

Econ 330: Urban Economics

Lecture 07

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Lecture 07: Urban Labor Markets

Schedule

Today:

(i). Urban labor markets

- Urban labor demand
- Urban labor supply
- Urban labor EQ

Upcoming:

- **Reading** (Chapter 5)
- **Problem set 02 due on
Tuesday, Nov 02 at Midnight**

Housekeeping

MT material is up to the first half of this **labor market lecture**

PS02 is due Tuesday, Nov 02

Office hours tomorrow is cancelled

Expect an announcement with details about the midterm this weekend

Urban labor markets

Urban labor Markets

Why care about labor markets in urban economics?

David Card:

| A city *is* a labor market

Cities provide incentives for firms and workers to locate close to each other

Density of a city is generated entirely by incentives in the labor market

Q: Modeling **individual** location decisions, what should we consider?

Urban labor Markets

What are the most important features in location decisions?

- Wages
- Rents
- Amenities (catch all)
- Birthplace
- Distance to birthplace

Wages are significant factor of individual/household location choices

Imagine if Amazon/Google/Microsoft opens a campus in Portland

- What would happen to rents? Gentrification? Commute times?

Introducing large amounts of high paying jobs + capital changes a city

Urban labor Markets

A labor market consists of:

(i). Firms that buy labor. Generate labor demand

(ii). HH's who sell labor. Generate labor supply

Labor and urban economist model labor markets (supply) differently

Labor: Discuss labor supply as being generated from labor-leisure trade off

- Model: Rational agents making optimal choices over leisure/education

Urban: Discuss labor supply as being generated from *location choices*

- Assume people work fixed hours but choose where to work

Urban labor Markets: Labor demand

Urban labor Markets: Labor demand

What do both fields have (somewhat) in common?

Labor demand

Definition: Labor Demand

- Set of quantities of labor demanded corresponding to a set of wages

Q: What's the difference between changes in:

- *labor demand*
- *quantity of labor demanded*

Δ Labor demand: Shift in the demand curve

Δ Quantity of labor demanded: Movement along a demand curve

Urban labor Markets: Labor demand

We will start with the **competitive** model:

Assumptions:

(i). Firms seek to maximize profits

(ii). Markets are perfectly competitive (in **both** inputs and output)

⇒ No individual firm can influence the price of labor (or other inputs)

⇒ No individual firm can influence the output price

Are these assumptions reasonable? Discuss

Urban labor Markets: Labor demand

Derive a condition for EQ labor the firm will hire in the competitive model?

$$\pi = P * Q - TC$$

Urban labor Markets: Labor demand

Derive a condition for EQ labor the firm will hire in the competitive model?

$$\begin{aligned}\pi &= P * Q - TC \\ \pi &= \underbrace{P * F(L, K)}_{\text{TR}} - \underbrace{w * L - r * K}_{\text{TC}}\end{aligned}$$

where:

- P : Output price
- $F(L, K) = Q$: Quantity produced (function of labor and capital)
 - $Q = F(L, K)$
- w : Wage rate; L : total labor employed $\Rightarrow w * L = \text{cost of labor}$
- r : rental rate; K : capital $\Rightarrow r * K = \text{cost of capital}$

Urban labor Markets: Labor demand

Claim: Firm hires labor **if and only if** the *marginal profit* w.r.t to labor is positive.

Definition: Marginal Profit w.r.t to labor ($\frac{\Delta\pi}{\Delta L}$)

- The change in profit from hiring an additional unit of labor

"Proof": (Too many cooks)

- If $\frac{\Delta\pi}{\Delta L} < 0$, added profit from an additional unit of labor is negative (ie. a loss), so the firm *should not* hire the next unit
- If $\frac{\Delta\pi}{\Delta L} > 0$, added profit from an additional unit of labor is positive (ie. a gain), so the firm *should* hire the next unit
- If $\frac{\Delta\pi}{\Delta L} = 0$ Optimal allocation for the firm. Can't do better

Urban labor Markets: Labor demand

Definitions:

- **Marginal Product of Labor:** Change in output from an additional unit of labor employed

- $MP_L = \frac{\Delta F(L,K)}{\Delta L}$

- **Marginal Revenue Product of Labor:** Value of the change in output from an additional unit of labor employed

- $MRP_L = P * \frac{\Delta F(L,K)}{\Delta L}$

Urban labor Markets: Labor demand

So what is $\frac{\Delta\pi}{\Delta L}$?

$$\frac{\Delta\pi}{\Delta L} = P * \frac{\Delta F(L, K)}{\Delta L} - w * \frac{\Delta L}{\Delta L}$$

Urban labor Markets: Labor demand

So what is $\frac{\Delta\pi}{\Delta L}$?

$$\begin{aligned}\frac{\Delta\pi}{\Delta L} &= P * \frac{\Delta F(L, K)}{\Delta L} - w * \frac{\Delta L}{\Delta L} \\ &= P * MP_L - w \\ &= MRP_L - w\end{aligned}$$

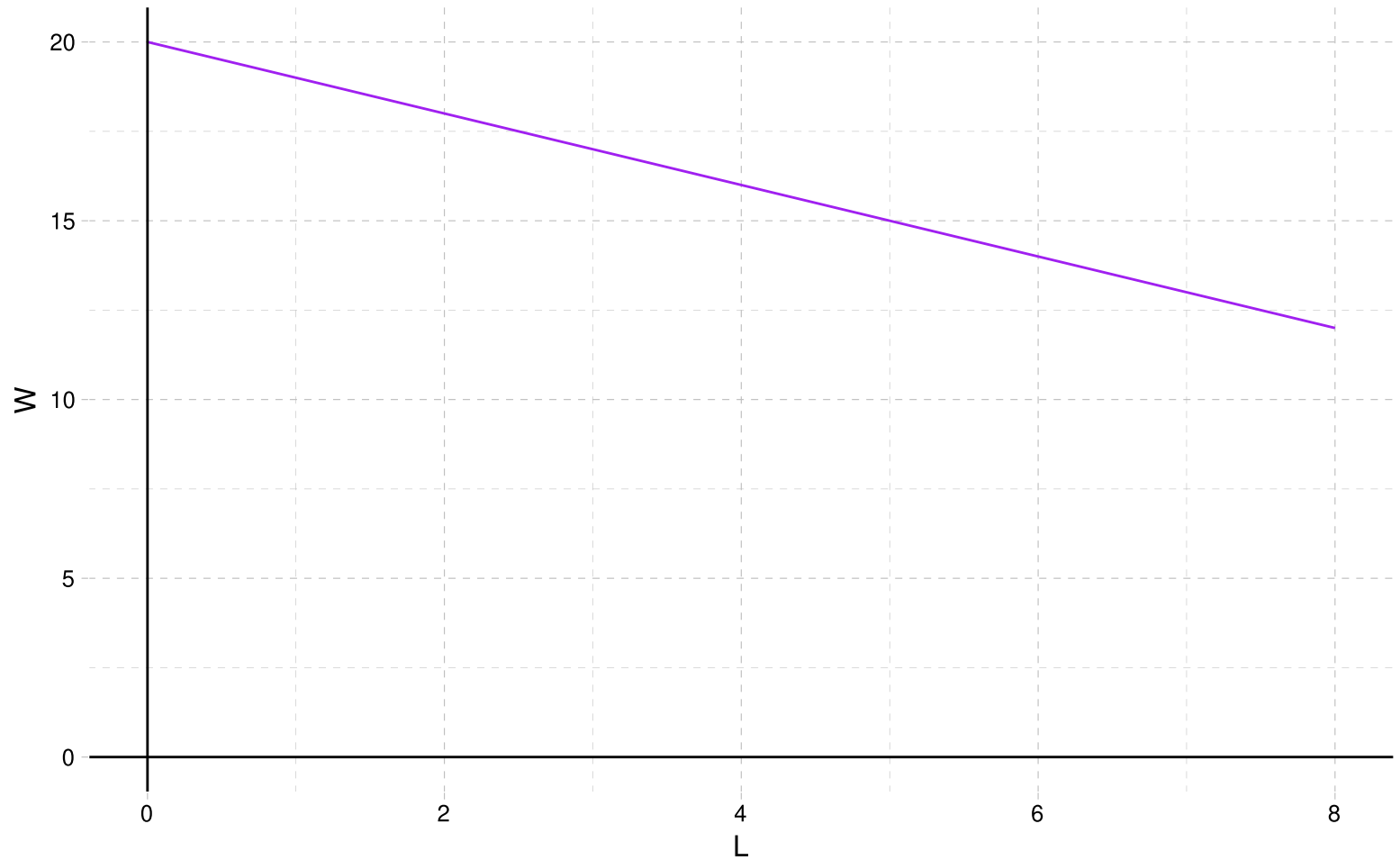
Now, set $\frac{\Delta\pi}{\Delta L} = 0$ to get the labor demand curve:

