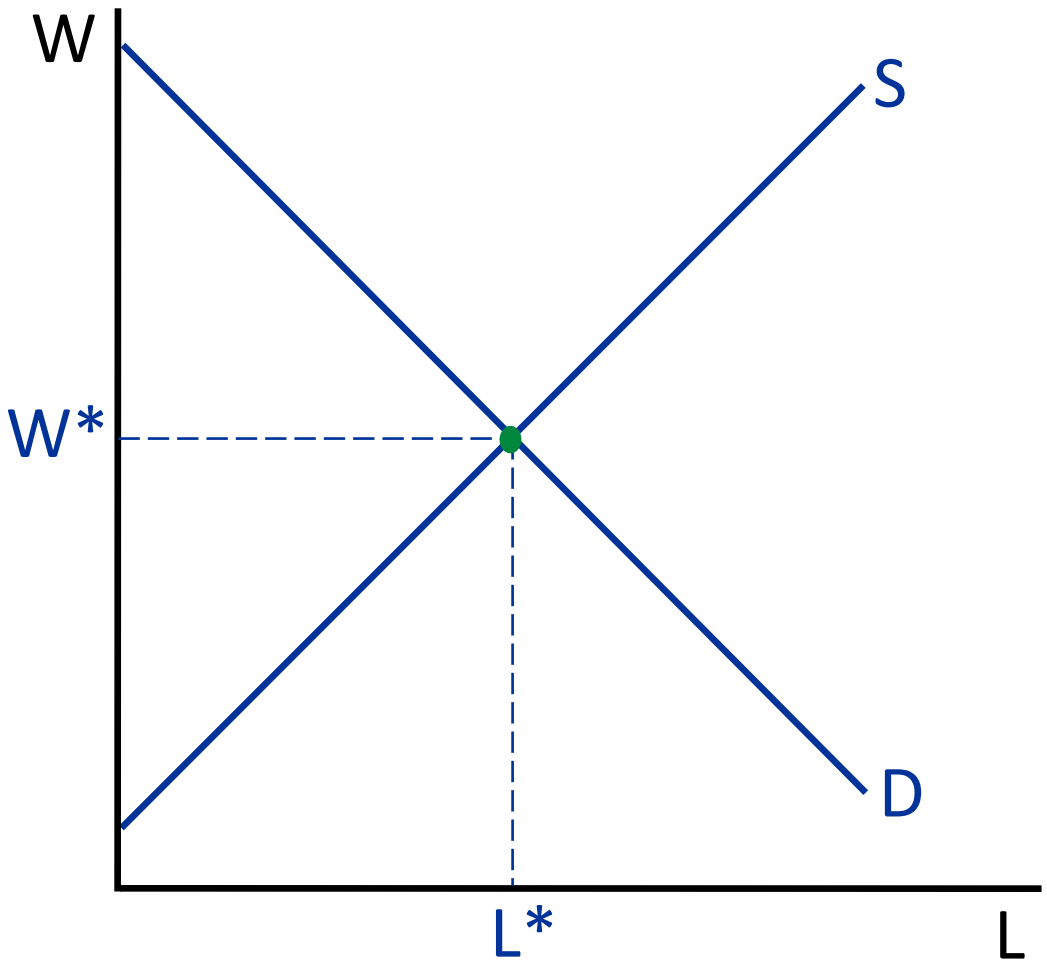
At wage W, L individuals are willing to work. Last worker opportunity cost of work is exactly equal to W

Labor Supply in Aggregate

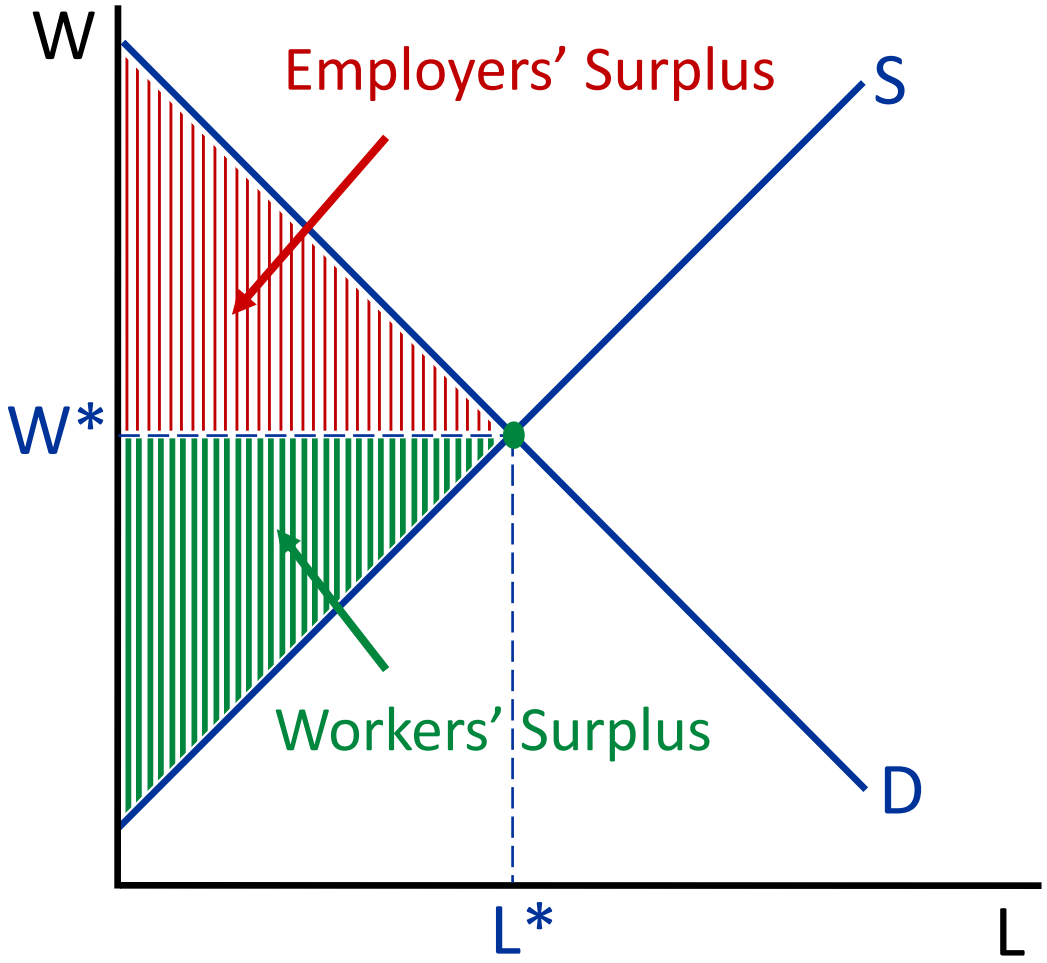


Workers' surplus is green triangle above supply curve and below wage line W.

Equilibrium in the Competitive Labor Market



Equilibrium in the Competitive Labor Market



The competitive equilibrium (W*,L*) is efficient:
it maximizes the sum of employers and workers' surpluses

Non-Competitive Aspects of Labor Market

- Competitive labor market is pretty far from reality
- In practice, wage is often set through a power struggle between employers and employees
- Employer side power: monopsony (analog of monopoly but on the buyers' side) where employer can set the wage
- Employee side power: union can organize workers and set wages that employers have to pay (monopoly on the selling of labor)
  - Example: University of California grad student workers strike in 2022 (organized by Union UAW)

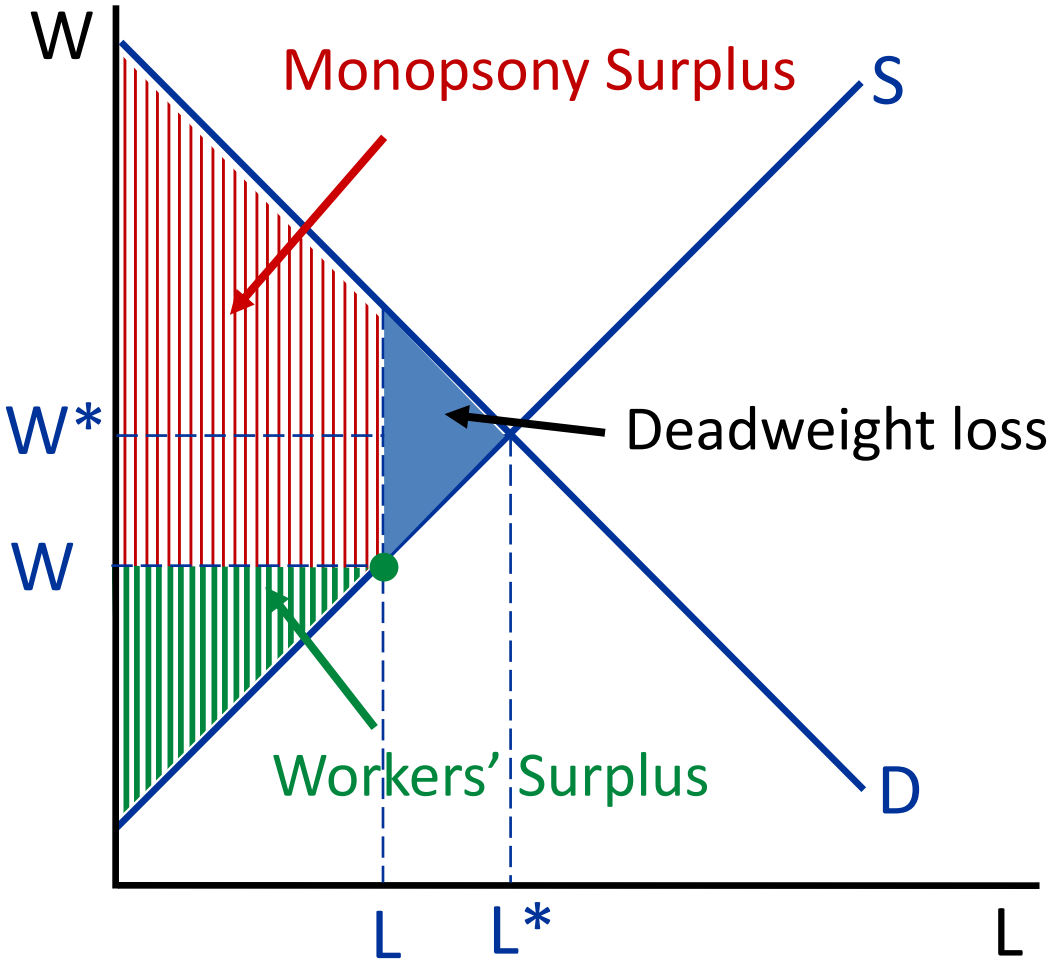
University of California grad student workers

UC grad student workers (48,000 workers) is an example where there is both monopsony power and union power. Students struck successfully in Fall 2022

Monopsony power

- Monopsony formal definition: only 1 employer hires workers on the labor market
- Classical example: only one landlord that local crop workers can work for => landlord sets the wage
- Monopsony firm chooses wage W that maximizes its surplus (=profits) taking into account that the supply of workers increases with W
- Monopsony concept invented by Joan Robinson in the 1930s, earliest famous female economist
- Real world has some monopsony power (concentrated industries, costly to switch firms, non-compete clauses)

Monopsony: employer chooses W to maximize its surplus subject to L=S(W)

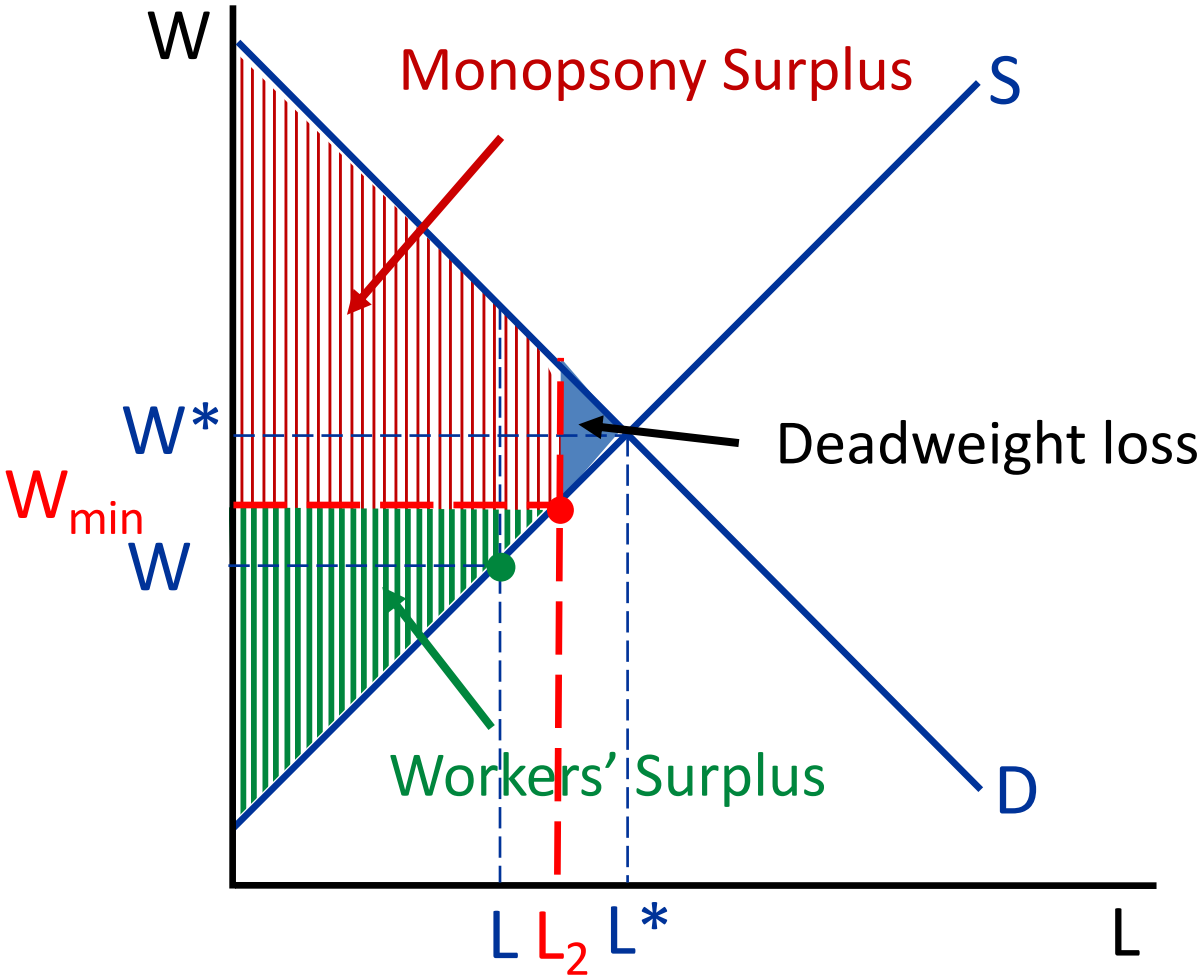


Monopsony chooses W to maximize red area. It squeezes workers' surplus (inequitable) and creates deadweight loss (inefficient)

