14.03/003 Micro Theory & Public Policy, Fall 2022

Lecture 1. Introduction and a First Application

David Autor (Prof), MIT Economics and NBER

Jonathan Cohen (TA), MIT Economics

What is 14.03 about?

- Microeconomic Theory and Public Policy is an intermediate course in microeconomic theory.
  - It is theoretical/quantitative with applications to real world policy problems.
  - Assumes proficiency with economic theory at the 14.01 level.
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  2. Causality.
  3. Empirical applications.

Empirical tools

1. Randomized experiment, a.k.a. Randomized Controlled Trial (RCT).
   - Randomly allocating the experimental units across the treatment groups.
   - **Example:** New Vaccine.

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2. Quasi-experiment
   - Unintentionally creates conditions similar to a randomized experiment.
   - **Example:** Lottery.

The Most Famous Picture in Economics

Equilibrium in competitive markets

Baseline model

Consider a (product) market with:

- One good, e.g., orange juice,
- traded at one price,
- with many consumers of the good,
- and with many producers of the good.

Then, the market equilibrium is where supply equals demand.

- Supply function $S(p)$: quantity of the good produced at price p.
- Demand function $D(p)$: quantity of the good consumed at price p.

Equilibrium in competitive markets

Graphical interpretation

What is the minimum wage in Massachusetts?

A: $24/h

B: $7.5/h

C: $16/h

D: $14.25/h

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Textbook Model of Wages and Employment

Outline

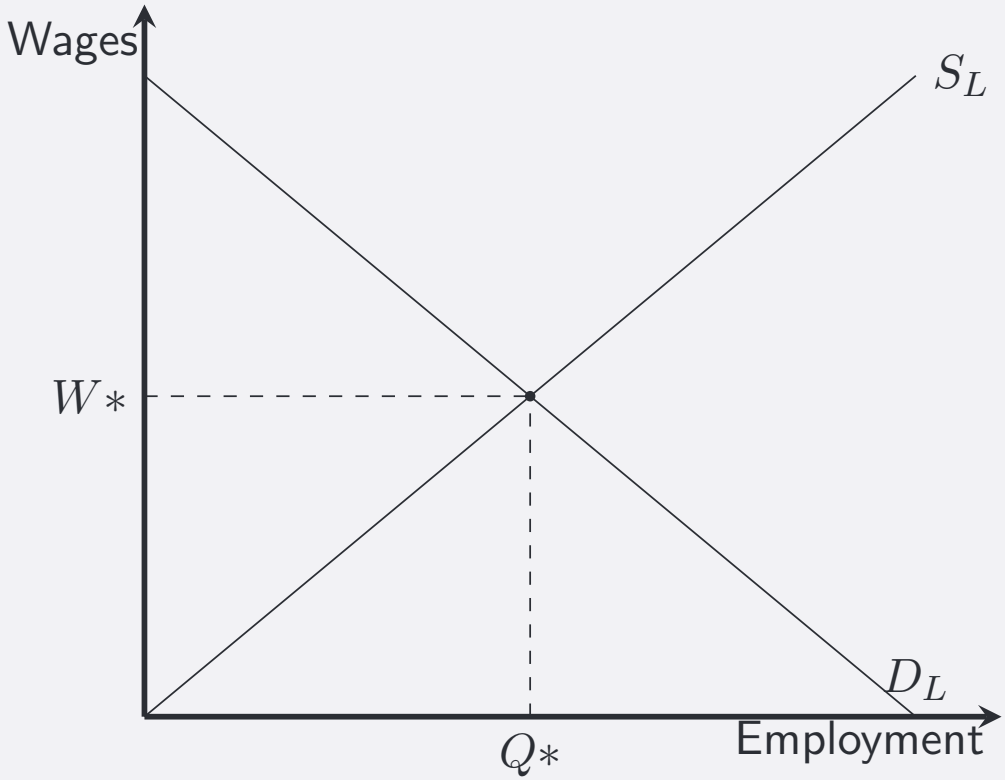
For today and next week

1. Textbook model of competitive labor market.
   - Impact of minimum wage on employment in the textbook model.
   - Assumptions behind this model.
2. Relax a key assumption: price-taking by firms.
   - Impact of min. wage on employment when employers have market power.
   - Testing the textbook model and alternatives.
3. Natural experiments in economics.
4. The Fundamental Problem of Causal Inference.
5. Estimating causal effects using "Differences-in-Differences" (DD).
6. The Card and Krueger minimum wage study.

Textbook model of wages and employment

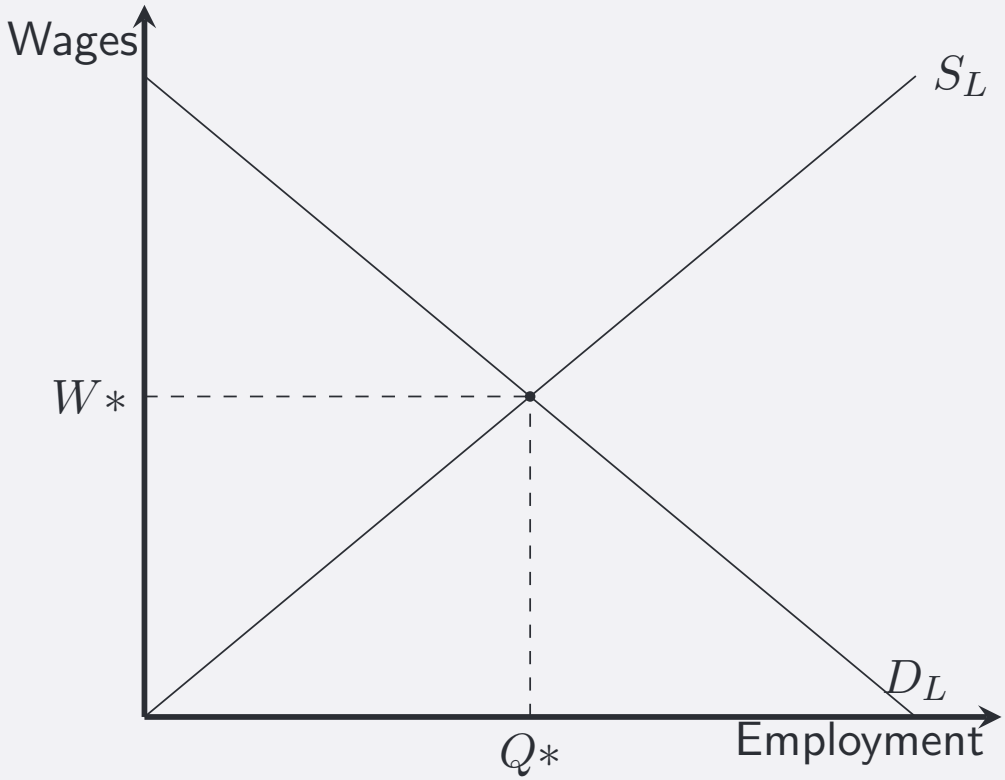
Competitive labor market

- Labor demand curve (D_L)
  - Potential employers, arranged according to willingness to pay.
- Labor supply curve (S_L)
  - Potential workers, arranged according to reservation wage.