$$MRP_L - w = 0 \implies MRP_L = w$$

What does this mean in words?

A firm will hire labor until labor costs (wage) exactly offsets the marginal revenue product of labor

Urban labor Markets: Labor demand



Urban labor Markets: Labor demand

Why might **labor demand** curves vary across cities?

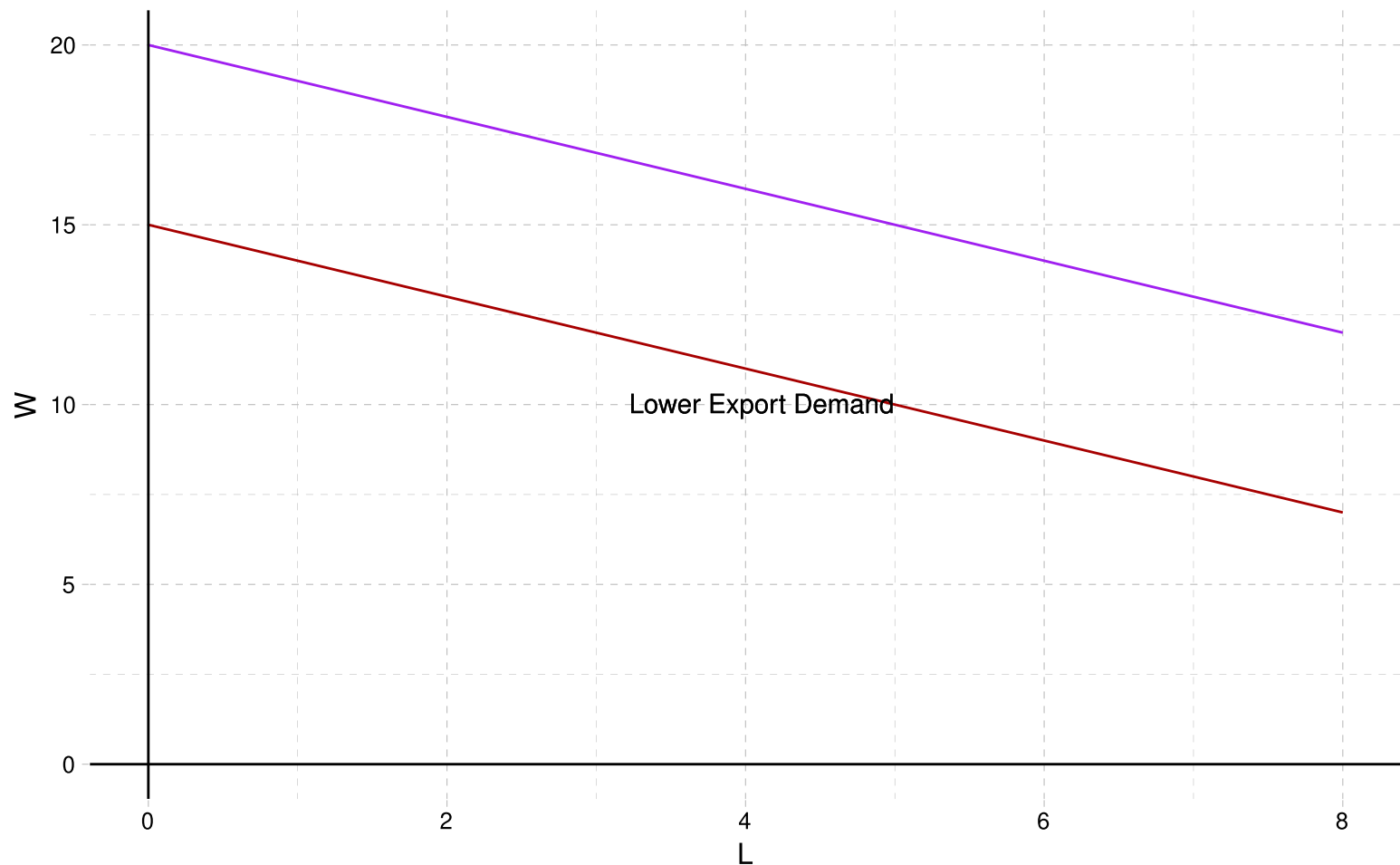
- (i).** Differences in productivity across cities (agglomeration)
- (ii).** Variation in (business) taxes across cities
- (iii).** Industrial public service infrastructure (electricity, water, gas pipelines)
- (iv).** Land use policies
 - stricter zoning \implies higher land price \implies less money for other inputs
- (v).** Demand for a city's exported goods

Urban labor Markets: Labor demand

Q: What would two cities where everything is equal except one has a higher productivity of labor look like?

Urban labor Markets: Labor demand

Q: What about a city with lower export demand?



Urban labor markets: Supply

Labor Supply

Labor supply is driven from location decisions of individuals

What generates location choices?

(i.) Wages

(ii.) Rents

(iii.) Amenities

(iv.) Other (birth location, family ties)

Labor Supply

A set of quantities of labor supplied corresponding to a set of wages.

Q1: What causes *movement along* the labor supply curve?

- A change in wages. That's it!

Q2: What causes a *shift* of the labor supply curve?