Monopsony consequences

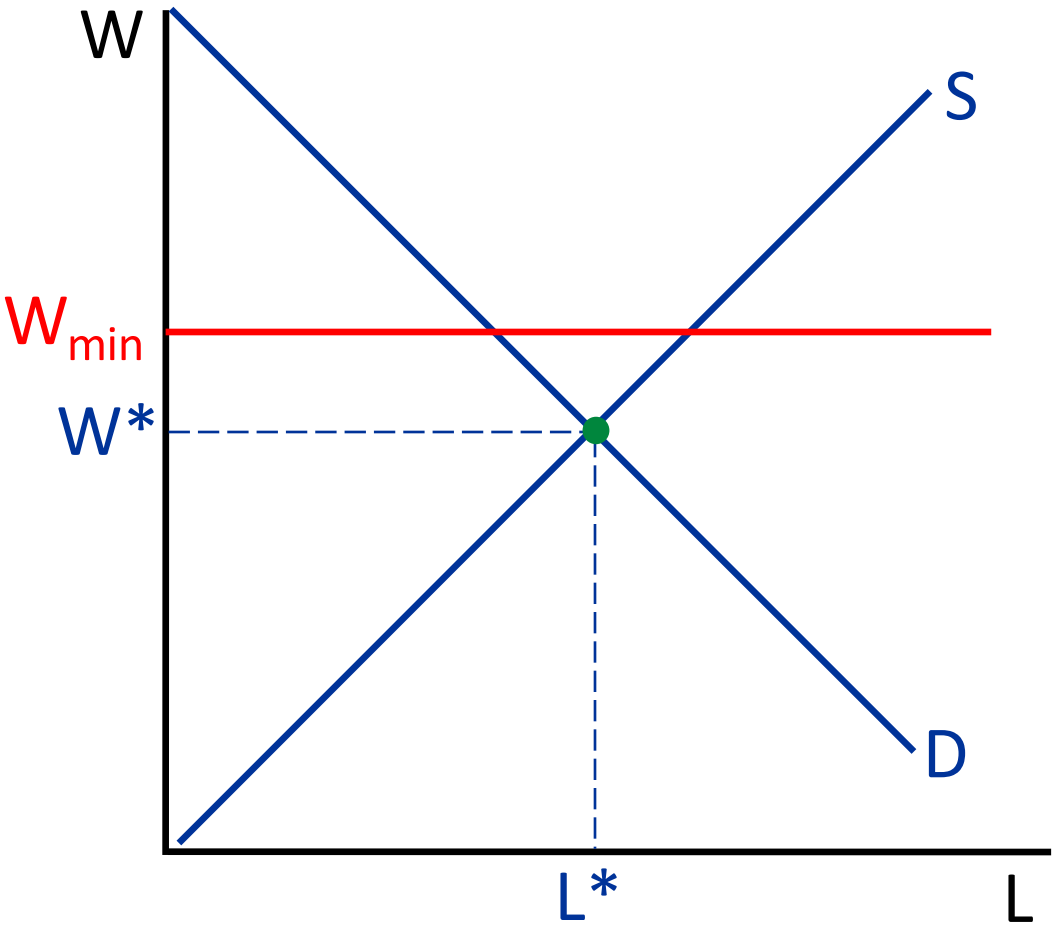
- Monopsony firm sets the wage W too low: Inequitable (as employers typically richer than workers) and Inefficient (workers cut down labor supply below L*)
- Monopsony is very damaging when workers have no other outside options (no other employers, and need the wage to live as in landlord example)
- In practice, most firms have only some monopsony power as workers have other job options: each firm faces a pretty elastic labor supply curve (infinitely so in competitive case)
- In monopsony situation, increasing the wage through a minimum wage legislation increases employment and reduces deadweight loss

Monopsony: Introducing a minimum wage above W is desirable both for equity and efficiency



Minimum wage above W increases workers surplus (equitable), reduces monopsony surplus and also increases L (efficient)

Effect of a Minimum Wage in Competitive Labor Market



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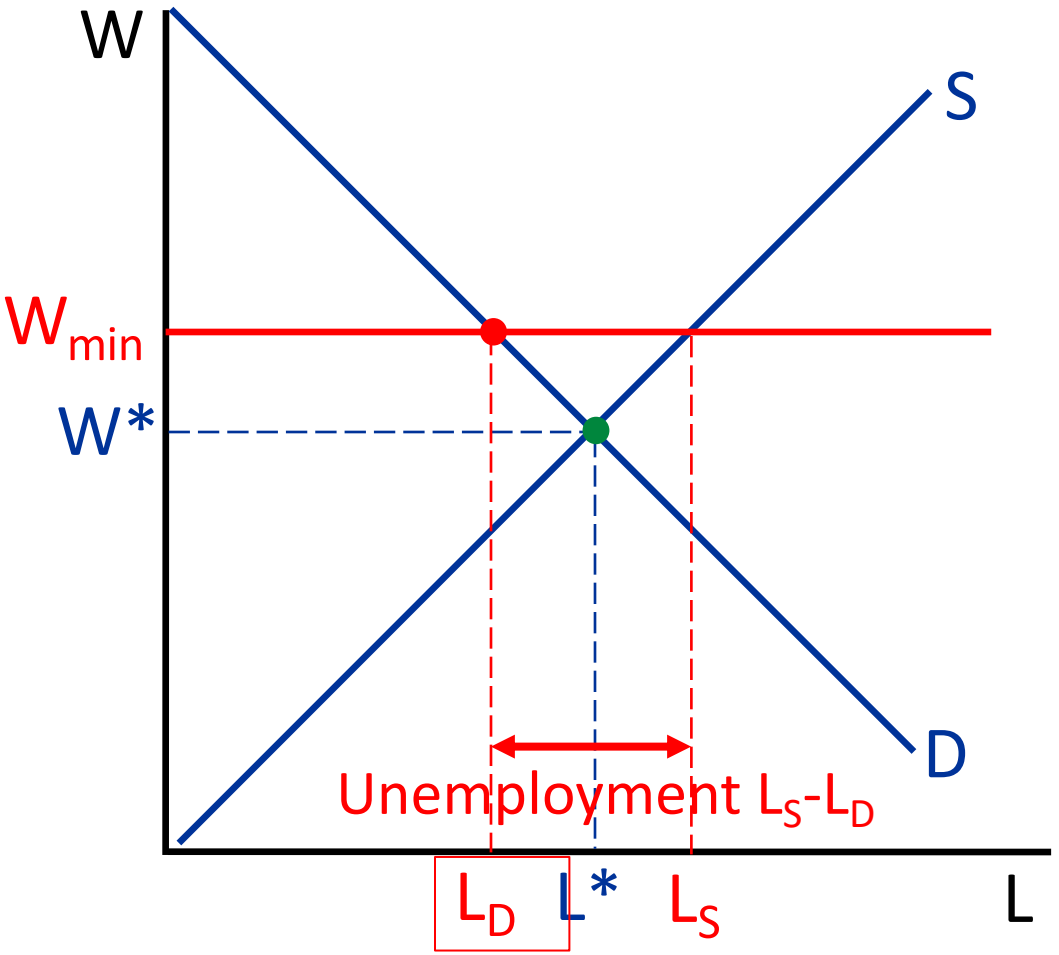


In competitive labor market, minimum wage above W* increases workers' surplus and decreases producers' surplus (equitable) but creates unemployment (inefficient)

Quiz:

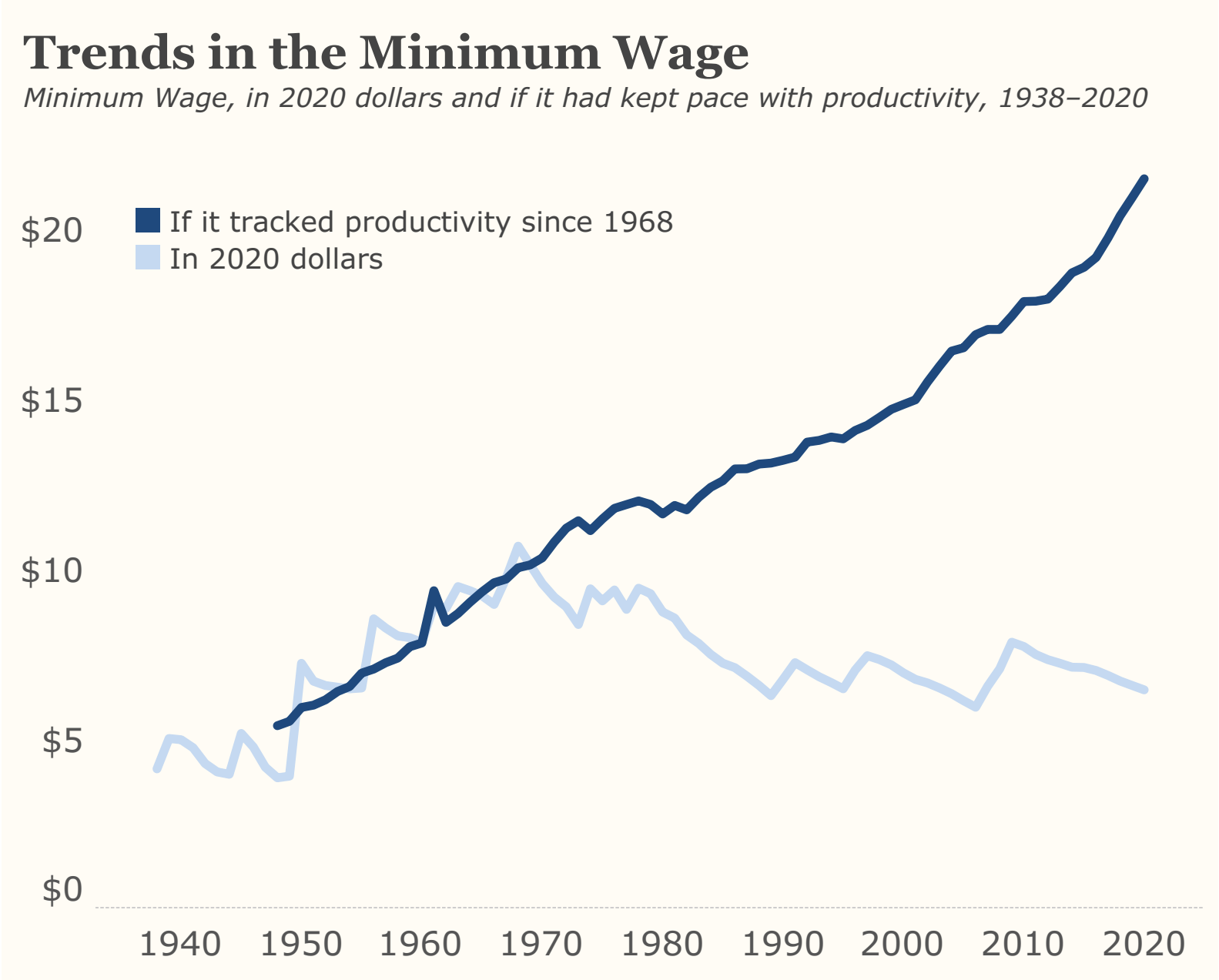
Question: What is true about the minimum wage in the models we saw?

- A. It's a form of price control that always creates inefficiency in competitive markets
- B. It can actually increase efficiency
- C. It's good for workers' surplus
- D. It's bad for producers' surplus
- E. All of A, B, C, D.

Minimum wage

- Most countries have minimum wages
  - Pro: increases pay of low skill workers
  - Cons: concern that it might increase unemployment
- US has very low Federal min wage of $7.25/hour (used to be much higher relative to average pay)
- States, Cities can have higher min wages: CA has $16/hour. Berkeley $18.7/hour (close to highest in US)
- Empirical evidence: minimum wage has small or no effects on employment: min wage reduces turnover of employees and firms pass on extra cost to their consumers

US Federal Min Wage has not kept up



Minimum wage and employment evidence

- Card and Krueger (1994): in April 1992 New Jersey (NJ) raised minimum wage from $4.25 to $5.05 but Pennsylvania's (PA) was unchanged at $4.25.

- Compare effect on fast food restaurants in NJ and eastern PA by surveying 400 restaurants before and after the NJ min wage increase. Difference-in-difference estimate.

- Find that rise in min wage increased employment in NJ fast-food restaurants (relative to PA). Supports the monopsony model and invalidates the competitive model.