Textbook model of wages and employment

Competitive labor market



- **Exogenous**—determined outside the model.
  - Labor demand and labor supply curves.
- **Endogenous**—determined by the model.
  - Equilibrium wage (w^*) and employment (Q^*).

Exogeneity and endogeneity

Definition (Exogenous)

Determined outside the model

Exogeneity and endogeneity

Definition (Exogenous)

Determined outside the model

Definition (Endogenous)

Determined by the model

Exogeneity and endogeneity

Definition (Exogenous)

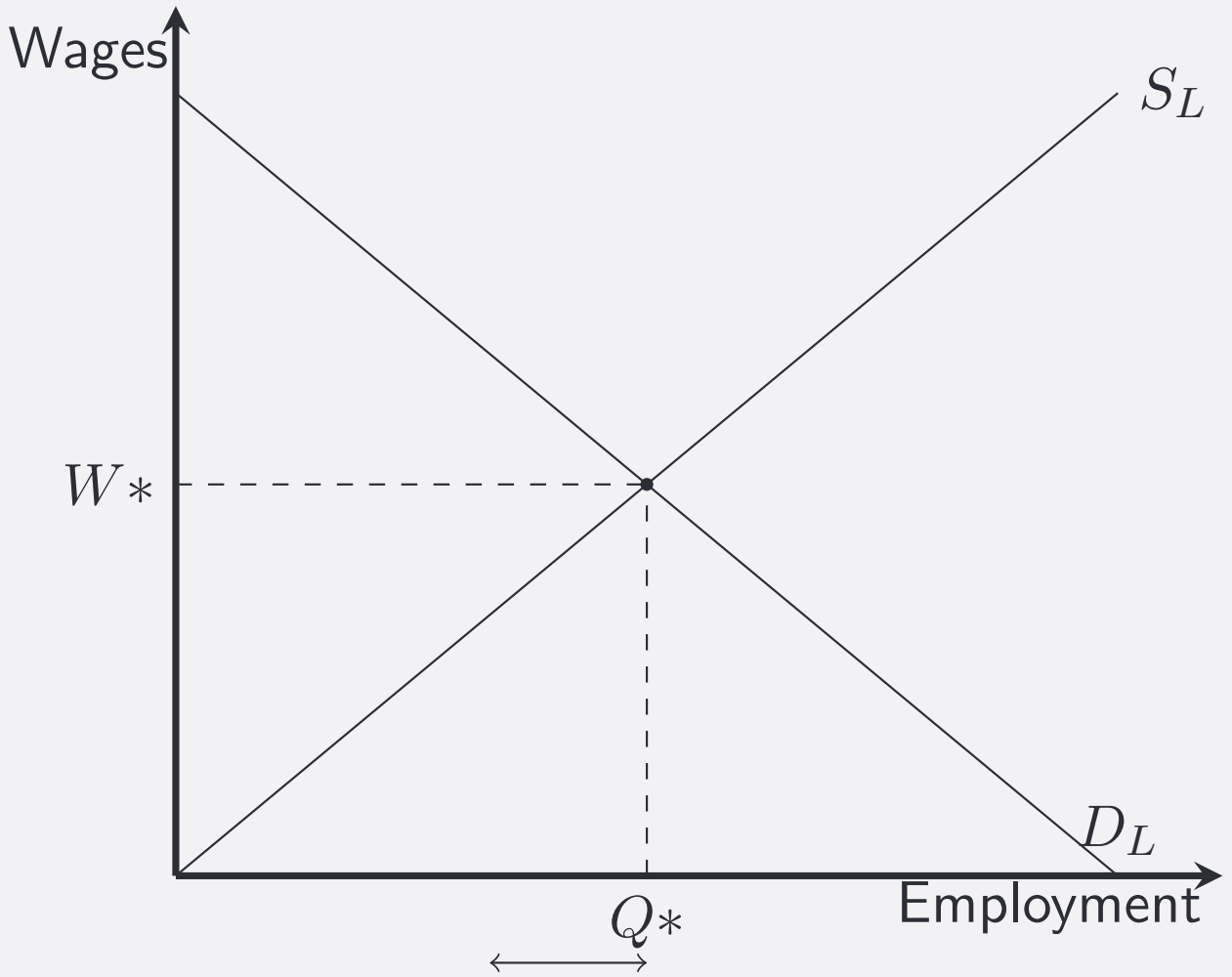
Determined outside the model

Definition (Endogenous)

Determined by the model

- Only exogenous variables can be *causes*
- Endogenous variables are affected by exogenous variables — but not the other way around
- Experiments allow us to study the causal effects of exogenous changes—the changes we select—on endogenous outcomes
- We'll have much more to say about exogenous and endogenous variables—and causal inference—as the semester goes on

Effect of a (binding) minimum wage



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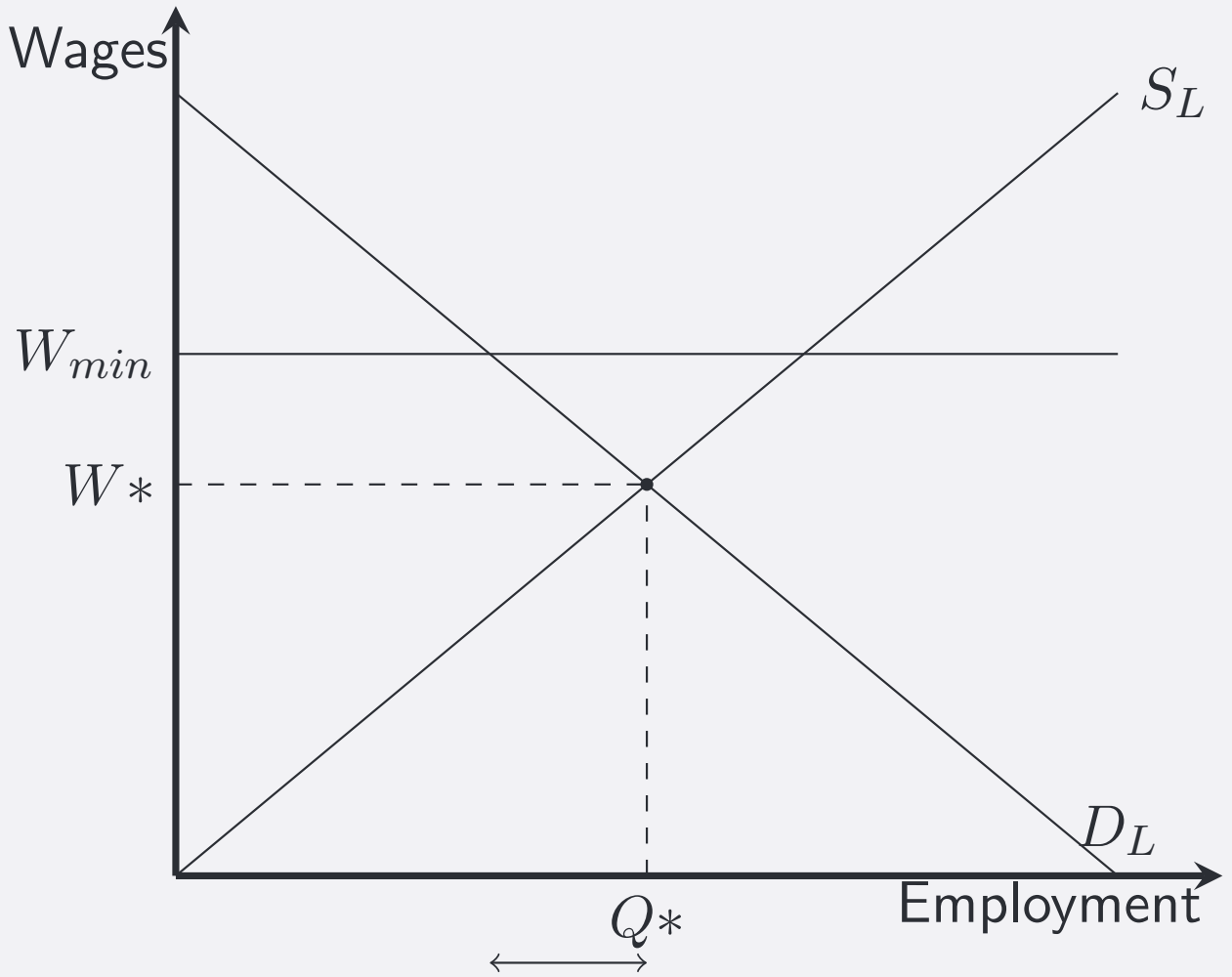