- Changes in amenities (building of a nicer school, eroding of air quality)
- Changes in residential government expenditures (increase in taxes drives people away, increases in govt spending brings people in)

Labor Supply

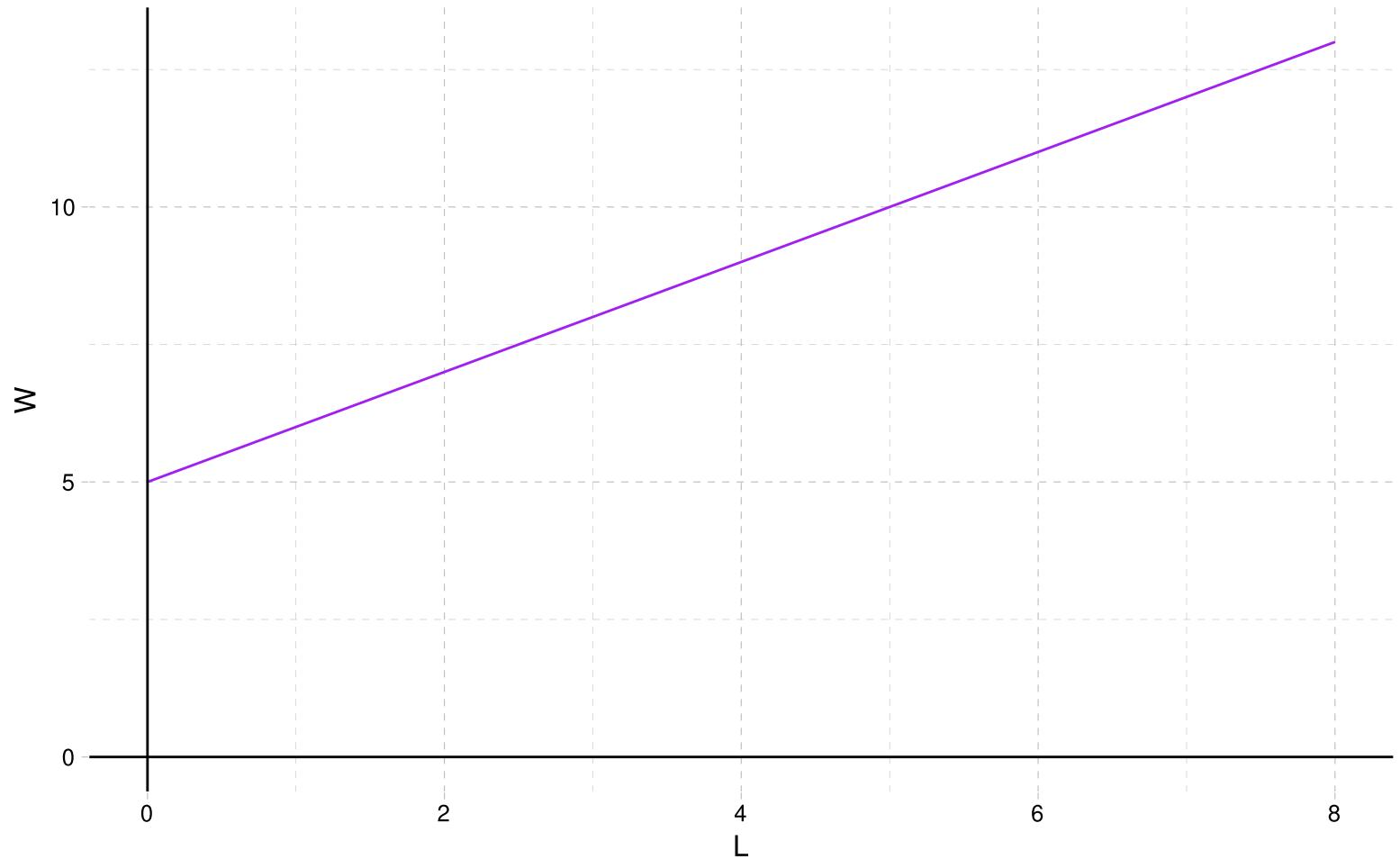
Knowing how responsive workers are to changes in wages is key for vast swaths of policies

- Estimates for labor supply elasticities are pretty big
- If $\epsilon_{\text{workforce}, \text{wage}} = 2$, what does this mean?

In general estimated labor supply elasticities are higher for workers with a college degree than without a college degree. What does this mean?

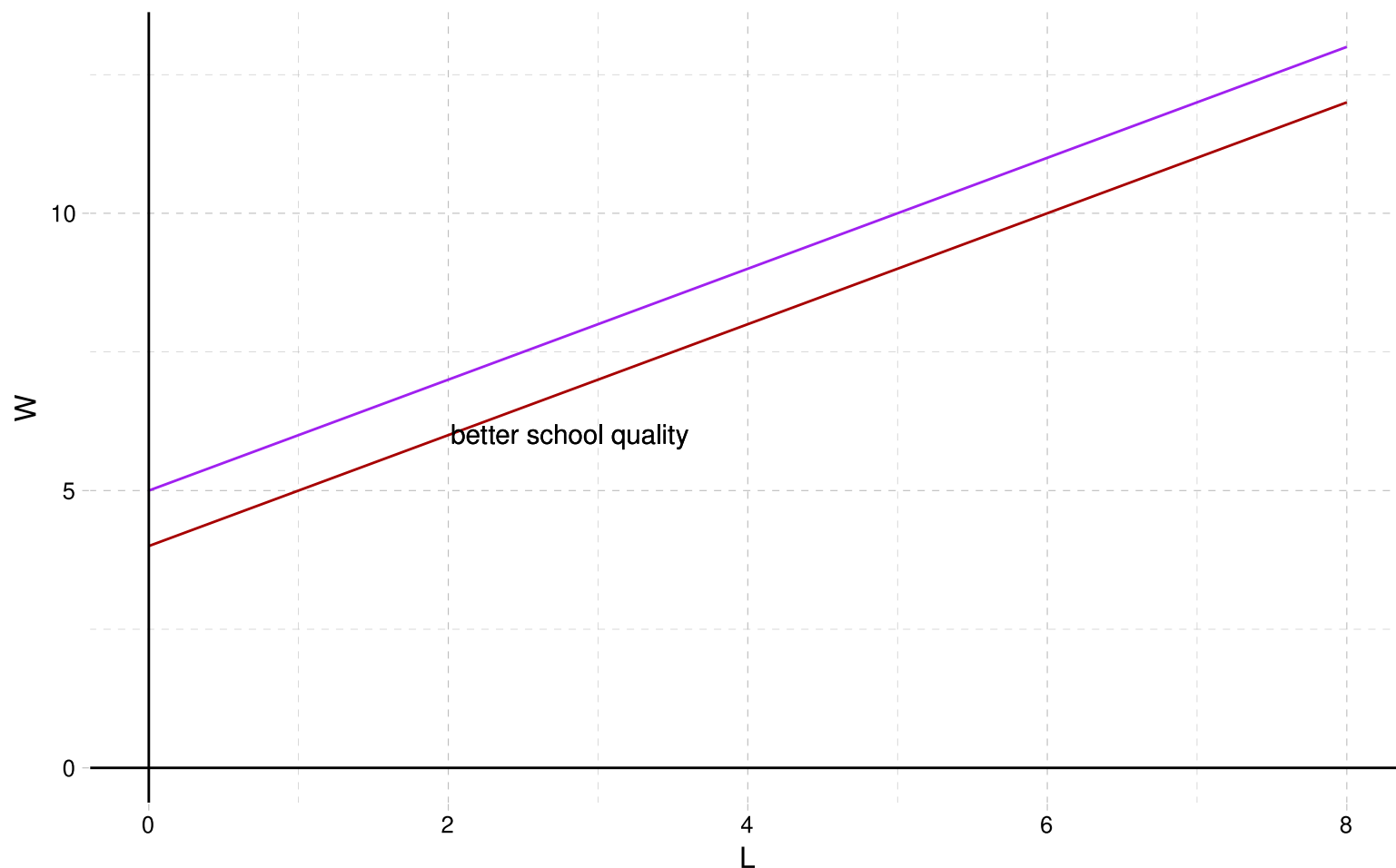
- College educated individuals are more responsive to changes in wages w.r.t to their location decisions

Labor Supply Example



Labor Supply

Question: What happens when a city improves its school quality?