- Generated a lot of controversy. Huge literature since then has largely found that minimum wage has generally not much impact on employment

TABLE 3—AVERAGE EMPLOYMENT PER STORE BEFORE AND AFTER THE RISE IN NEW JERSEY MINIMUM WAGE

	Stores by state			Stores in New Jersey[a]			Differences within NJ[b]	
Variable	PA (i)	NJ (ii)	Difference, NJ − PA (iii)	Wage = $4.25 (iv)	Wage = $4.26–$4.99 (v)	Wage ≥ $5.00 (vi)	Low–high (vii)	Midrange–high (viii)
1. FTE employment before, all available observations	23.33 (1.35)	20.44 (0.51)	−2.89 (1.44)	19.56 (0.77)	20.08 (0.84)	22.25 (1.14)	−2.69 (1.37)	−2.17 (1.41)
2. FTE employment after, all available observations	21.17 (0.94)	21.03 (0.52)	−0.14 (1.07)	20.88 (1.01)	20.96 (0.76)	20.21 (1.03)	0.67 (1.44)	0.75 (1.27)
3. Change in mean FTE employment	−2.16 (1.25)	0.59 (0.54)	2.76 (1.36)	1.32 (0.95)	0.87 (0.84)	−2.04 (1.14)	3.36 (1.48)	2.91 (1.41)
4. Change in mean FTE employment, balanced sample of stores[c]	−2.28 (1.25)	0.47 (0.48)	2.75 (1.34)	1.21 (0.82)	0.71 (0.69)	−2.16 (1.01)	3.36 (1.30)	2.87 (1.22)
5. Change in mean FTE employment, setting FTE at temporarily closed stores to 0[d]	−2.28 (1.25)	0.23 (0.49)	2.51 (1.35)	0.90 (0.87)	0.49 (0.69)	−2.39 (1.02)	3.29 (1.34)	2.88 (1.23)

Notes: Standard errors are shown in parentheses. The sample consists of all stores with available data on employment. FTE (full-time-equivalent) employment counts each part-time worker as half a full-time worker. Employment at six closed stores is set to zero. Employment at four temporarily closed stores is treated as missing.

[a]Stores in New Jersey were classified by whether starting wage in wave 1 equals $4.25 per hour ($N = 101$), is between $4.26 and $4.99 per hour ($N = 140$), or is $5.00 per hour or higher ($N = 73$).

[b]Difference in employment between low-wage ($4.25 per hour) and high-wage (≥ $5.00 per hour) stores; and difference in employment between midrange ($4.26–$4.99 per hour) and high-wage stores.

[c]Subset of stores with available employment data in wave 1 and wave 2.

[d]In this row only, wave-2 employment at four temporarily closed stores is set to 0. Employment changes are based on the subset of stores with available employment data in wave 1 and wave 2.

Card and Krueger (1994): in April 1992 New Jersey (NJ) raised minimum wage from $4.25 to $5.05 but Pennsylvania's (PA) was unchanged at $4.25. # workers/fastfood increased slightly in NJ and decreased in PA: consistent with monopsony

Vote on minimum wage increase

- California Proposition 32 in November 2024 elections: Increases CA minimum wage by $2 (from $16 to $18 in 2025) and indexes it to cost-of-living after. Do you support this?

A. Yes, I want all workers to have living wages.

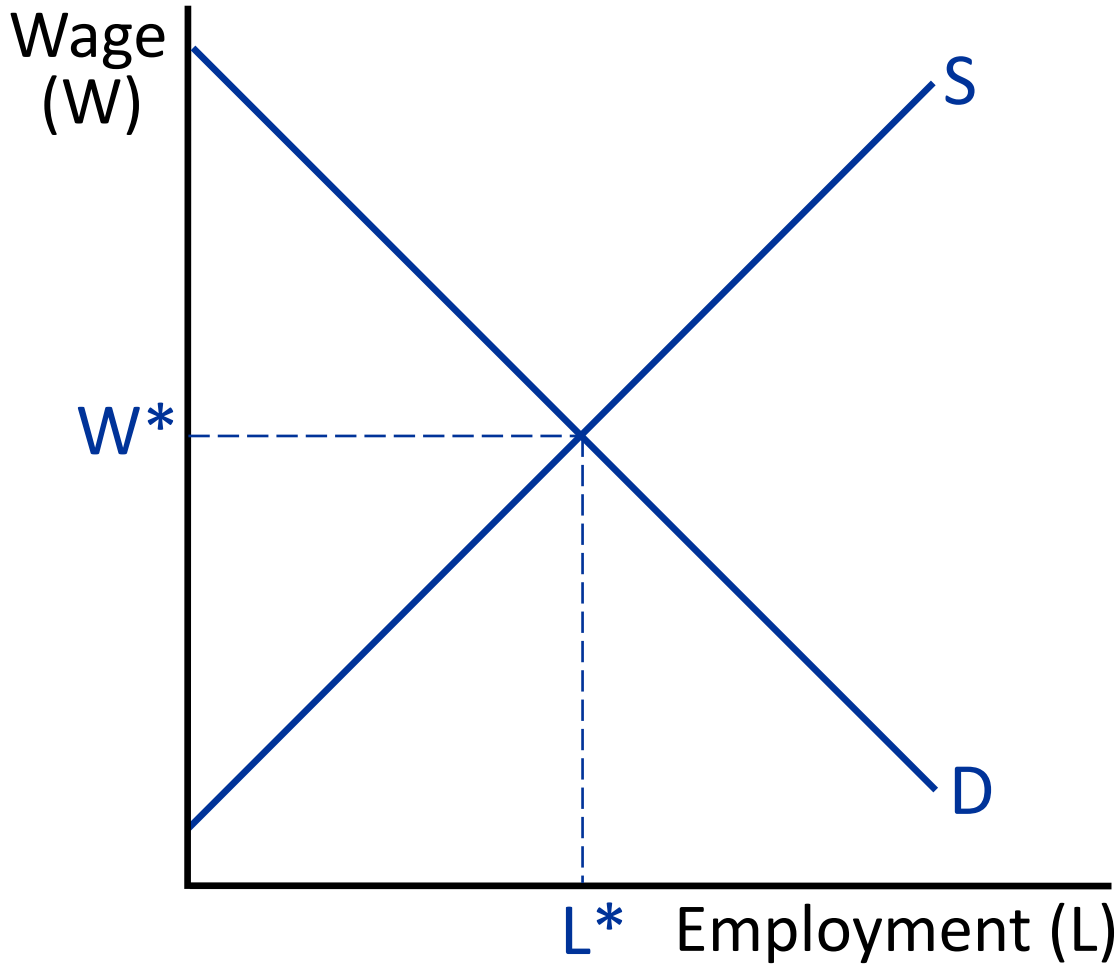
B. Yes, it prevents employers from exploiting their workers

C. No, it hurts the profits of employers.

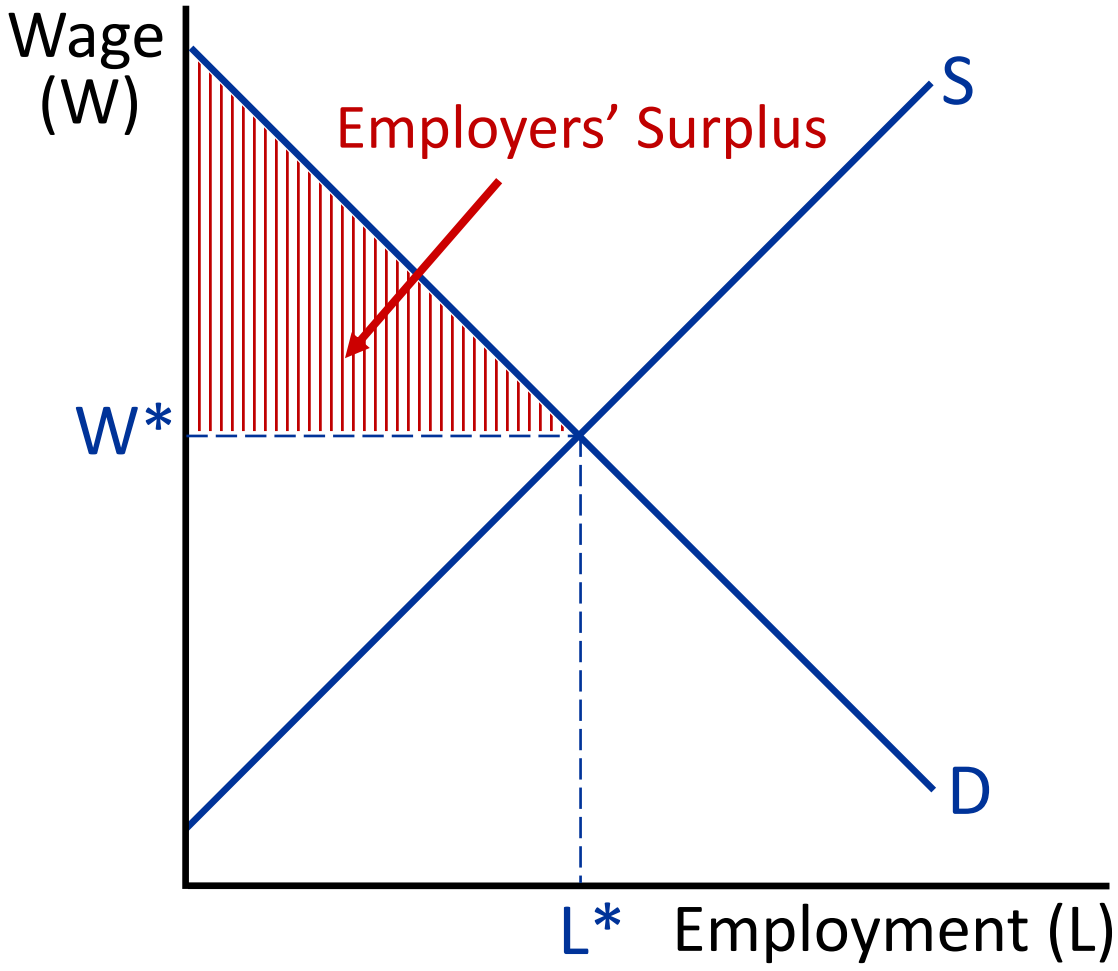
D. No, it interferes with the working of the free market

E. I don't care because Berkeley has a higher min wage

Equilibrium in the Competitive Labor Market

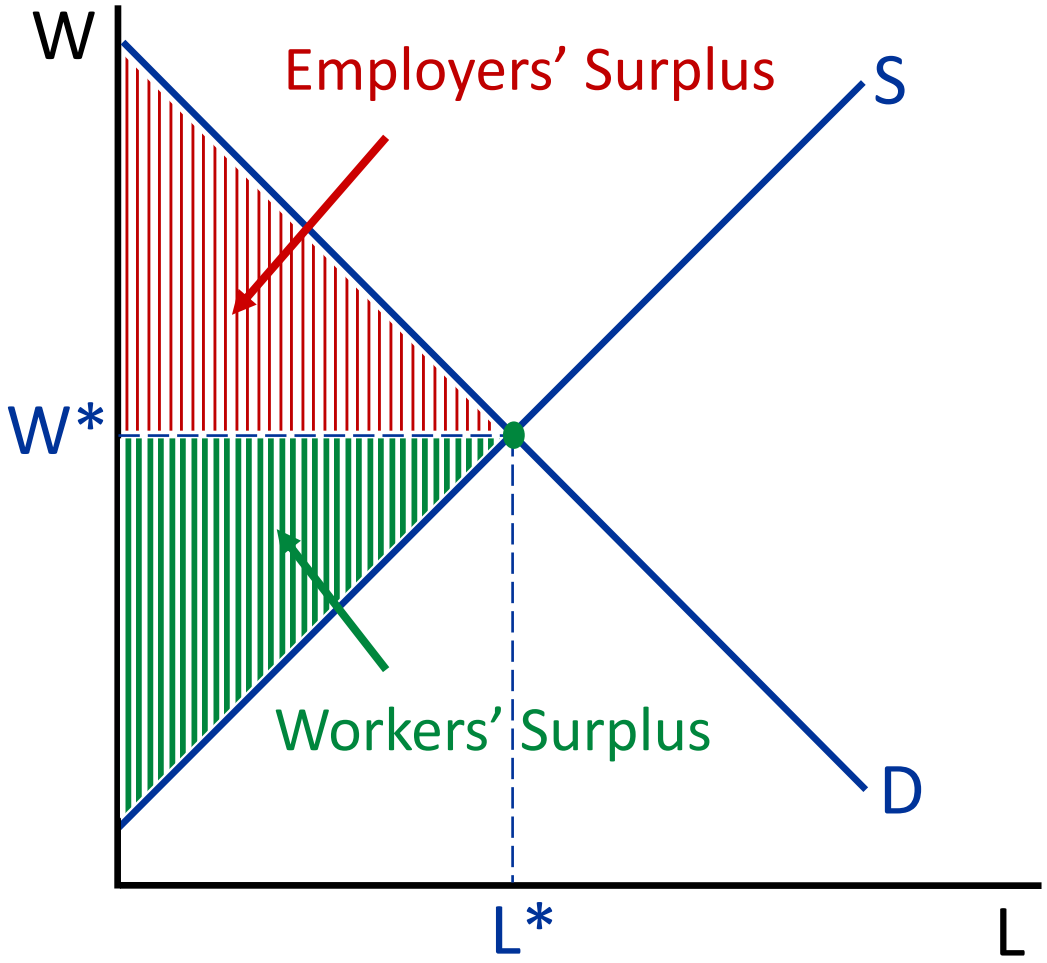


Producer surplus



Employers get surplus (profits) from employing workers at wage W because all but the last worker have a mrp_L above W.