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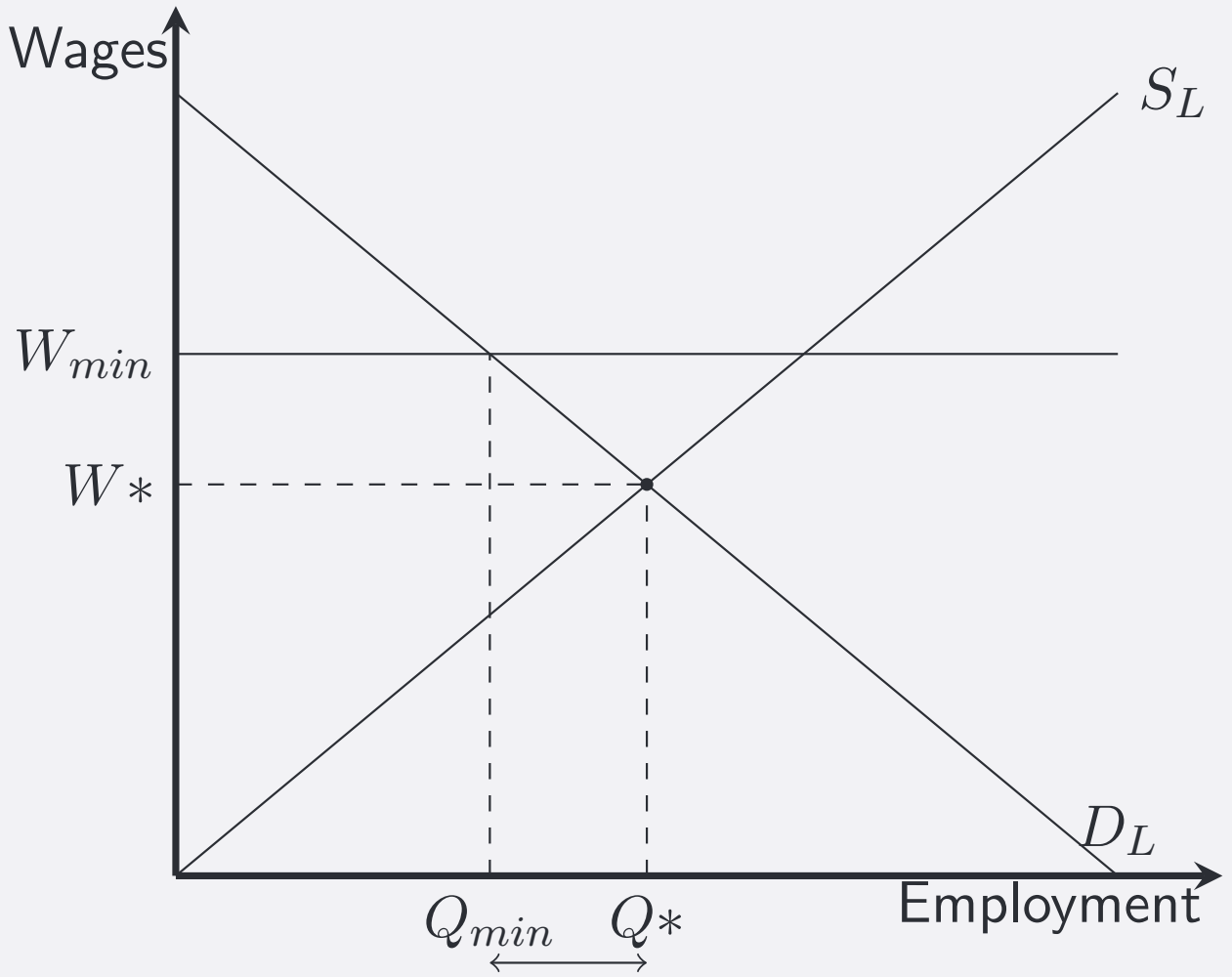

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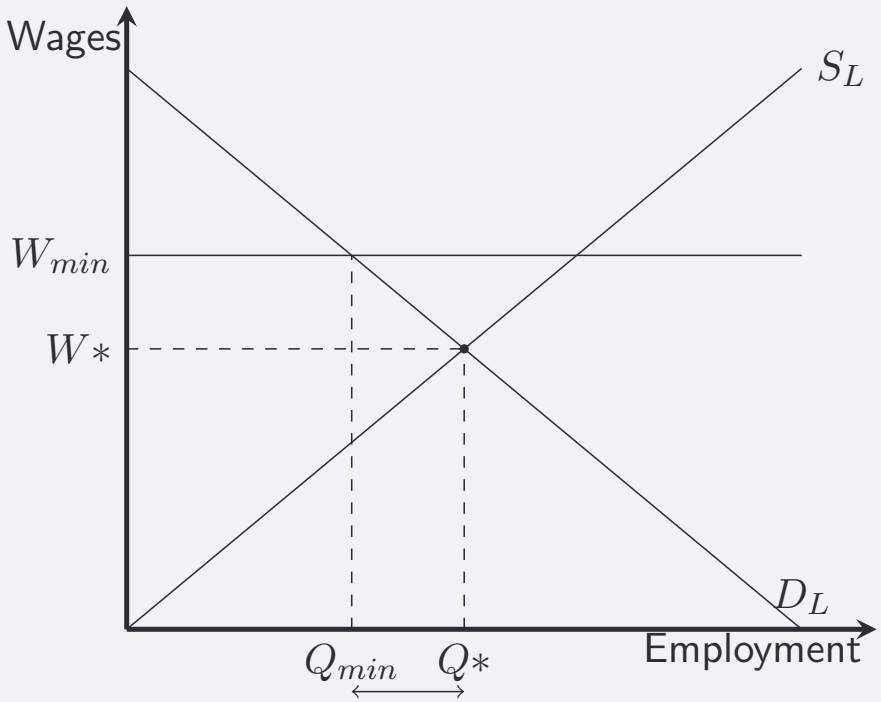

- Wages:

$$w_{\min} > w^*$$

- Employment:

$$Q_{\min} < Q^*$$

Should we impose a minimum wage?