Equilibrium

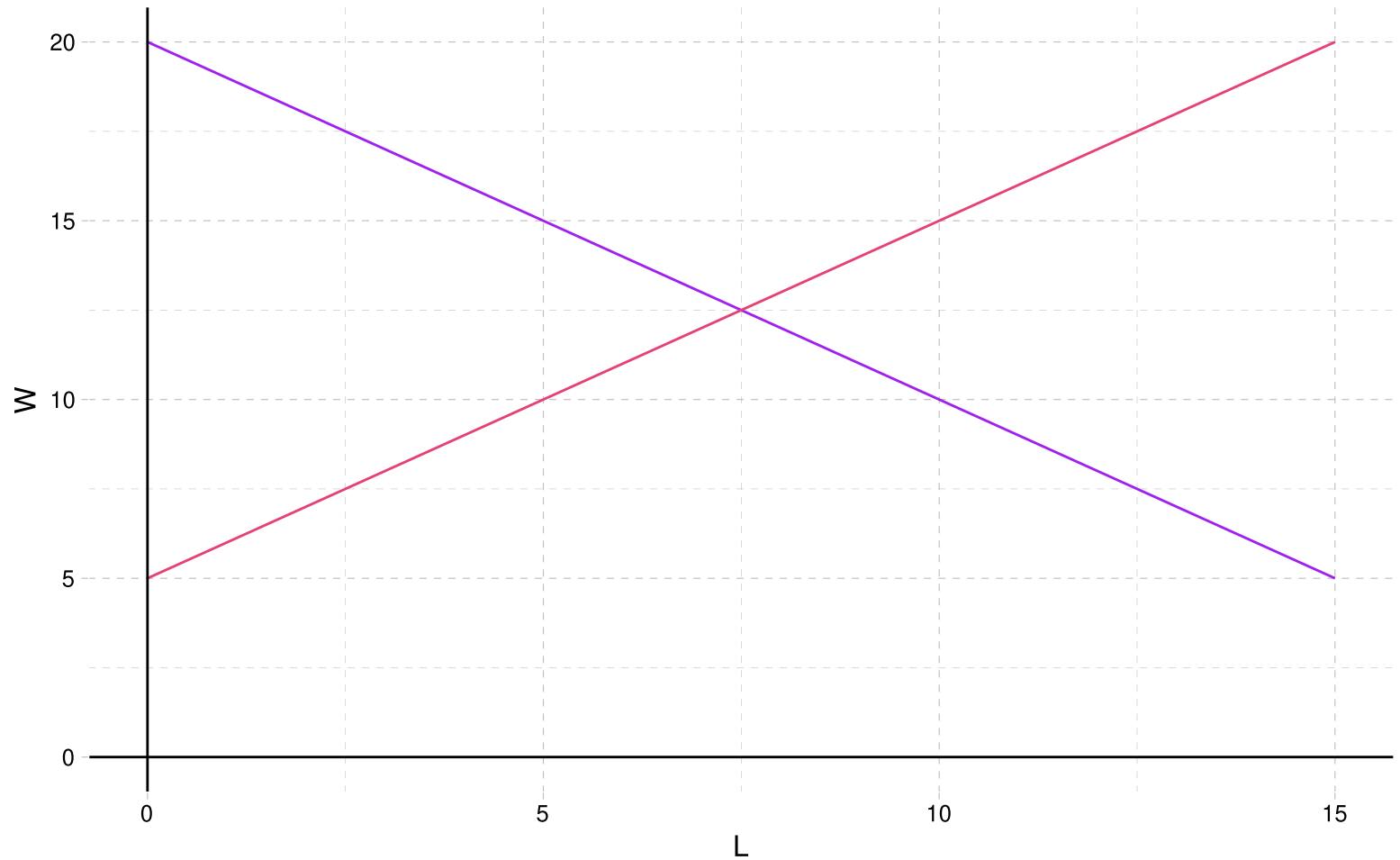
Equilibrium

Defn

- A **labor market equilibrium** is a pair of points (L^*, W^*) such that:
 - labor supply = labor demand
- IE: a labor market eq is where there is no excess supply or demand

We usually think of cities as being "separate" labor markets, so the equilibria can be different across cities

Equilibrium: Example



End of MT material

Competitive labor markets

Competitive Model: Example

Recall our assumptions for the competitive model:

- (i). Firms seek to maximize profits
- (ii). Markets are perfectly competitive (in both inputs and output)

Suppose we have the following linear L_D and L_S curves:

$$W_D = 40 - 5L_D$$

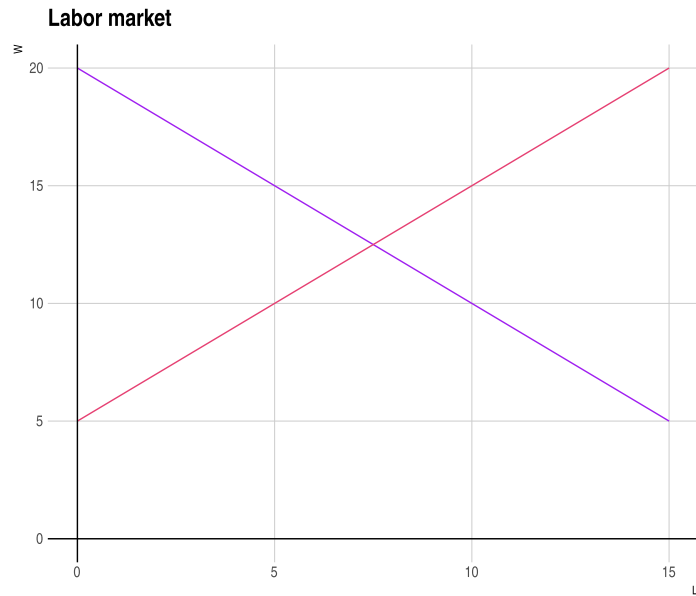
$$W_S = 5 + 2L_S$$

Solve for equilibrium W^*, L^*

Competitive Model: Example

$$W_D = 40 - 5L_D$$

$$W_S = 5 + 2L_S$$



Competitive Model

We built up labor **supply** and **demand**. Where do these come from?

- Demand: Firms
- Supply: Workers

What did we assume about the market structure?

- **Perfect Competition**

Probably not super reasonable

What are some other common labor market structures?

Monopsony

Monopsony

Definition: Monopsony

- A labor market situation which there is only **one buyer**

A firm is a **monopsonist** if they are **the only employer** of labor in the area

A firm has **monopsony power** if they have influence on the market wage

Not to be confused with **monopoly** (only one **seller** of a good)

Can you think of any examples?

- Coal towns
- Amazon / Walmart Towns?
- Universities (go GTFF!)

I owe my soul to the company store - 16 Tons

Monopsony

So what are the main consequence(s) of **monopsony**?

Monopsonists have the ability to pay a wage below the marginal value

The consequences?

- **Higher profit** for the firms
- Deadweight loss; inefficient outcomes (ie less surplus)

Lets formalize monopsonies in a labor market model

Recall: In the competitive model, the firm pays the worker $w = MRP_l$.

- Is this what the monopsonist would do?