Producer and Employer Surplus

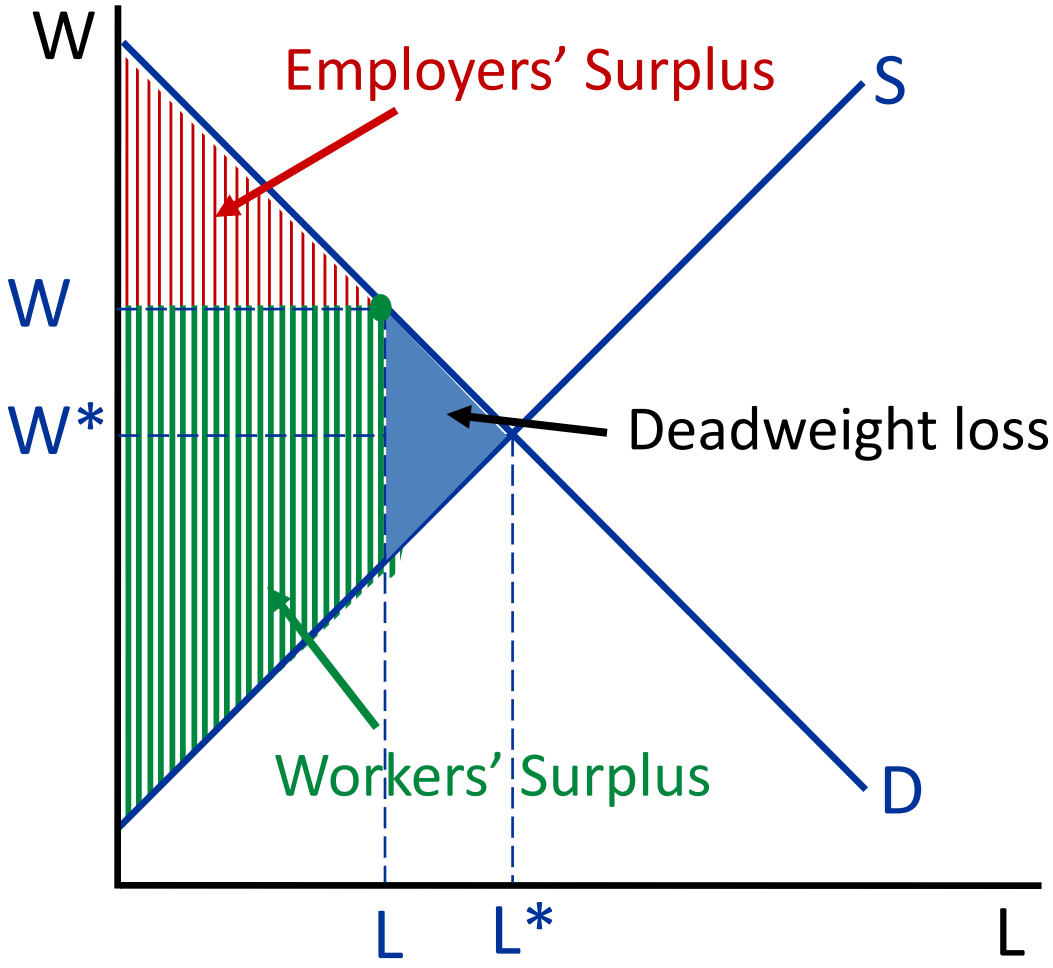


The competitive equilibrium (W*,L*) is efficient:
it maximizes the sum of employers and workers' surpluses

Union power

- Union: workers organize as a single agent through a union. Employers can only hire workers through the union
- Union chooses wage W that maximizes surplus of workers taking into account that labor demand decreases with W. Conceptually, union is a monopoly that sells labor to firms.
- Union power depends a lot on legislation (how easy it is to unionize, funding of unions). In US, union power rose during the 1930s (New Deal) and has declined a lot since 1980 (Reagan). Less decline in Europe.
- Firms typically dislike unions because they force them to take into account workers' welfare instead of only profits

Union monopoly chooses W to maximize workers' surplus subject to L=D(W)



Union squeezes employers' surplus (equitable) and creates deadweight loss (inefficient)

Poll on Unions

Poll: What best fits your views on Unions?

A. I dislike Unions because they interfere with the working of the free market and create deadweight loss

B. I dislike Unions because they hurt the profits of employers

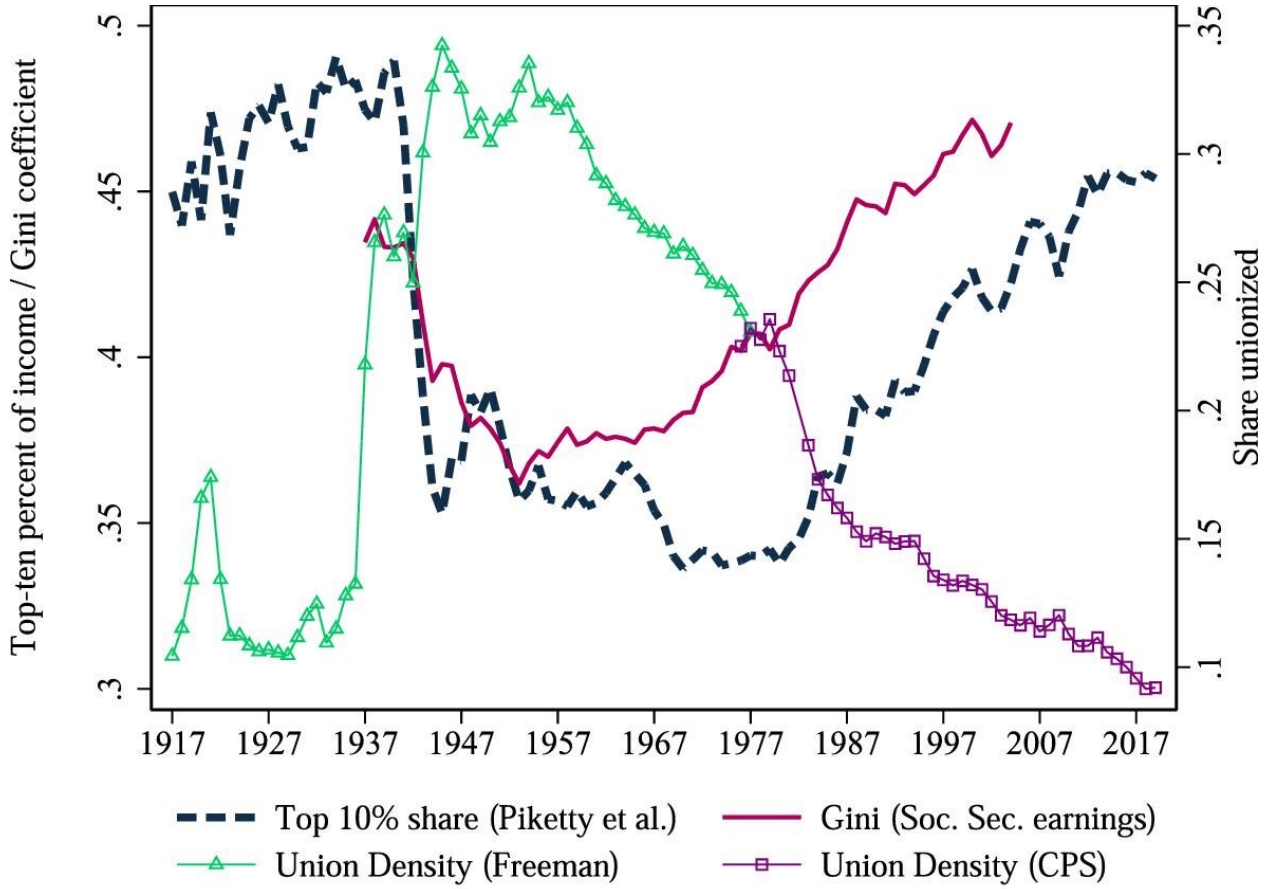
C. I like Unions because they help workers get better pay

D. I like Unions because they prevent employers from exploiting their workers

Firms' vs. workers' power in the labor market

- Real world has both monopsony power on the employer side and union power on the workers' side
- If wages are high and profits are low then workers have more power than firms.
- If wages are low and profits are high then firms likely have more power than workers.
- Unbalanced power always leads to too little employment (as workers can't be forced to work, and employers can't be forced to hire)
- Empirically, unions reduce inequality. Not much effect on macro employment but reduce long hours per worker

Figure I Union Density and Inequality Measures, 1917–2019
Top-share individual income inequality is from Piketty, ...



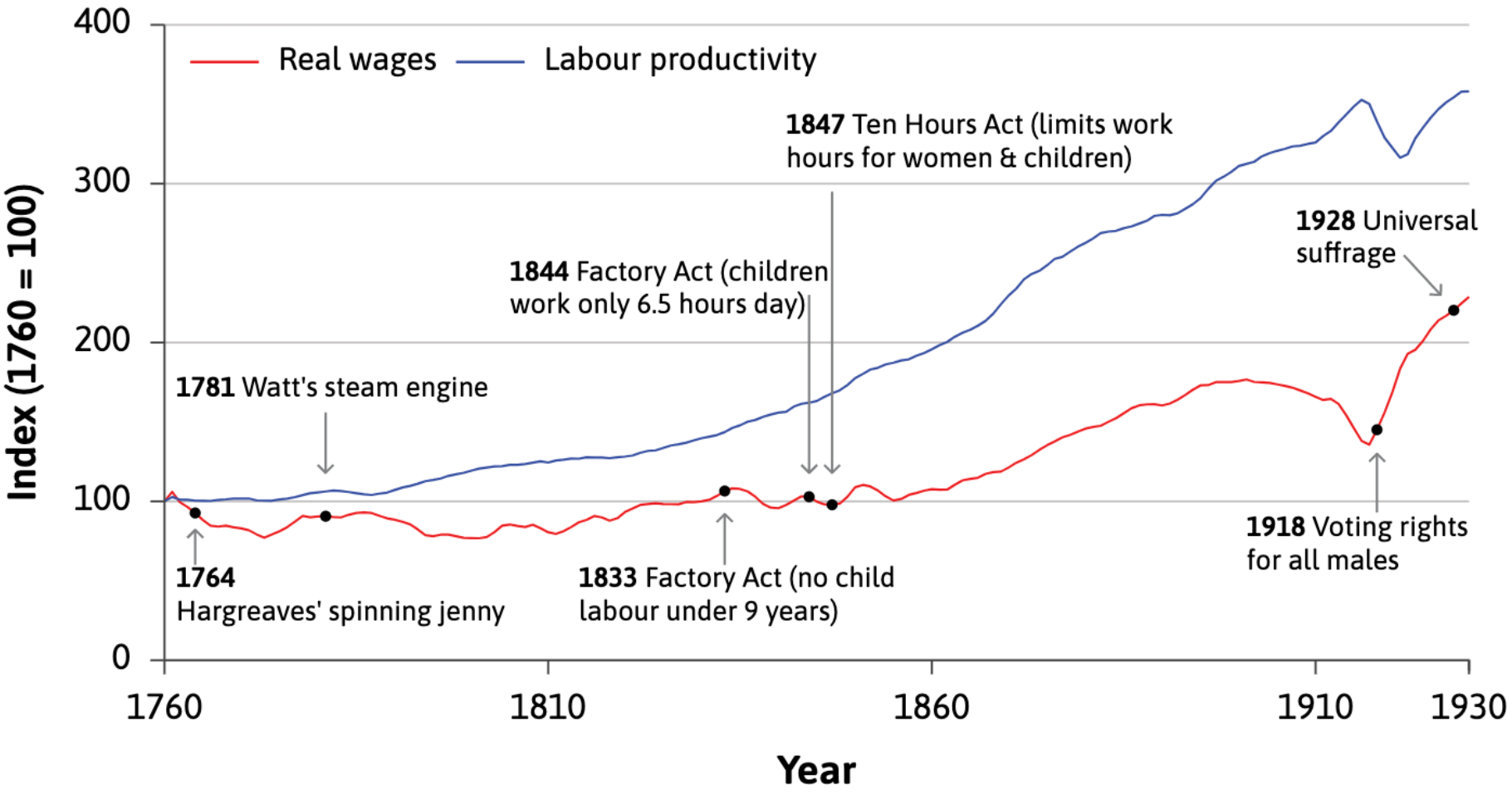
Q J Econ, Volume 136, Issue 3, August 2021, Pages 1325–1385, https://doi.org/10.1093/qje/qjab012

IV. Social Determinants of Labor Market

Social determinants of labor supply

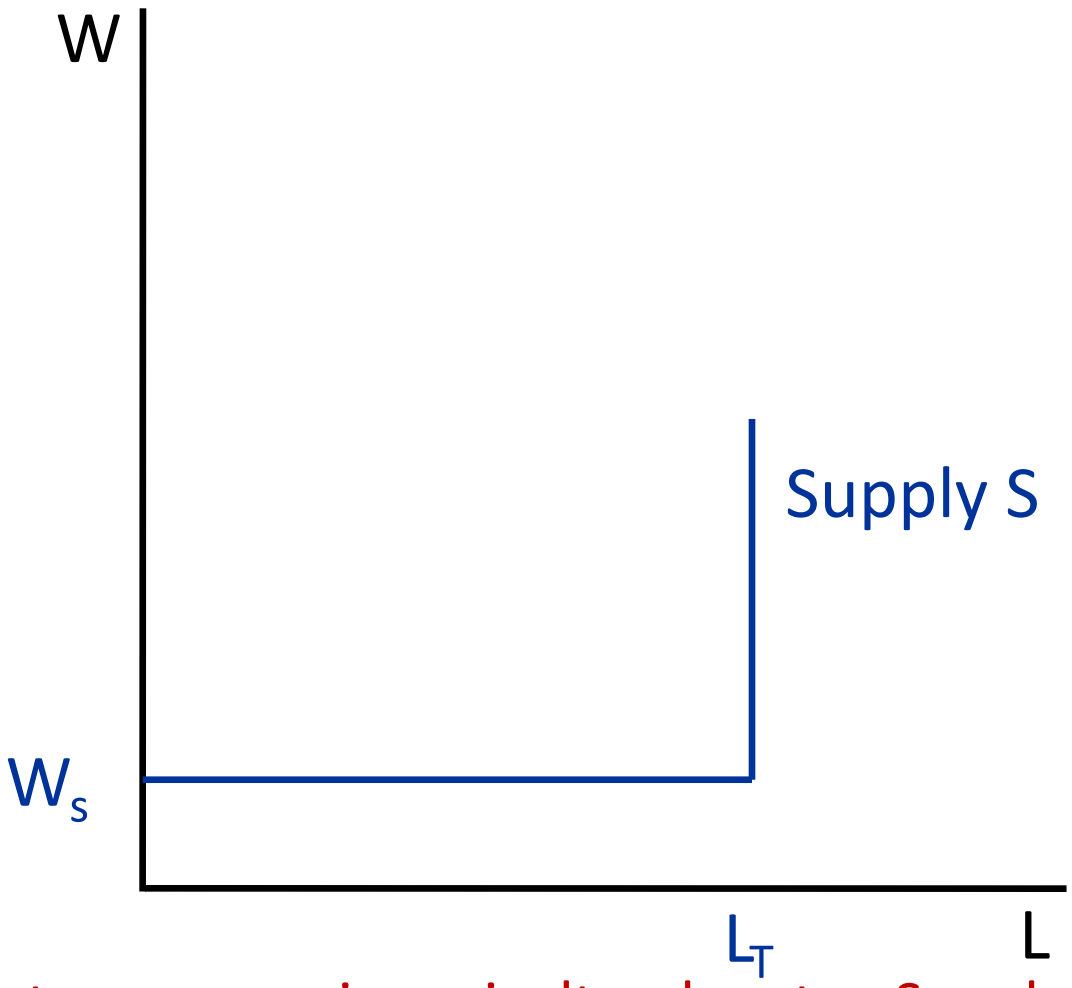
- Early industrialization: long-hours and low pay. Pay eventually catches up with productivity.
- Hours of work regulated by union agreements, then overtime and vacation mandates
- Youth labor is regulated by labor laws/education mandates
- Old age labor regulated by retirement programs
- Female market labor driven by norms + child care policy