- Employment went down.

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$$\eta = \frac{\partial Q}{Q} \frac{w}{\partial w} \gtrless -1.$$

  - Why not simply use the slope of D_L?

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Definition (Elasticity of Y with respect to X)

The ratio of the proportional change in a variable Y caused by a given proportional change in a variable X.

Elasticity of demand in various markets

Product	Demand Elasticity
Electricity	-0.2
Gasoline (short run)	-0.2
Gasoline (long run)	-0.7
Private schools	-1.1
Automobiles	-0.4 to -1.0
Airline travel	-1.2 to -3.0
Restaurant meals	-2.3

Elasticity of demand in various markets

Demand elasticities for various car models (1990)

Model	Demand Elasticity
Nissan Sentra	-6.5
Ford Escort	-6.0
Ford Taurus	-4.2
Nissan Maxima	-4.8
Lincoln TownCar	-4.3
Lexus LS400	-3.1
BMW 735i	-3.5

Source: "Automobile prices in market equilibrium", by Berry, Levinsohn, and Pakes, *Econometrica* 1995.

Why did employment fall?

An individual firm's perspective

- Each firm is a price-taker in the competitive model.
- Marginal Revenue Product of Labor (MRPL).
  - What the marginal worker produces.
  - Decreasing in employment due to decreasing returns in the production function.

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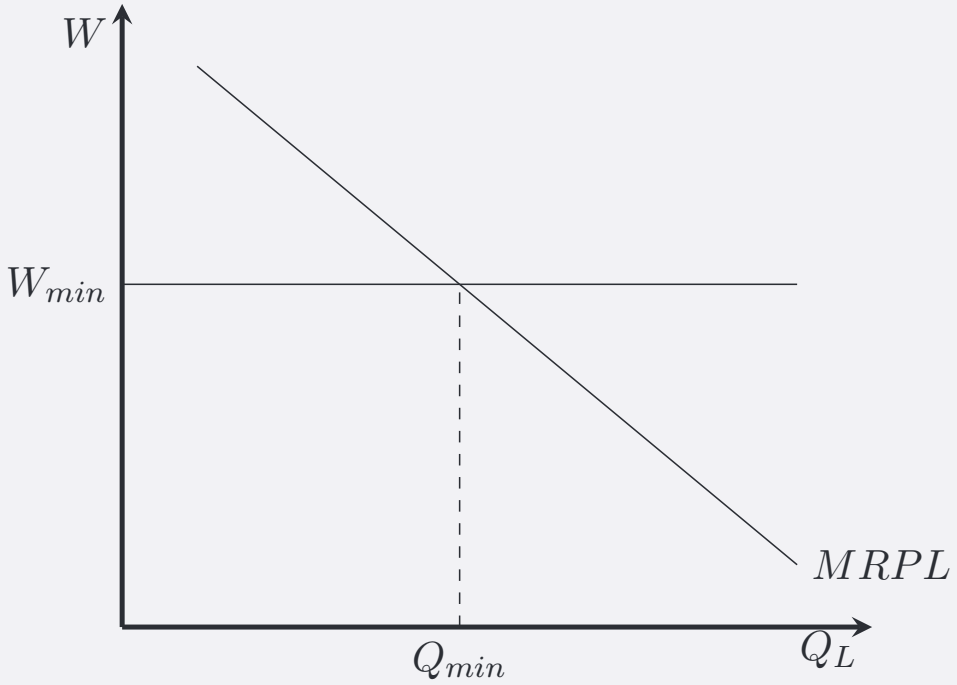

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Why did employment fall?

- Why is $w^* = MRPL$?
- Firm's profit maximization problem:

$$\max \ \pi = p \cdot f\left(L\right) - w(L) \cdot L,$$

  - Assume that $f'\left(\cdot\right) > 0$ and $f''\left(\cdot\right) < 0$, and p is exogenous.

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- FOC:

$$\frac{\partial \pi}{\partial L} = p \cdot \frac{\partial f\left(L\right)}{\partial L} - w(L) - \frac{\partial w(L)}{\partial L} \cdot L = 0$$

Rearranging:

$$\overbrace{pf'(L)}^{MRPL} = \overbrace{w(L)}^{\text{equil. wage}} + \overbrace{w'(L)L}^{\Delta\text{total labor costs}}$$

An individual firm's perspective

$$\overbrace{pf'(L)}^{MRPL} = \overbrace{w(L)}^{\text{equil. wage}} + \overbrace{w'(L)L}^{\Delta\text{total labor costs}}$$

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  - Adding one worker could raise the cost of all other workers!

An individual firm's perspective

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- Third term is potentially important
  - Adding one worker could raise the cost of all other workers!
- *Competitive* model assumes:

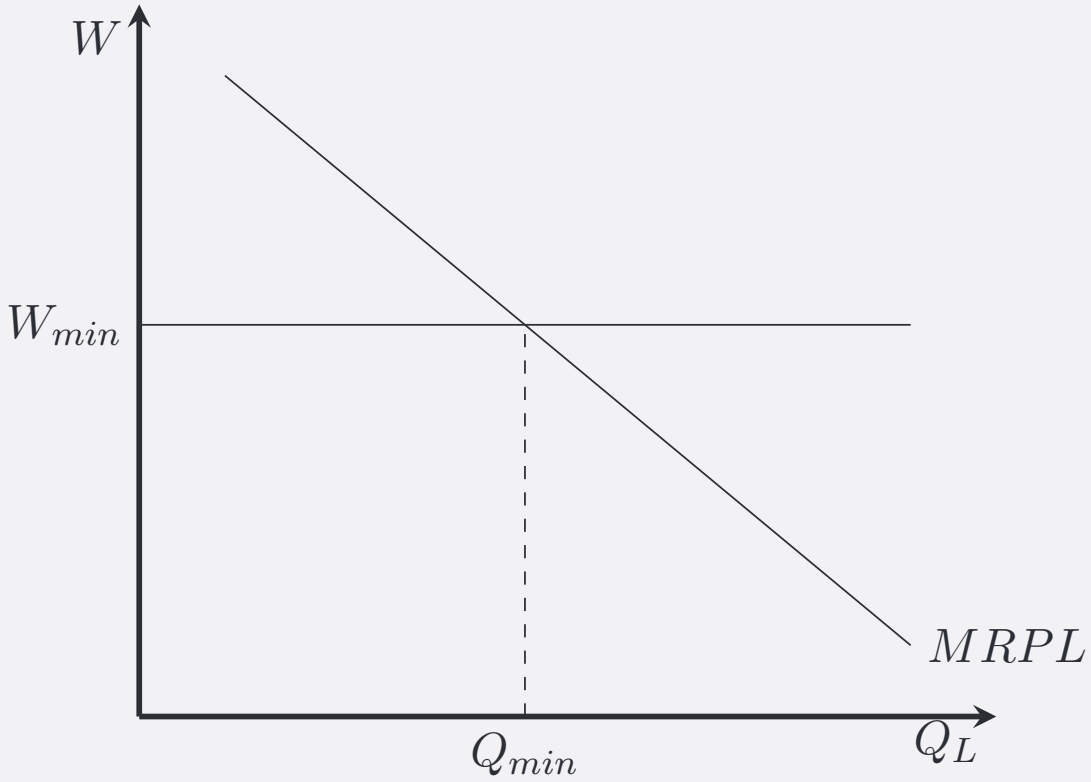
$$w'(L) = 0 \Longleftrightarrow \text{Price taking firms,}$$