Monopsony

Competitive model: Firms seek to maximize profits but can't influence wages

The competitive firm hires labor until the marginal profit w.r.t to labor is zero

$$\pi = TR - TC$$

$$\pi = TR - wL - rK$$

Profit maxing cond: $\frac{\Delta\pi}{\Delta L} = 0 \implies MRP_L - w = 0 \implies w = MRP_L$

Monopsony: Formalizing the Result

Monopsonist can influence wages by the amount of labor they hire

Now

$$\pi = TR - w(L)L - rK$$

where $w(L)$ is an increasing function of the amount of labor hired

Firm will hire labor until marginal cost is equalized to marginal benefit

- or: *marginal profit* wrt *labor* is equal to zero

$$\frac{\Delta\pi}{\Delta L} = 0$$

Monopsony: Formalizing the Result

So the monoposonist hires until:

$$MRP_L = MC_L$$

Compared to the competitive outcome:

$$MRP_L = W$$

Important: In the competitive model, marginal cost of labor was constant (equal to wage)

An Example:

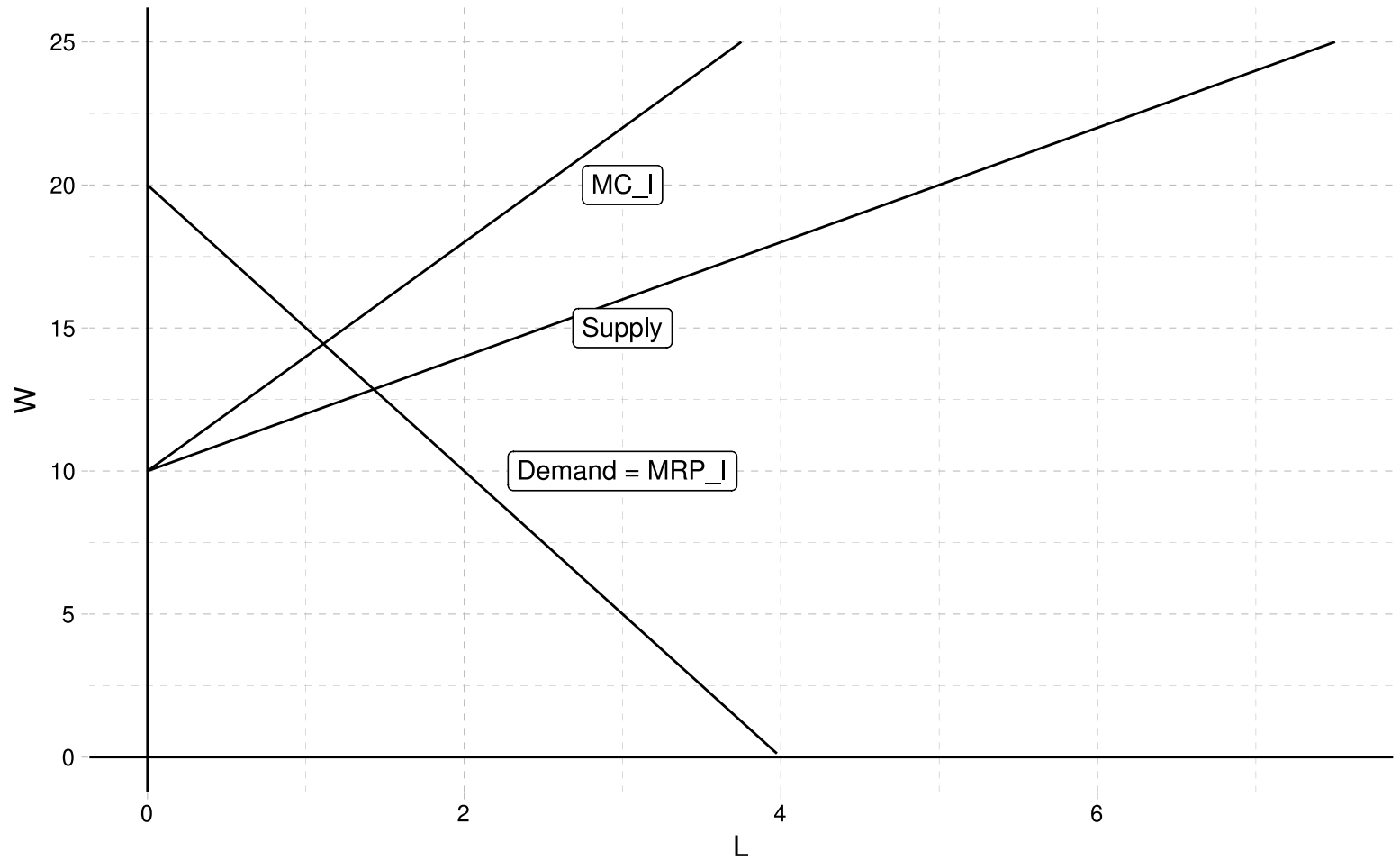
Monopsonist Wage Schedule

Wage	Labor	TC	MC
1	1	1	1
2	2	4	3
3	3	9	5
4	4	16	7
5	5	25	9

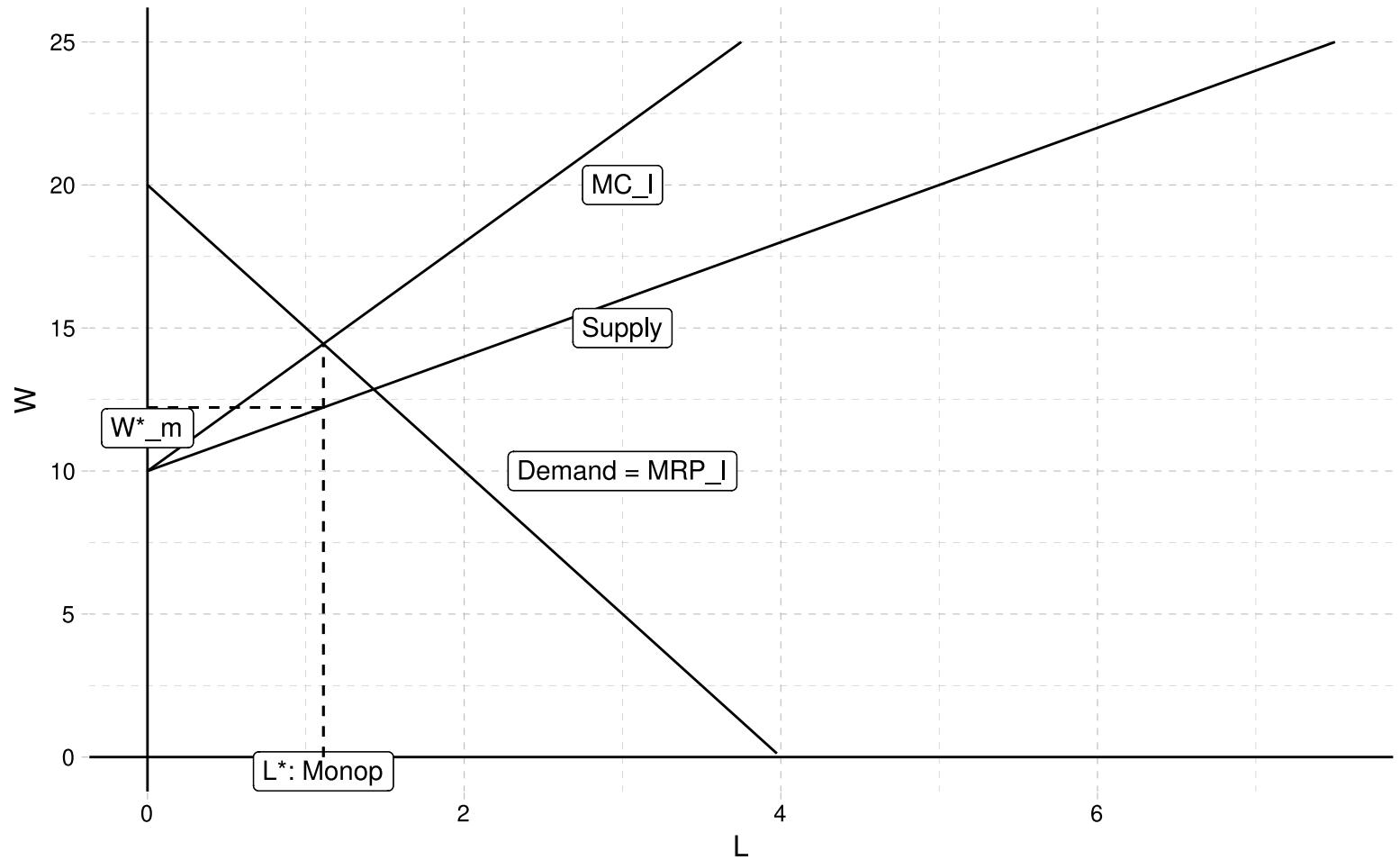
Let's fill in the table. What do you notice?