British Industrialization: Real wage vs. Production per worker



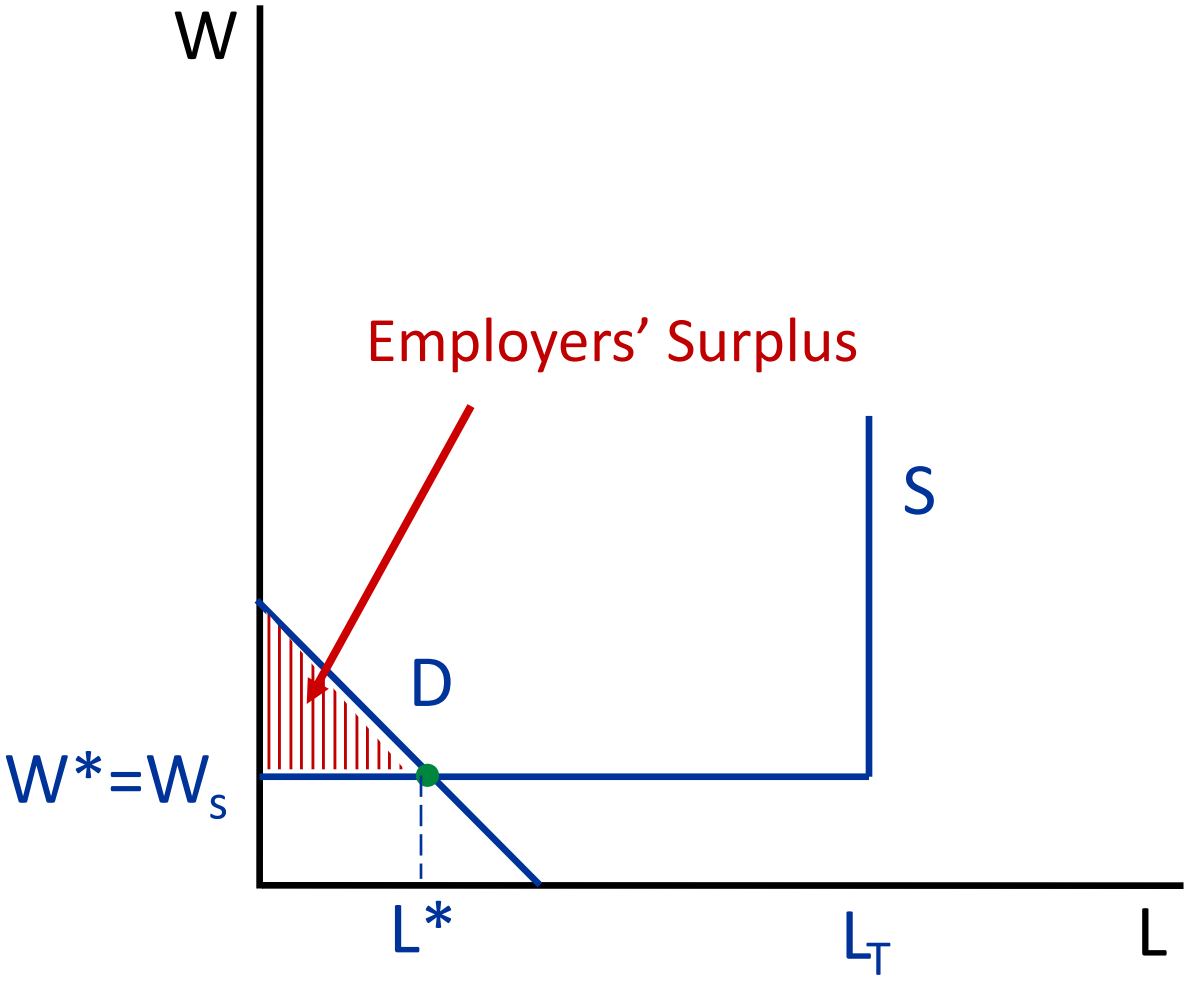
Source is Allen (2001). Wages lag behind productivity for 50 years in first industrialization

From subsistence work to industrialization: Supply curve of workers for industry



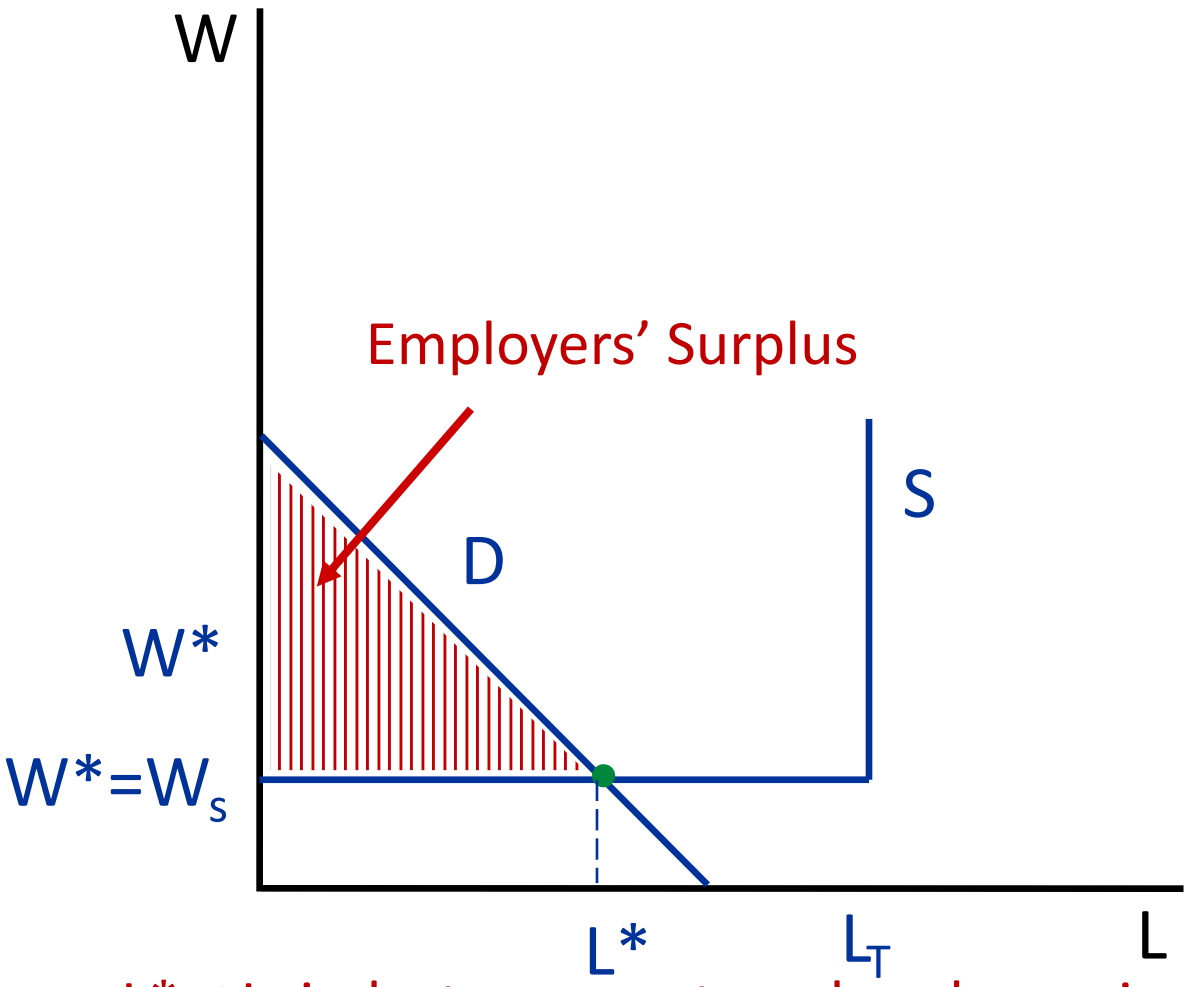
W_s is subsistence wage in agricultural sector. Supply curve is flat at W_s up to L_T (no subsistence workers left)

Industrialization and Wages: Labor Demand in Industrial Sector Appears



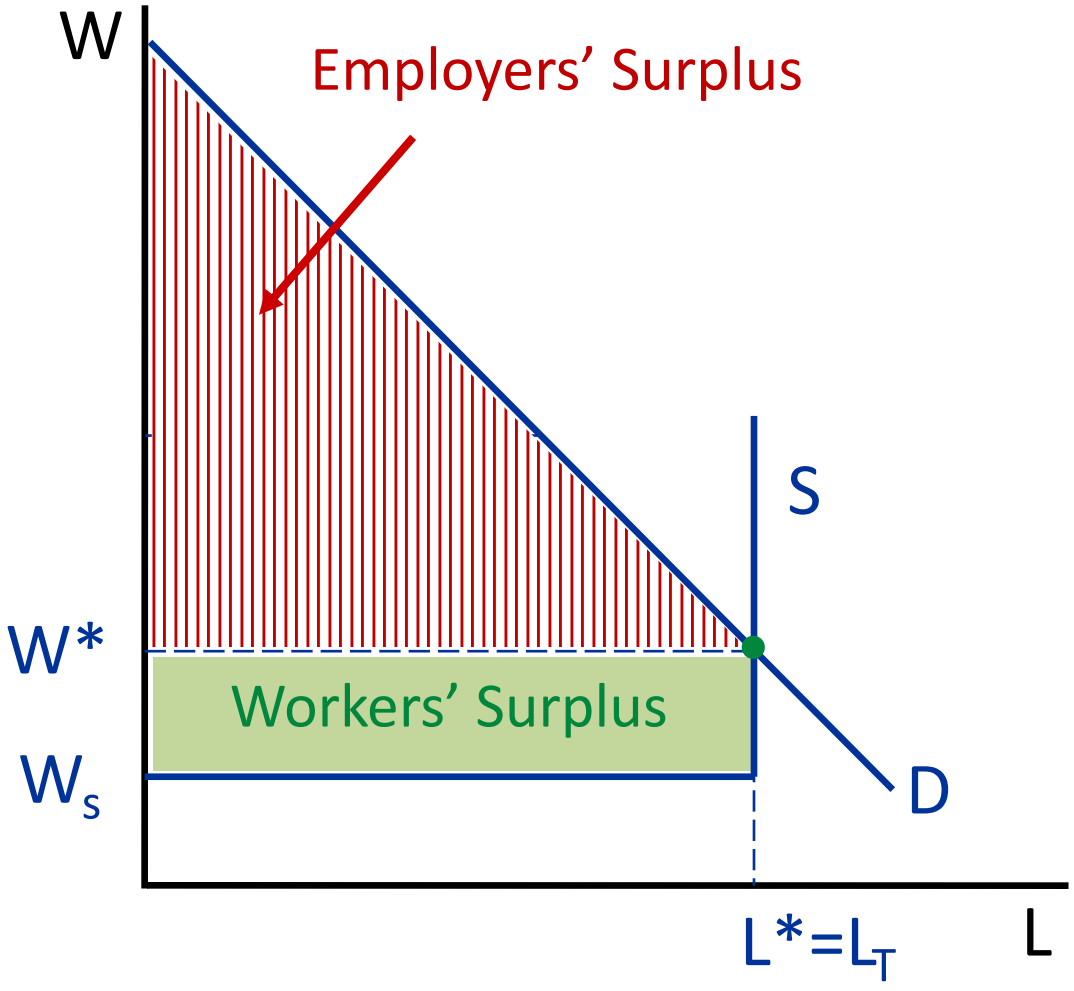
Industry can get workers by paying subsistence wage W_s

Industrialization and Wages: Industry becomes more productive and grows



As long as $L^* \leq L_T$, industry can get workers by paying subsistence wage W_s