  therefore, $pf'(L) = w^*$.
- Re-arranging in terms of the elasticity of labor supply (η)

$$MRPL = w\left(1 + \frac{\partial w}{\partial L}\frac{L}{w}\right) = w\left(1 + \frac{1}{\eta}\right)$$

  - If the firm is not a price taker ($\eta < \infty$) in the labor market, then the wage it pays is *strictly less* than MRPL.

Monopsonistic employer



1. S_L is upward sloping for a monopsonist.
2. If all workers receive the same wage, the marginal cost of a worker includes a raise given to all inframarginal workers.
3. Thus, MC_L is *even more* upward sloping than S_L.

Monopsonistic employer

Definition (Monopoly)

One seller, many buyers

Monopsonistic employer

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Definition (Monopsony)

One buyer, many sellers

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- More generally, a market where a buying agent is not a *price-taker*
- If a firm has labor market power—it is not a price-taker—its own demand for labor affects the market wage
- Examples?

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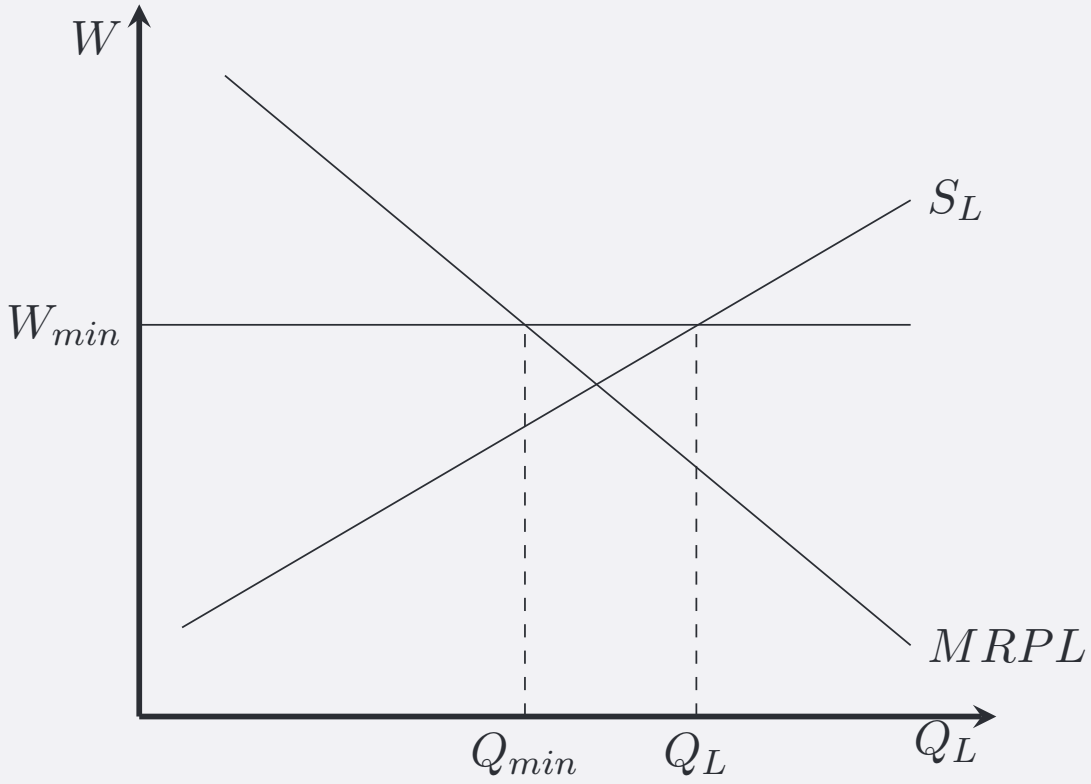

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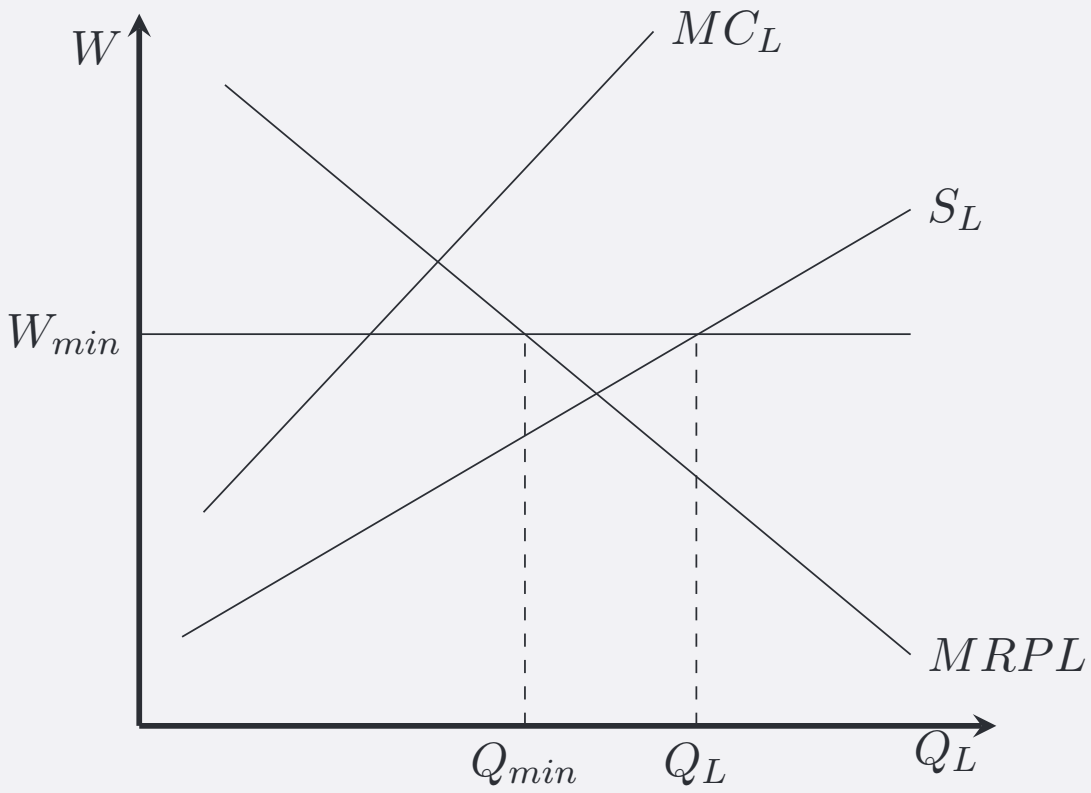