At every level of labor, the marginal cost of labor exceeds the wage

Graph of Monopsony



Graph of Monopsony



Monopsony: Example

Suppose a firms L_D and L_S are described by the following functions:

$$W_D = 40 - 2 * L$$

$$W_L = 4 + 2x$$

- (i). What is the MC_L curve for the firm?
- (ii). What is the EQ wage w^* and quantity of Labor L^* ?

Monopsony: Example

$$W_D = 40 - 2 * L$$

$$W_L = 4 + 2x$$

Minimum wage

Minimum wage

Minimum wages are a form of **price controls**.

Specifically, a minimum wage is a **price floor**

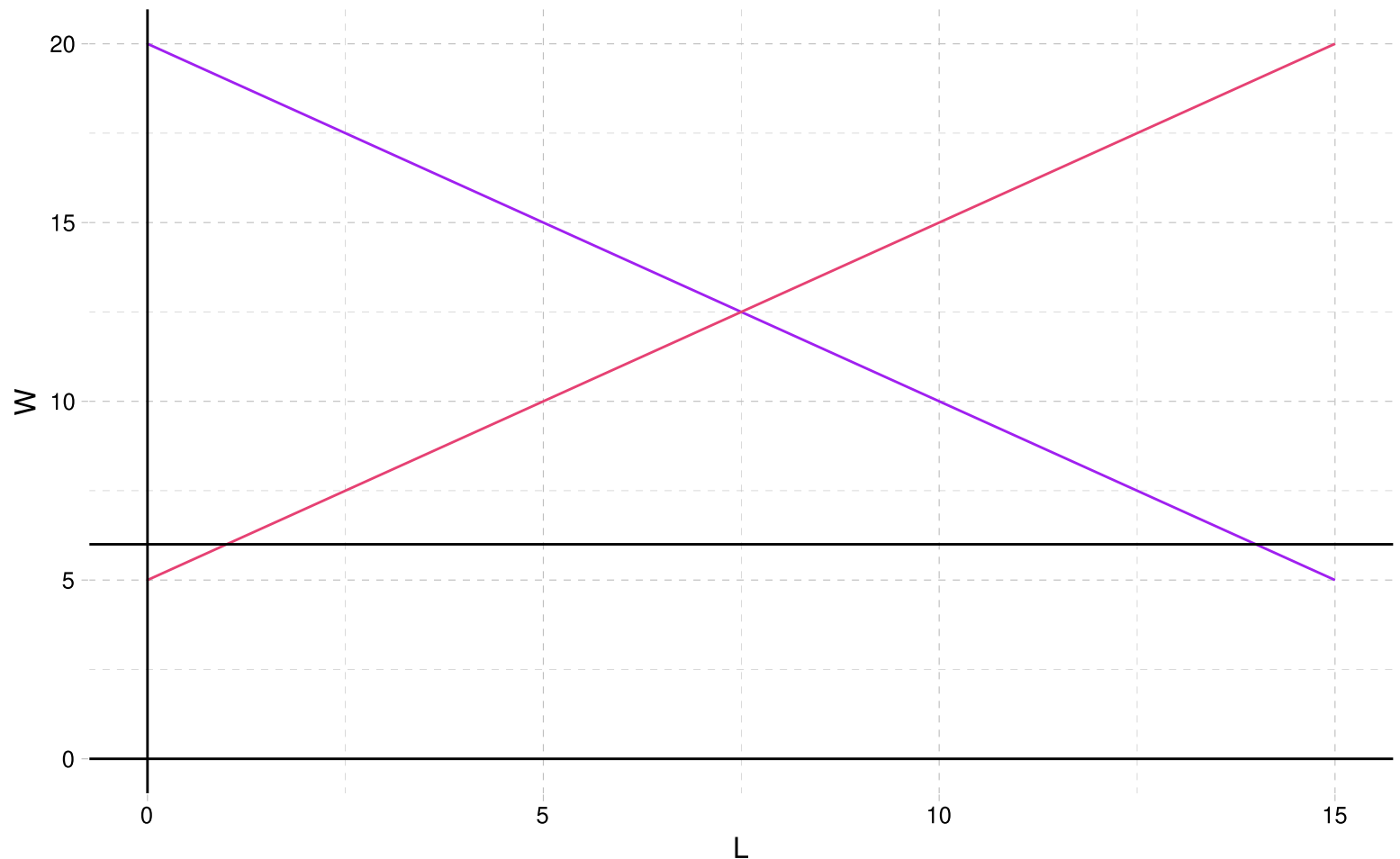
- **Price floor:** Dictates the **minimum** allowed price for transactions in a marketplace