Industrialization and Wages: Labor Demand in Industrial Sector Expands



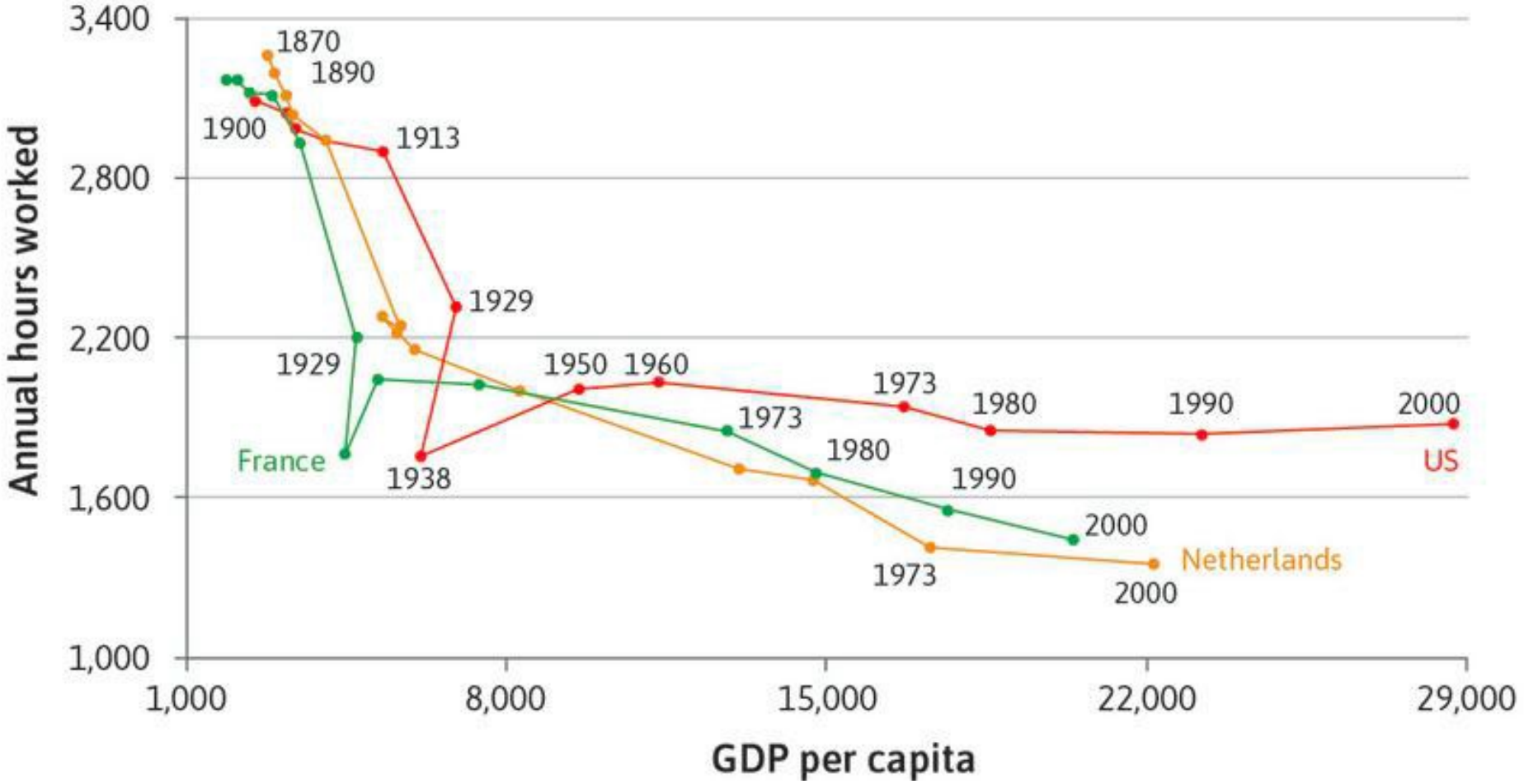
Wage goes above W_s only after there are no subsistence workers left

Quiz:

Question: Why are workers failing to get any gain from industrialization early on in the model?

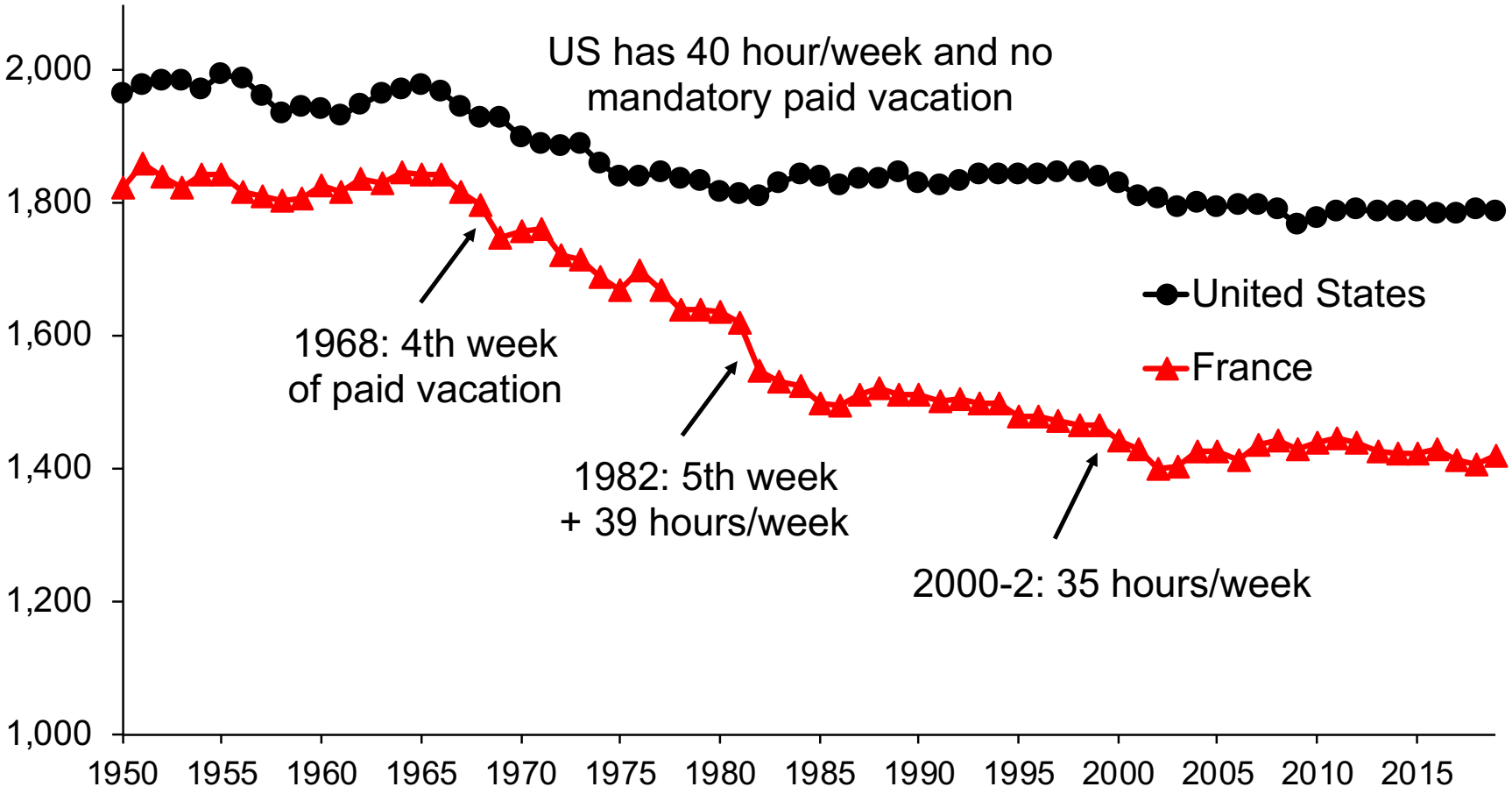
- A. Because industrialists are exploiting them
- B. Because the new industry is competitive
- C. Because there are subsistence workers in agriculture
- D. All of the above
- E. None of the above

Decline of hours of work in the long-run: 40h/week=2000h/year



Average Annual Hours of Work of Employees

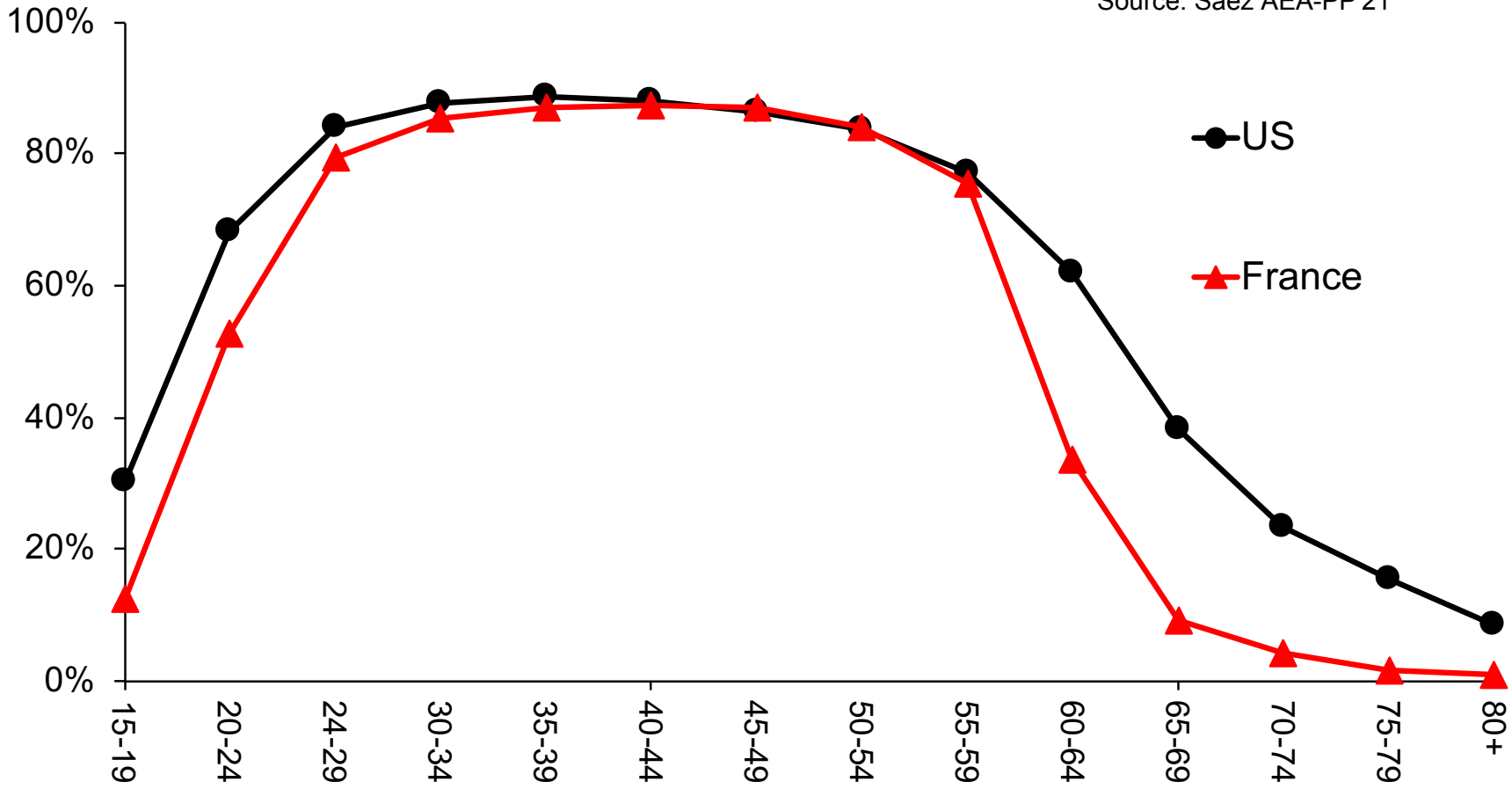
Source: Saez AEA-PP'21



Source: OECD database online. Includes all ages, genders, and part-time, full-time, overtime.