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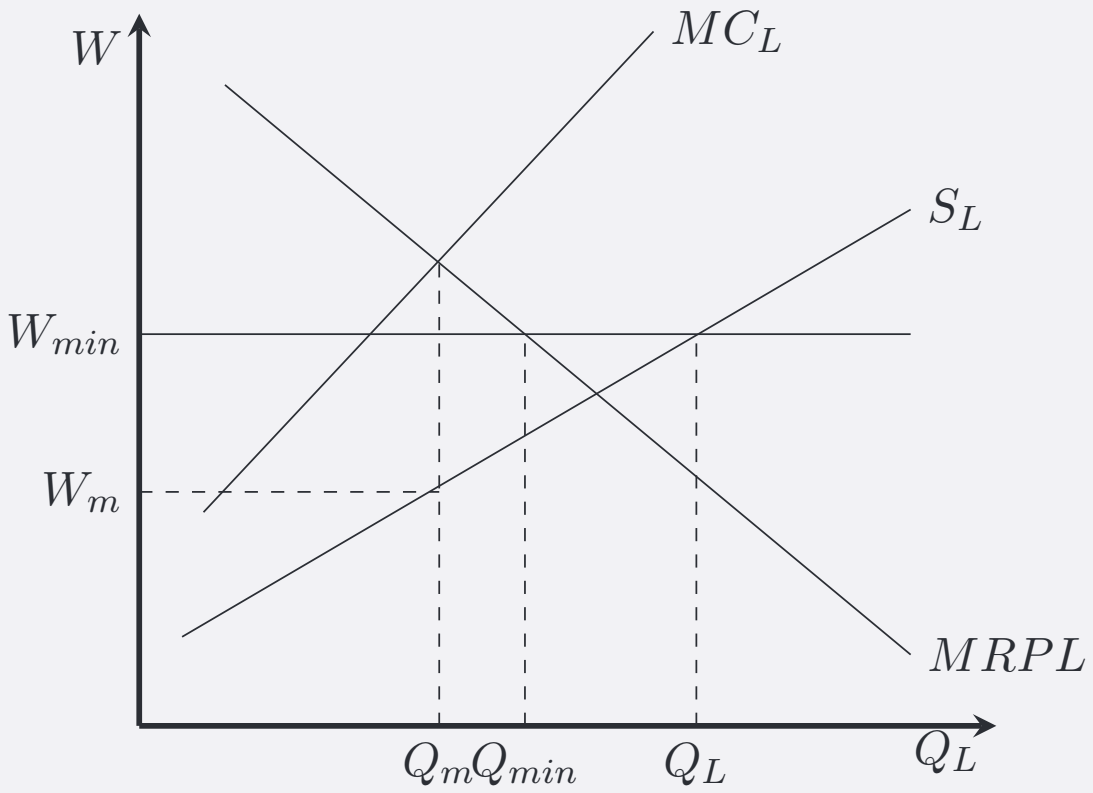

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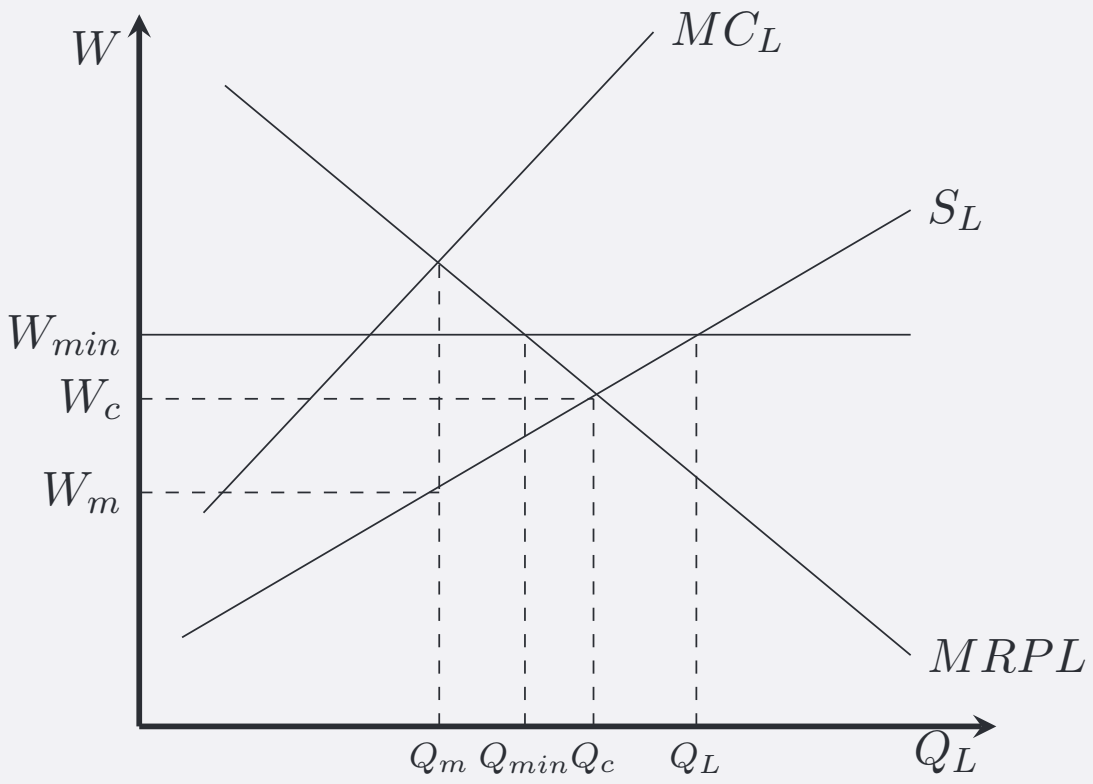