A price floor is **binding** if it has an impact on the market equilibrium

A price floor that is below the market price is **nonbinding**

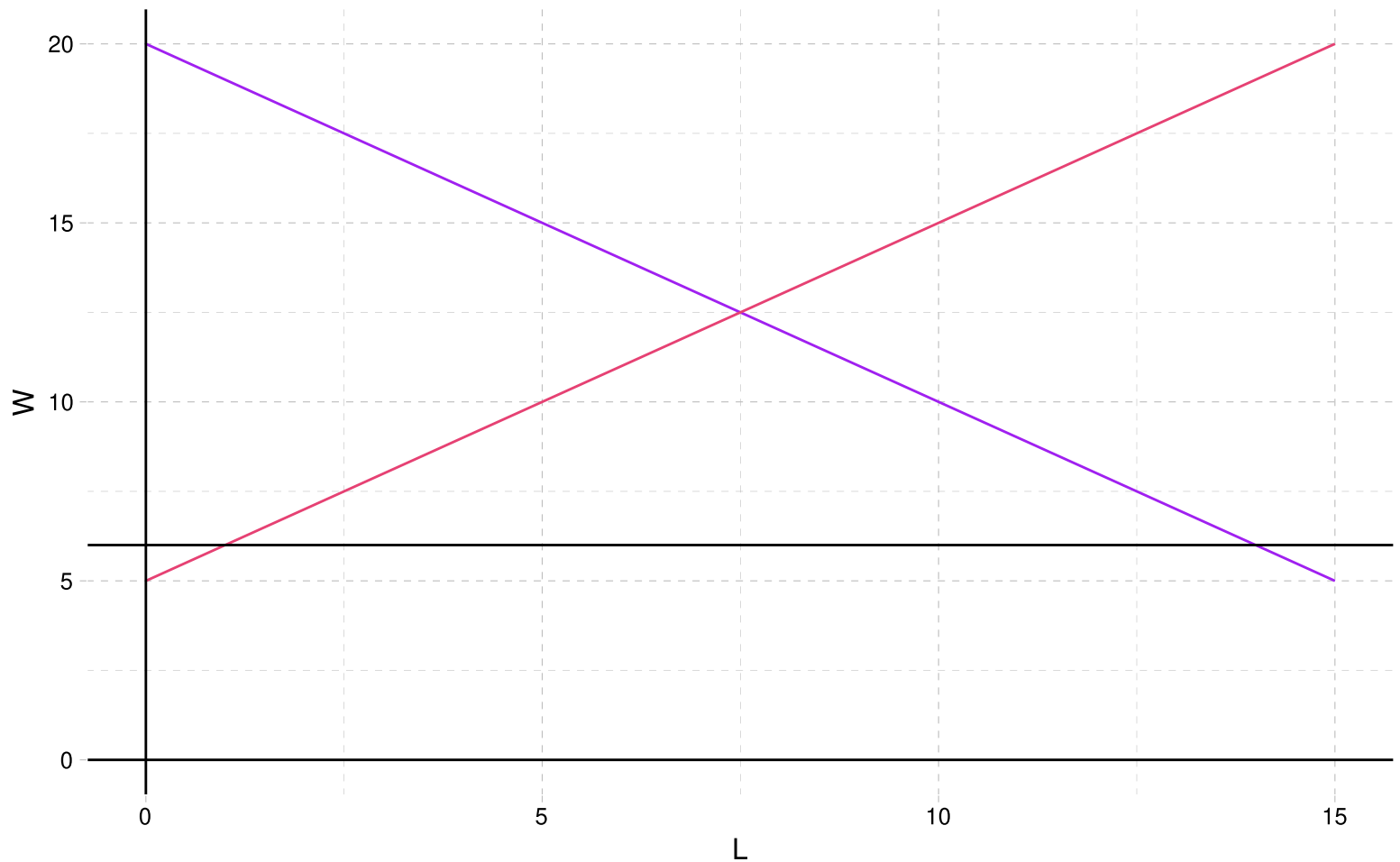
Minimum wage

Is the following price floor binding?