Employment Rates of Men by Age, 2019

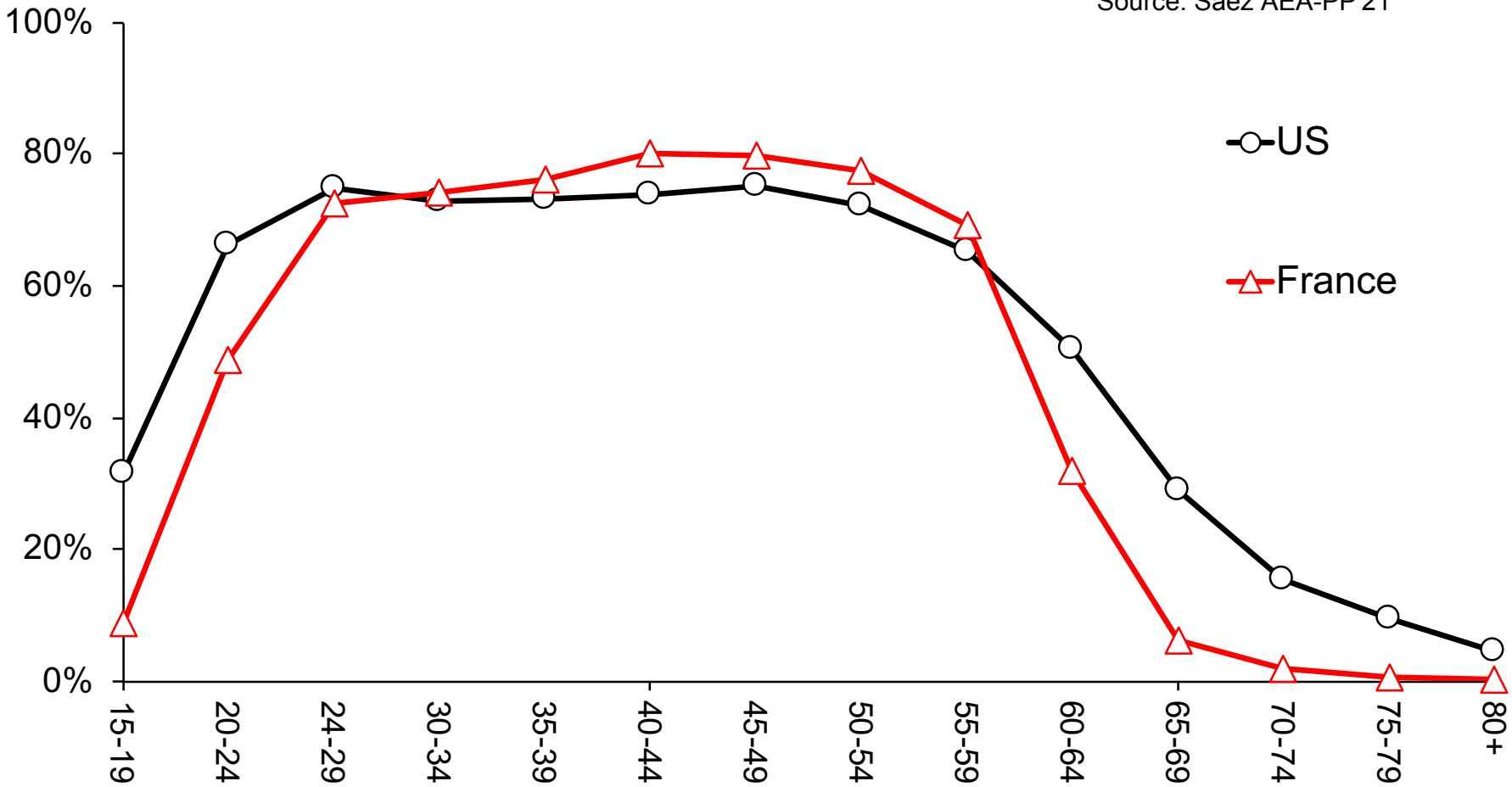
Source: Saez AEA-PP'21



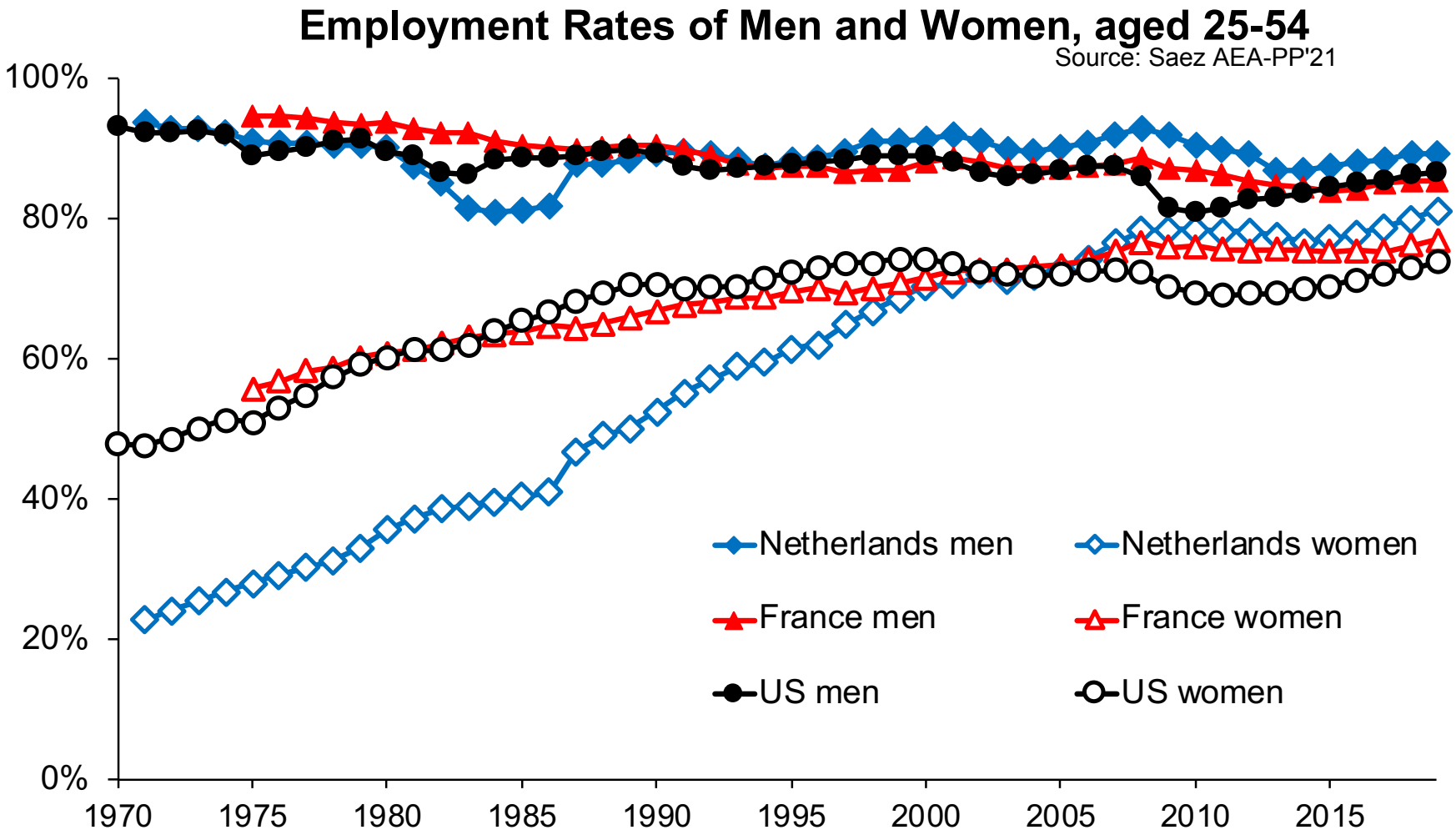
Source: OECD database online. Employment to population ratios.

Employment Rates of Women by Age, 2019

Source: Saez AEA-PP'21



Source: OECD database online. Employment to population ratios.



Source: OECD database online.

Quiz:

Question: With economic development, who do you think humans should work less to enjoy more leisure or harder to take advantage of their increased productivity?

- A. We should work less
- B. We should work the same
- C. We should work more

V. Examples of Labor Market Analysis

Example 1: Increase in Machines or Technological Progress

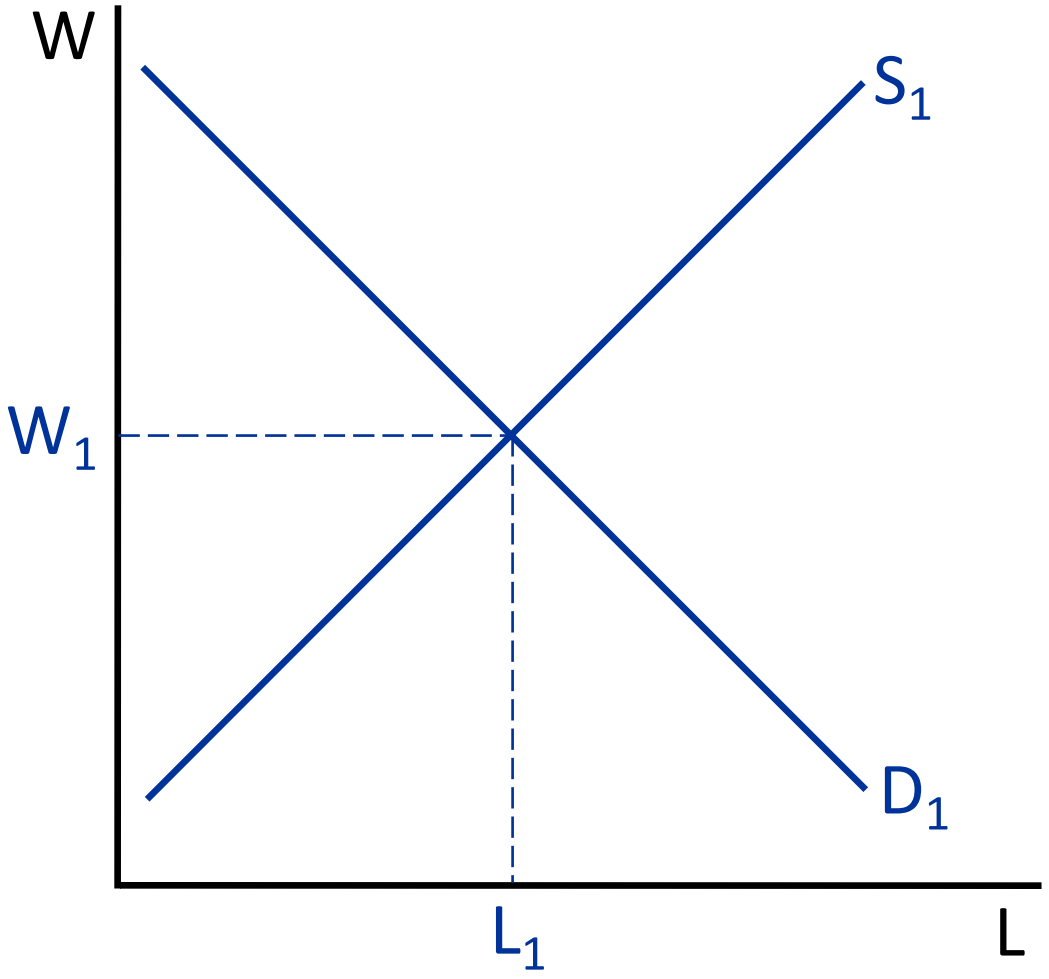
- Consider the market for high-skilled workers.
- Computer technology spread rapidly across many industries in the late 1980s and 1990s.
- What would you expect this to do to the employment and wages of high-skilled workers whose jobs use computers (such as architects, engineers, and scientists)?

Example 1: Increase in Machines or Technological Progress (continued)

- The addition of machines or technological progress (or, often, both together) will increase the MP_L.
- This implies that the labor demand curve shifts out.
- Wages and employment of workers using the machines will rise.

Effect of an Increase in Capital (Computers)

Market for High-Skilled Workers



Effect of an Increase in Capital (Computers)

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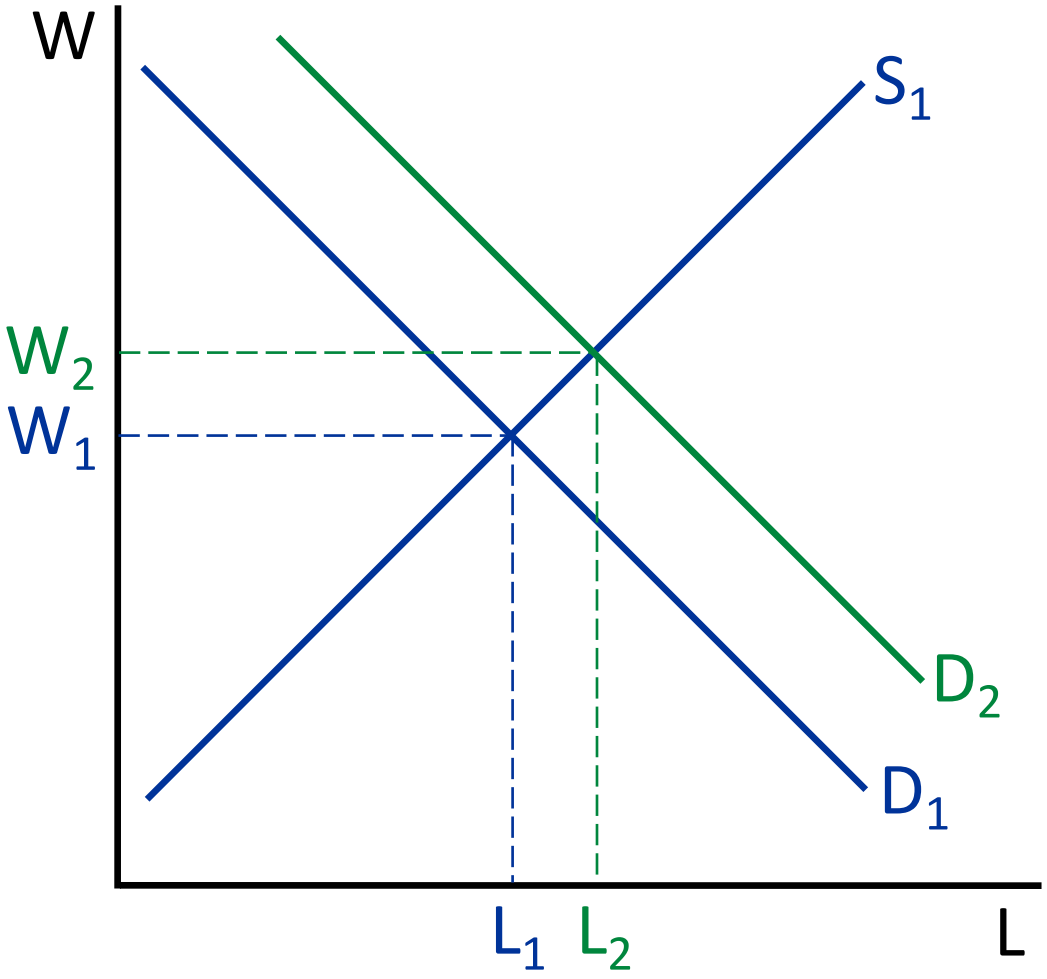
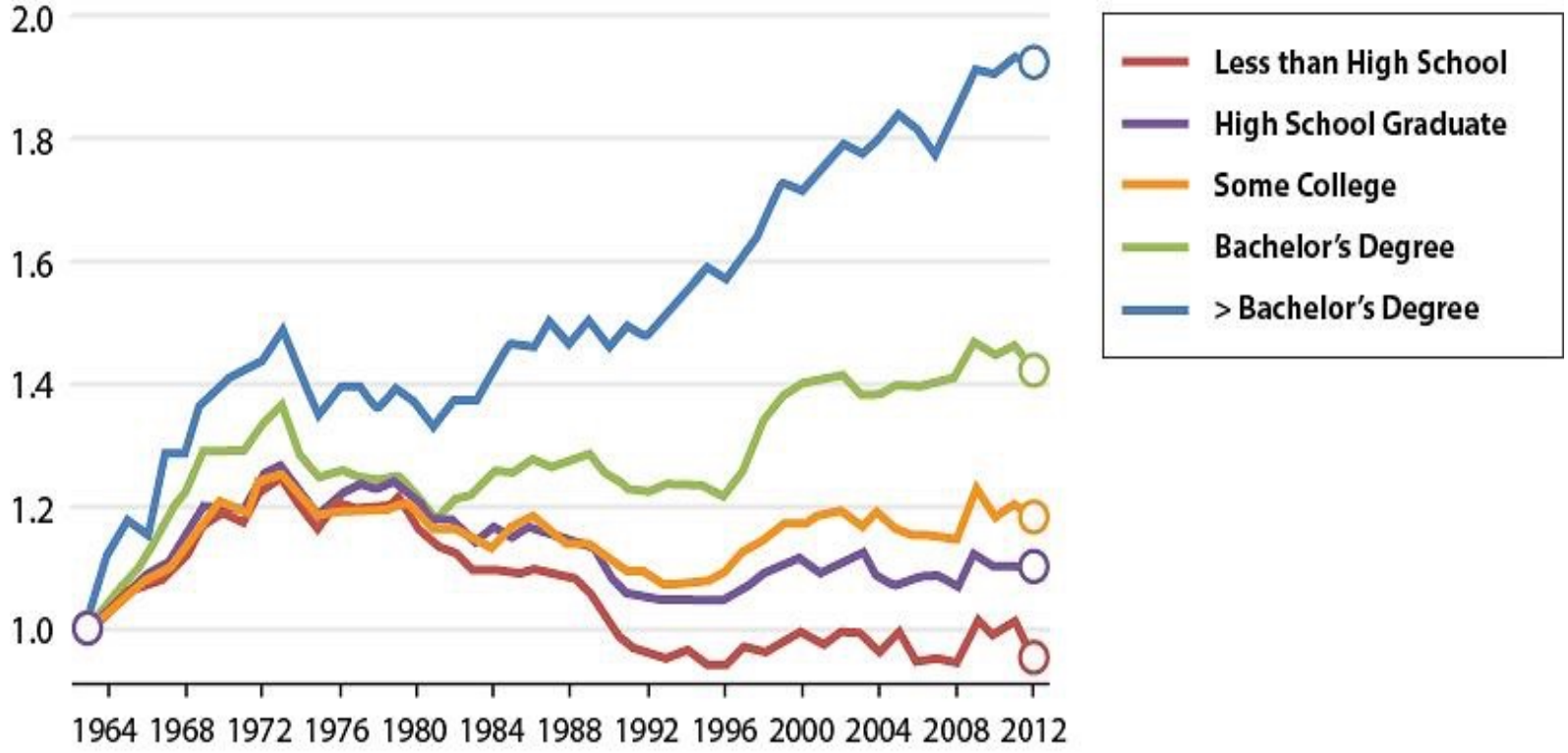