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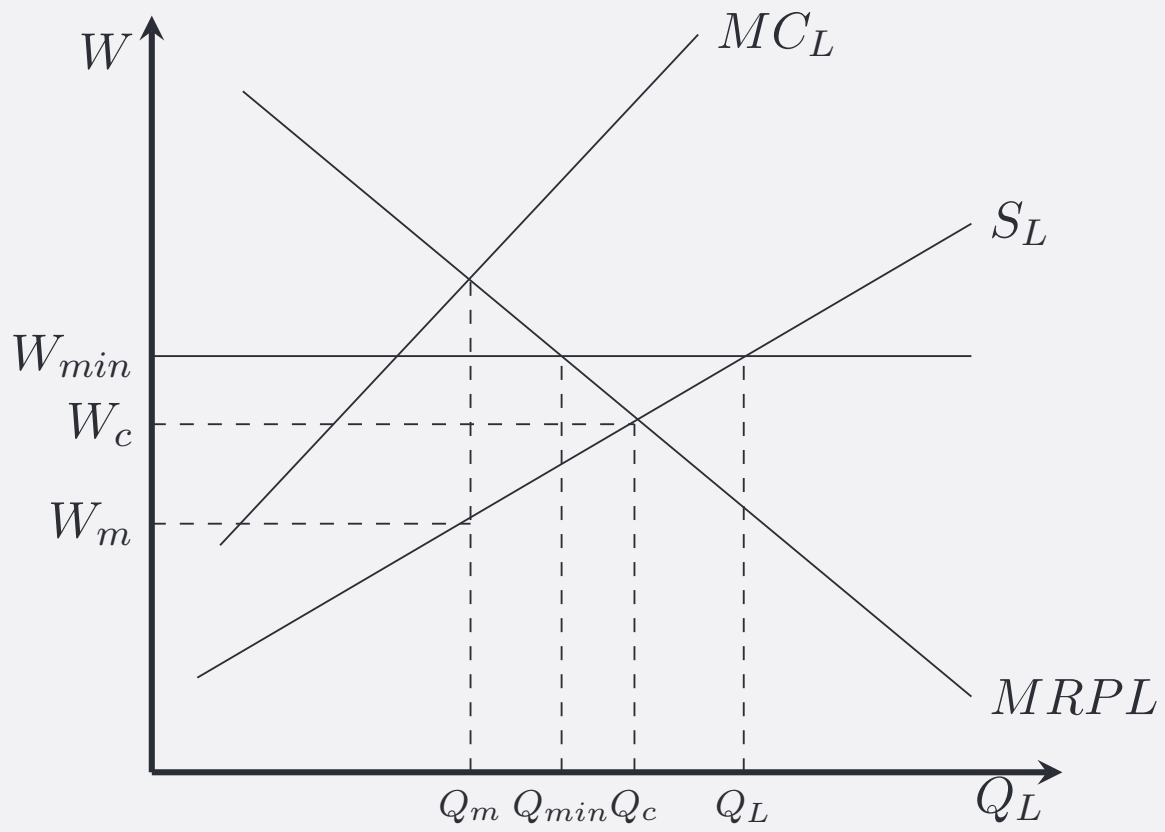
Effect of a minimum wage

Monopsonistic employer



- Why did we get $w_{\min} > w_m, Q_{\min} > Q_m$?
  - The firm is now a *price-taker* for labor at $w_{\min}$
  - Firm chooses $Q_{\min}$ so that $w_{\min} = MRPL$

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Monopsonistic employer

- Does raising minimum wage to monopsonists *always* increase employment?

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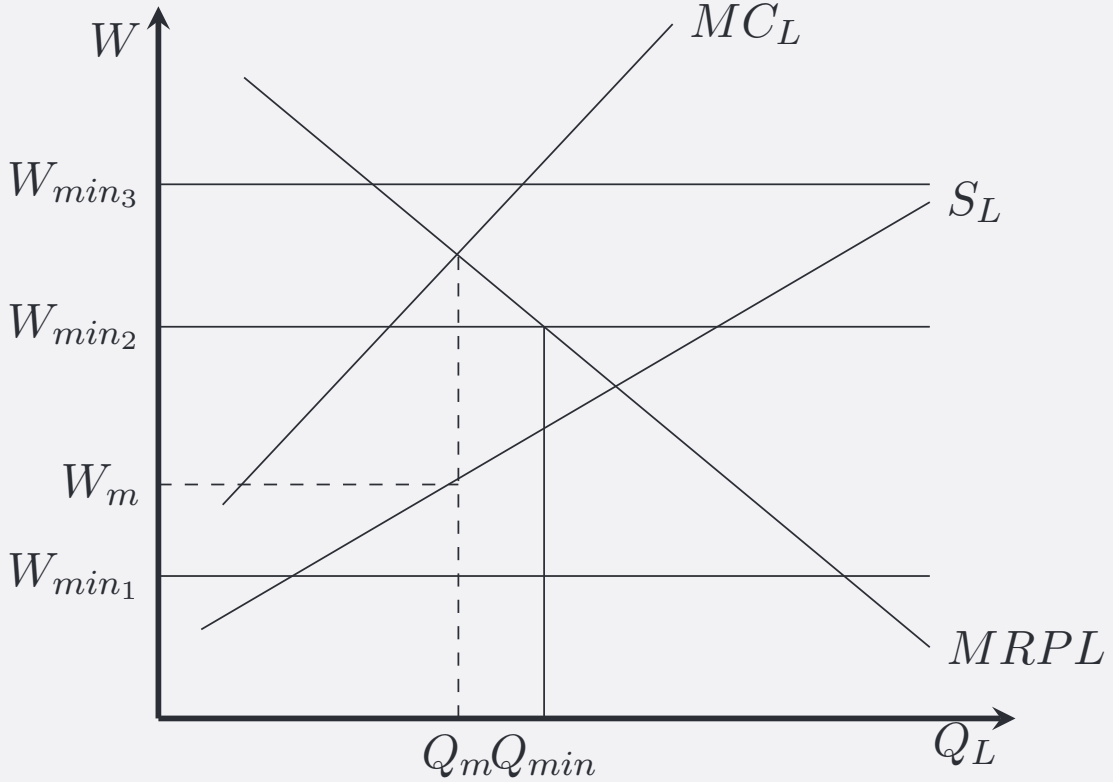

Testing for monopsony in the labor market

- Where would you expect to find monopsony power?