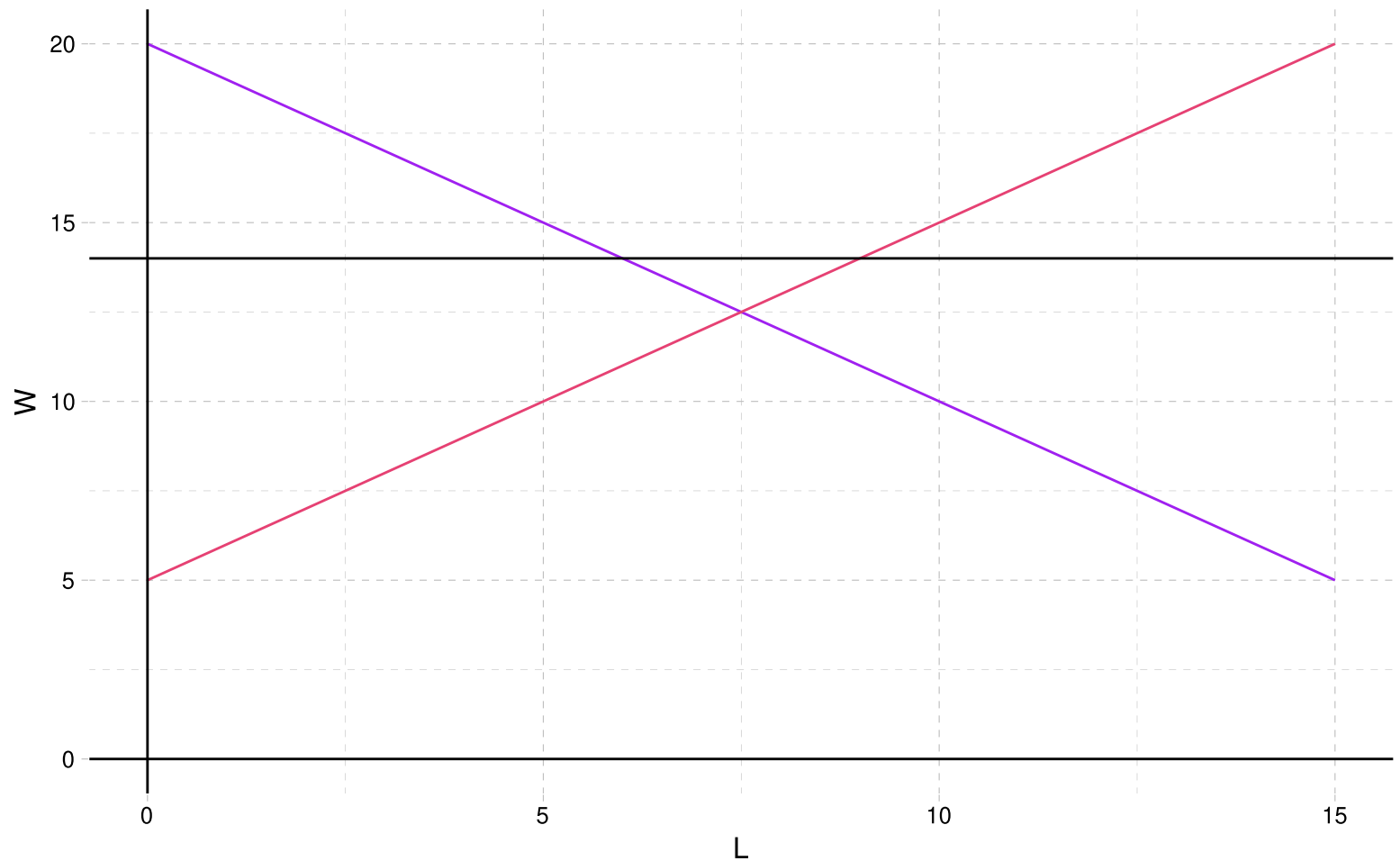
Minimum wage

The following is **nonbinding**



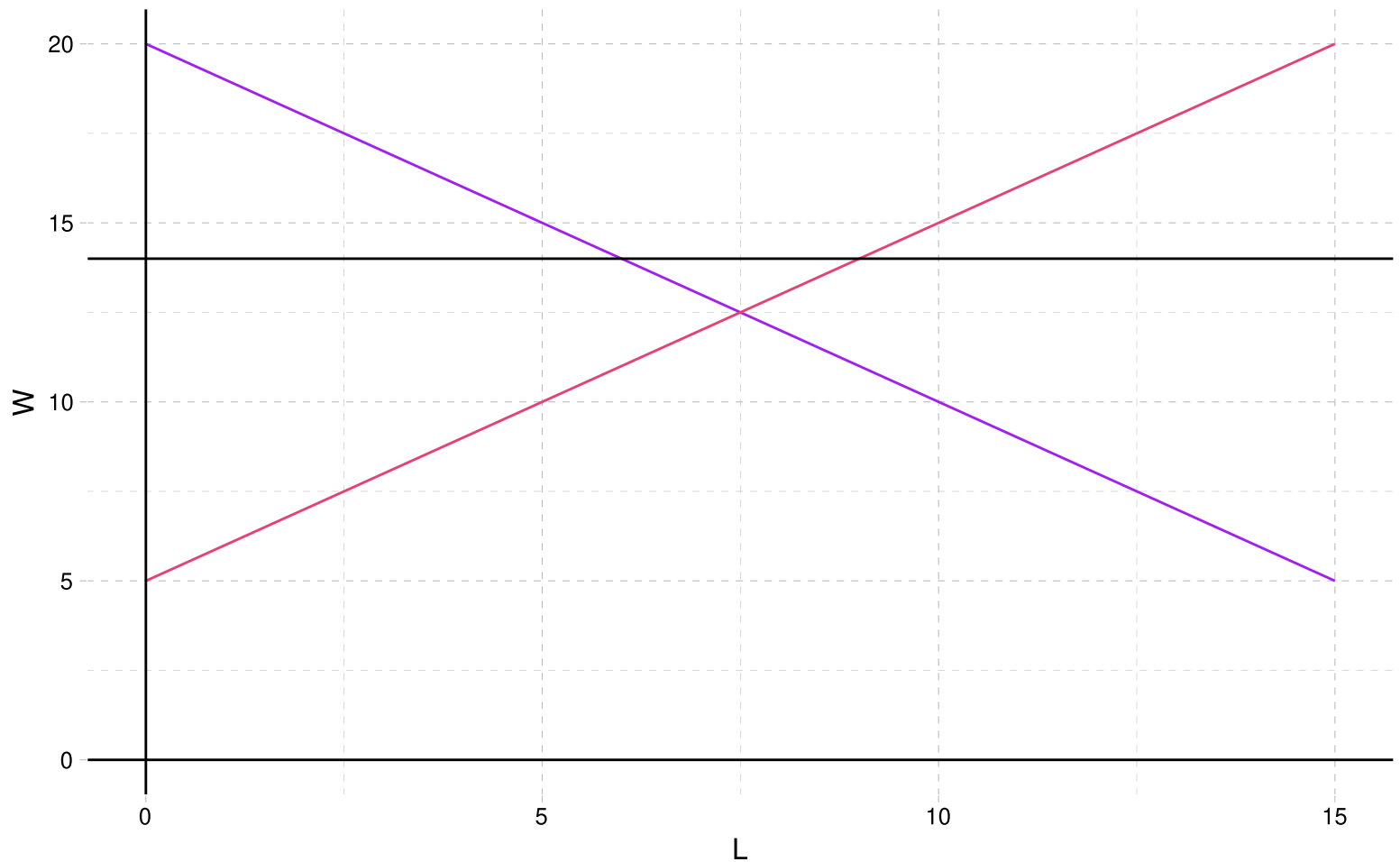
Minimum wage

Is the following binding?

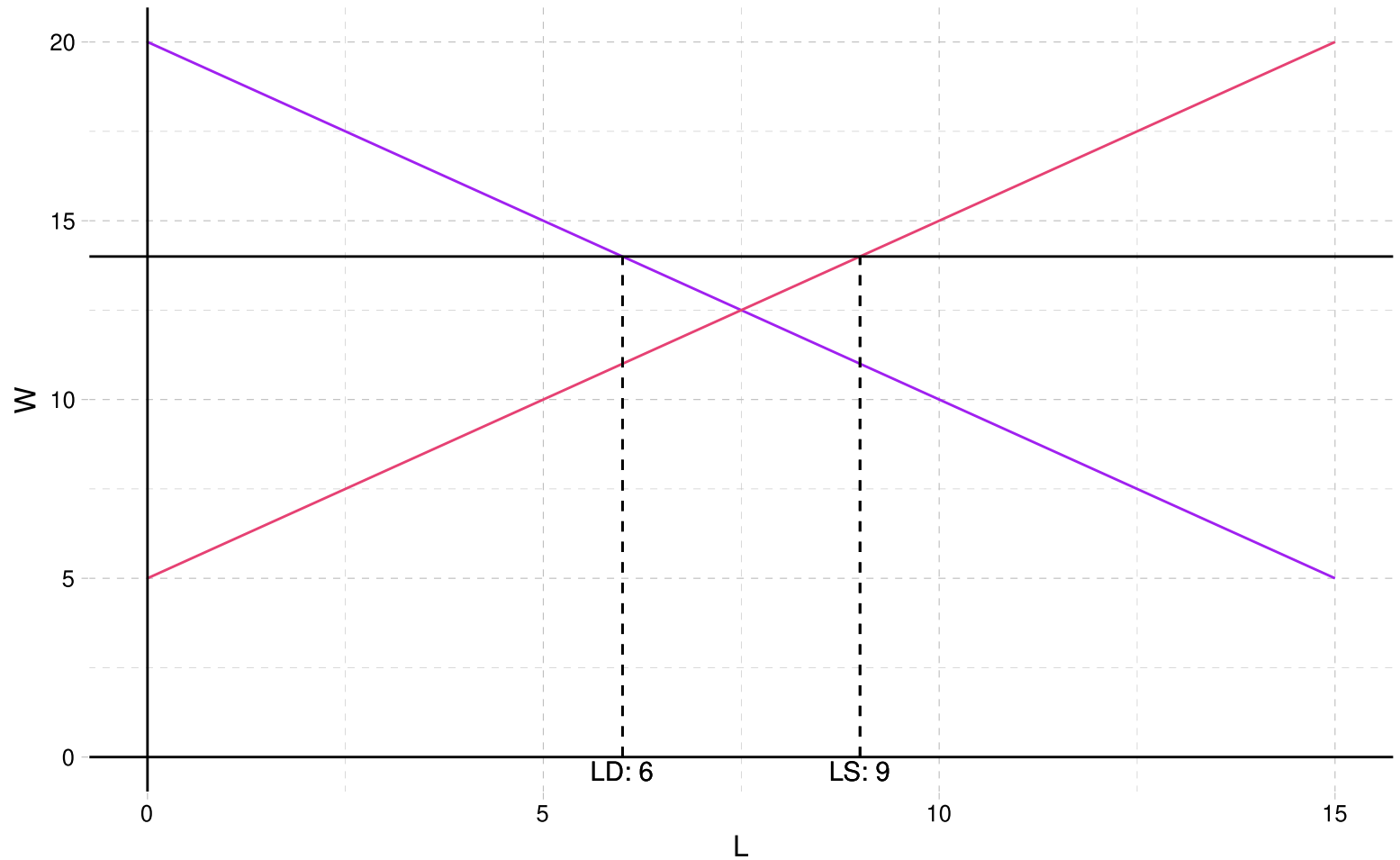


Minimum wage

The following is **binding**



Minimum wage



Monopsony and Minimum Wage

- So we saw the **monopsonist** outcome leads to **lower employment and wages** than the **competitive outcome**.
- In perfect competition, what happens to unemployment with a minimum wage?
- Is it the same with a monopsony? No!

Minimum wage: Example

Let's compare the effect of a minimum wage on both market structures:

- Competitive market
- Monopsony

Suppose we have two cities (A and B). City A follows the following L_D and L_S

$$W_D^A = 25 - 5 \cdot L_D^A$$

$$W_S^A = 3 + 3 \cdot L_S^A$$

And city B follows the following L_D and L_S

$$W_D^A = 25 - L_D^A$$

$$W_S^A = 1 + 3 \cdot L_S^A$$

Minimum wage: Example

Minimum Wage: Monopsony