Real Wages of Full-Time Male Workers by Educational Level



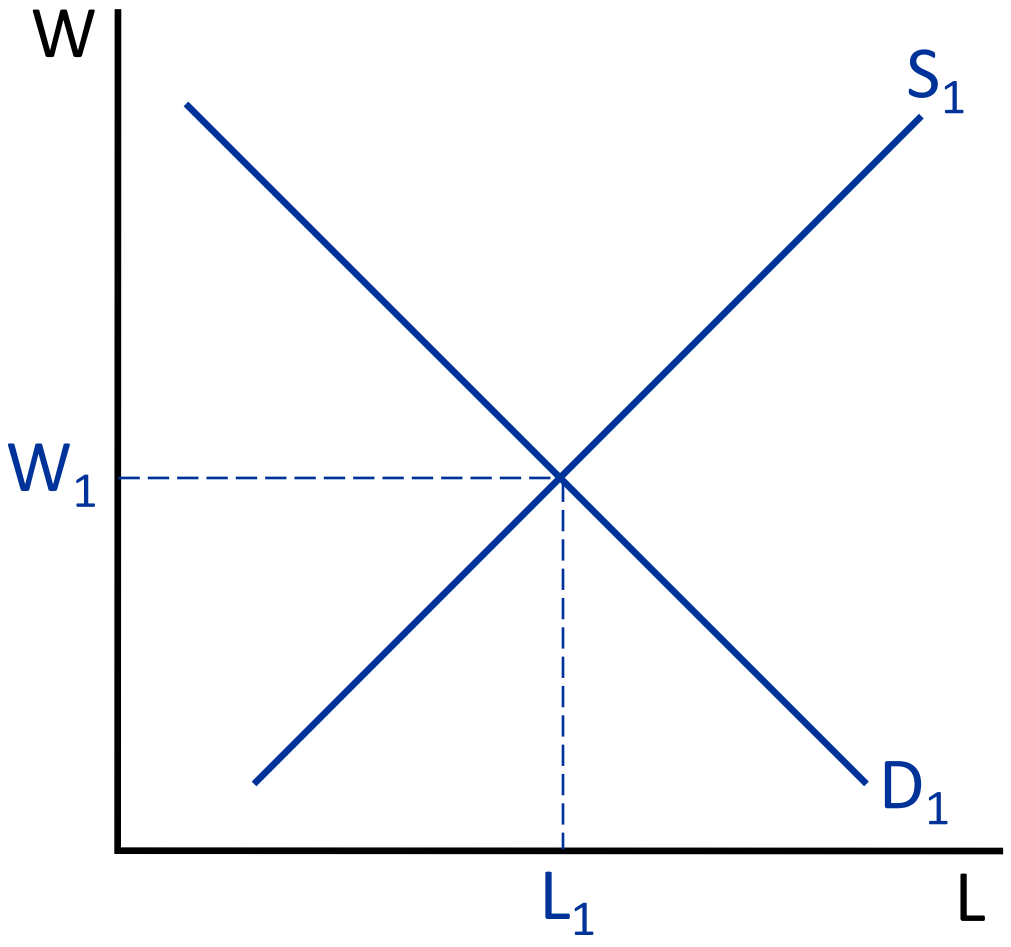
Source: David Autor, "Skills, Education, and the Rise of Earnings Inequality among the "Other 99 Percent".

Example 2: Increased Immigration of Low-Skilled Workers

- Suppose that immigration of low-skilled workers increases.
- What would you expect this to do to the wages and employment of low-skilled workers?

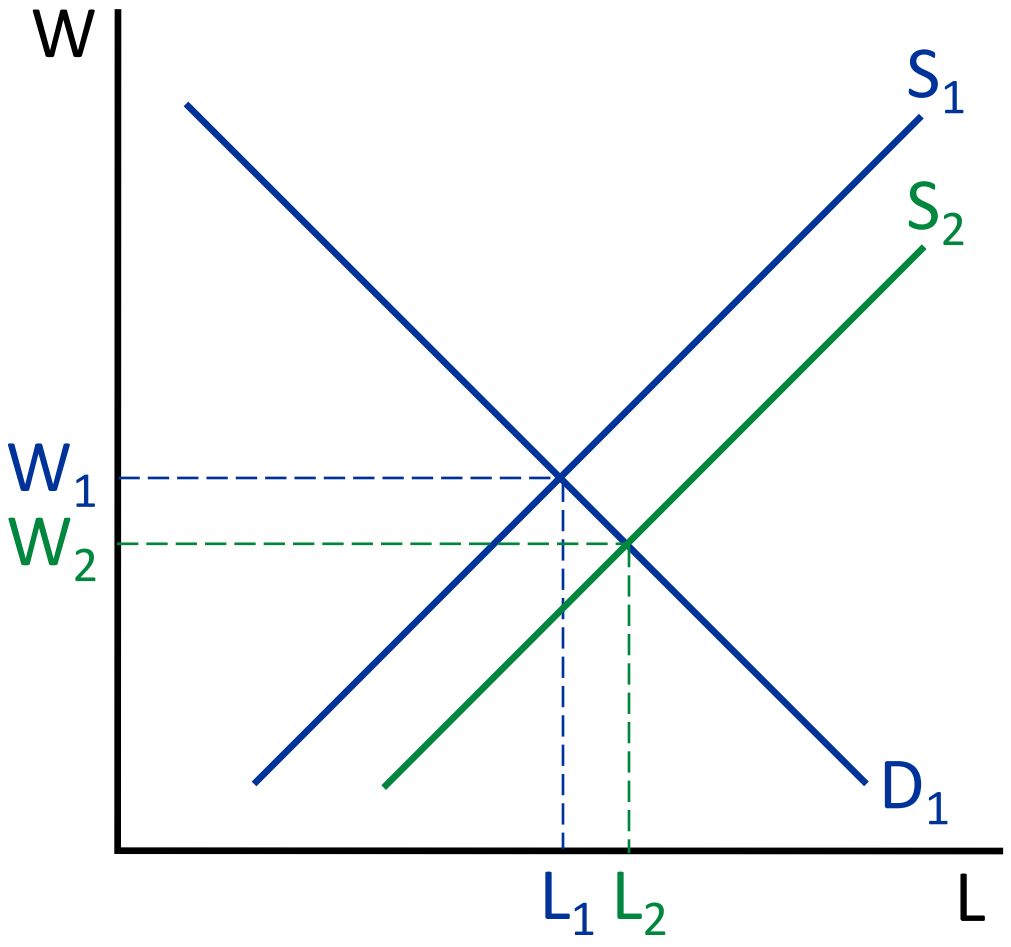
Effect of Increased Immigration of Low-Skilled Workers

Market for Low-Skilled Workers



Effect of Increased Immigration of Low-Skilled Workers

Market for Low-Skilled Workers



Empirical Evidence on the Impact of Immigration

- Problems with previous studies:
  - Many looked at wages and the number of immigrants by city.
  - But, perhaps there were both labor demand and labor supply changes.
  - Sometimes immigrants came to a city because labor demand was expanding, and sometimes for family or political reasons
  - Possible to find no correlation between immigration and wages, even if the supply effects were as theory predicts.

Empirical Evidence on the Impact of Immigration

- David Card paper uses a natural experiment:
  - Mariel Boatlift (May-September 1980).
  - 125,000 Cubans migrated to the U.S.
  - Almost all went to Miami.
  - No issue of immigrants choosing to go where the labor market was expanding.
  - Excellent data on wages and employment before and after the influx of immigrants.

Card Paper on the Effects of the Mariel Boatlift

Table 3. Logarithms of Real Hourly Earnings of Workers Age 16–61 in Miami and Four Comparison Cities, 1979–85.

Group	*1979*	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*
Miami:							
Whites	1.85	1.83	1.85	1.82	1.82	1.82	1.82
	(.03)	(.03)	(.03)	(.03)	(.03)	(.03)	(.05)
Blacks	1.59	1.55	1.61	1.48	1.48	1.57	1.60
	(.03)	(.02)	(.03)	(.03)	(.03)	(.03)	(.04)
Cubans	1.58	1.54	1.51	1.49	1.49	1.53	1.49
	(.02)	(.02)	(.02)	(.02)	(.02)	(.03)	(.04)
Hispanics	1.52	1.54	1.54	1.53	1.48	1.59	1.54
	(.04)	(.04)	(.05)	(.05)	(.04)	(.04)	(.06)
Comparison Cities:							
Whites	1.93	1.90	1.91	1.91	1.90	1.91	1.92
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)
Blacks	1.74	1.70	1.72	1.71	1.69	1.67	1.65
	(.01)	(.02)	(.02)	(.01)	(.02)	(.02)	(.03)
Hispanics	1.65	1.63	1.61	1.61	1.58	1.60	1.58
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.02)

Bottom line: Huge influx of Cubans in 1980 did not affect wages of other groups

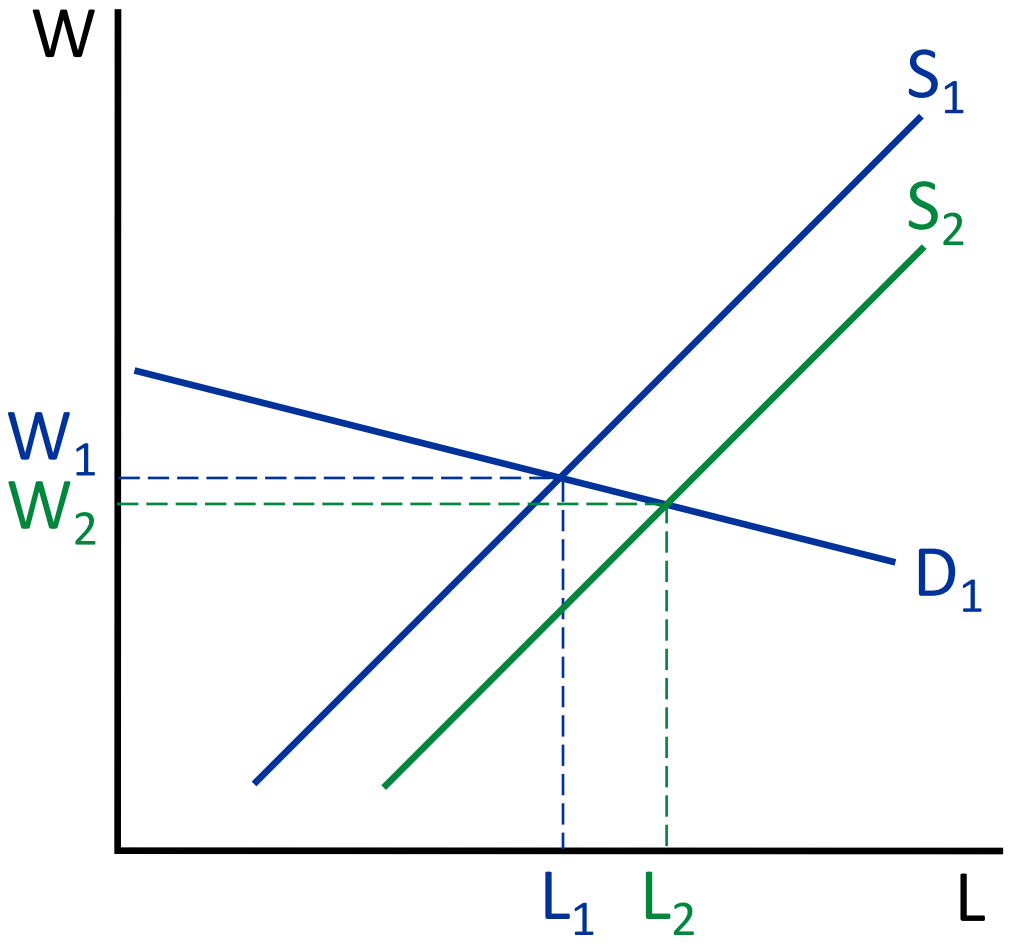
Source: David Card, "The Impact of the Mariel Boatlift on the Miami Labor Market"

Card's Explanation for Why Wages Didn't Fall

- Some migration to Miami that otherwise would have occurred didn't because of the boatlift.
- Labor demand may have been quite elastic.
    - Miami had a number of industries that used low-skilled workers and could expand easily.

Effect of Increased Immigration of Low-Skilled Workers

Market for Low-Skilled Workers



If labor demand is very elastic, a shift out in labor supply would reduce wages only slightly.

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