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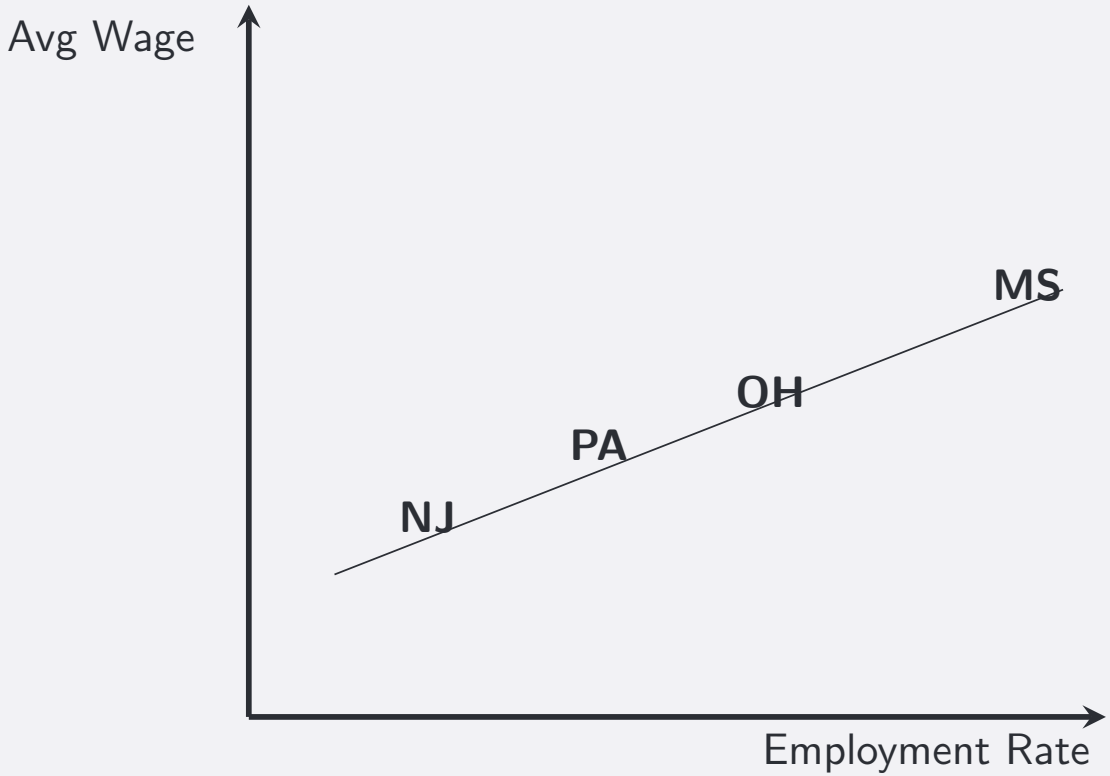
- How do we test? Use key *empirical implications*
  - In the competitive model, an increase in the minimum wage always reduces employment: $W \uparrow \rightarrow L \downarrow$
  - In the monopsonistic model, an increase in the minimum wage (may) raise employment: $W \uparrow \rightarrow L \uparrow$

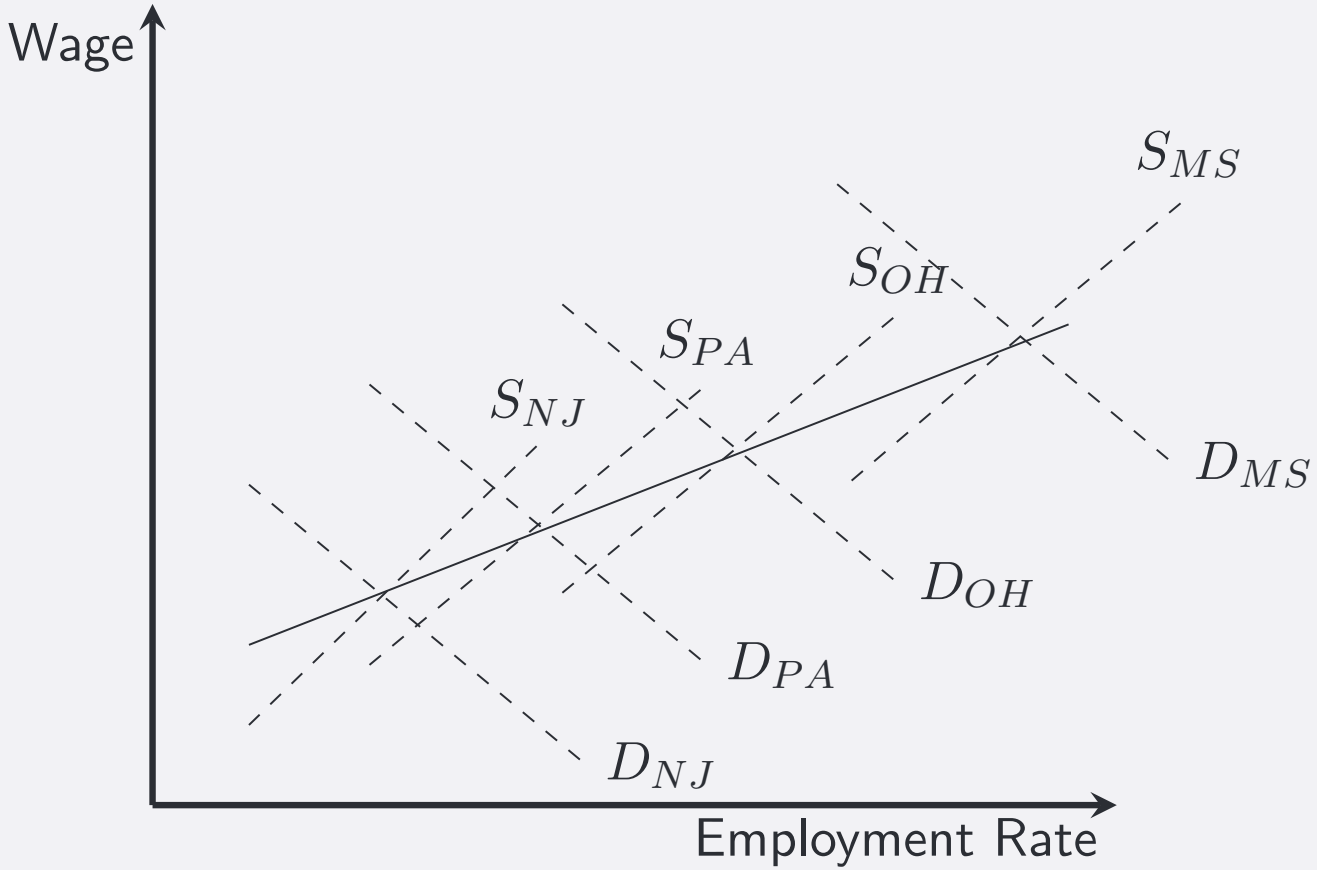
Testing for monopsony in the labor market

– Let's suppose you find the following pattern:



– Would this convince you that higher wage levels *caused* higher employment?

Testing for monopsony in the labor market



Testing for monopsony in the labor market

- A further problem:
  - We do not ever see supply and demand curves.
  - We only *observe* equilibrium wage and quantity employed.
- Cannot directly see if individual firms face upward sloping labor supply.
- How do we overcome this problem?

Testing for monopsony in the labor market

- A further problem:
  - We do not ever see supply and demand curves.
  - We only *observe* equilibrium wage and quantity employed.
- Cannot directly see if individual firms face upward sloping labor supply.
- How do we overcome this problem?
  - We need an experiment!
  - Specifically, one in which wages are raised exogenously.
  - We could then study its impact on employment to infer the slope of the relationship between wages and employment.
- Downward sloping $\rightarrow$ competitive market, upward sloping $\rightarrow$ monopsony.

Today's concepts

- Experiments and quasi-experiments.
- Exogenous and endogenous variables.
- Supply, demand, elasticity.
- Competitive labor markets.
- Monopsonistic labor markets.
- Marginal revenues, marginal costs.