

# Econ 330: Urban Economics

## Lecture 8

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Feb 1st, 2021



# Lecture 9: Urban Labor Markets I

# Schedule

## Today

- 1) **Labor Markets and Urban Econ**
- 2) **Urban Labor Demand**
- 3) **Urban Labor Supply**
- 4) **Equilibrium**

## Upcoming

- **Read**
- **HWII** due saturday 
- **Midterm**: one week from today  


# Quick Midterm Notes

- **Midterm will be given next Monday (Feb 8th)**
  - You must take it during class hours. **Submitted by 6:15**
- **Write your answers on a piece of paper -- upload a pdf**
- No need to answer it on the same page as the test. However if this is easier for you, there is space provided and you can do so. Single pdf
- Review with specifics next class. Fun stuff coming after midterm!

## Moving Forward

We are now transitioning from looking at **within** city sorting to **across** city sorting

# Labor Markets

Why labor econ in urban econ?

- David Card:

| A city *is* a labor market

**Question:** What does Card mean? Do you agree?

- Cities provide incentives for firms and workers to locate close to each other
- In a sense, the density of a city is generated entirely by incentives in the labor market

# Motivation

To further motivate our study of urban labor markets, let's ask the following:

**Question:** If we wanted to model **individual** decision making for locations, what things would we throw into this model?

- Put differently, what are some of the most important features for where people decide to live?
- **wages**
- Rents
- Amenities (this can include tons of things)
- Birthplace?
- Distance to birthplace?

# Motivation

- It turns out that wages are a pretty big feature of individual and household location choices
  - If Amazon opens in Portland, will this impact where people live?

**Q2** Let's now take it as given that people care about their wage. Followup question: How do wages respond to changes in household/individual location decisions?

**It depends**<sup>TM</sup> (on what?)

- The structure of the labor market (production processes, competitiveness of the labor market)

# Labor Markets

A labor market consists of:

1. Buyers of labor (firms)
  - Note: **firms** generate labor demand
2. Sellers of labors (people)
  - Note: **people** generate labor supply



# Labor EC101

Usually:

- Labor economists discuss labor supply as being generated from a labor-leisure tradeoff
  - Model: Rational agent's making optimal choices over leisure choice/education choice, etc

Urban is different

- Assume that labor supply is generated from *location choices*
- Assume people work the same amount, but choose where to work and live

What do both fields have (somewhat) in common?

## Labor Demand

- Definition: **Labor Demand**
  - A set of quantities of labor demanded corresponding to a set of wages (the entire curve)

### Question:

How is a change in *labor demand* different than a change in *quantity of labor demanded*?

# Checklist

1) **Labor Markets and Urban Econ:**  
**overview:** 

2) **Urban Labor Demand**

3) **Urban Labor Supply**

4) **Equilibrium**

# Labor EC101: Labor Demand

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

## Assumptions

1. Firms seek to maximize profits
2. Markets are perfectly competitive (in **both** inputs and output)
  - **Implication:**
    - 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

# Firm Labor Demand

Can we derive a rule for how much labor the firm will hire in the competitive model?

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

# Firm Labor Demand

Can we derive a rule for how much 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
- $F(L, K)$ : quantity produced, as a function of labor and capital utilized.  
Sometimes written  $Q = F(L, K)$
- $w$ : wage rate,  $L$ : total labor employed
- $r$ : rental rate of capital,  $K$ : capital used

# Firm Labor Demand

**Claim:** The firm hires more labor so long as the *marginal profit* w.r.t labor is positive.

- **Defn:** Marginal Profit (w.r.t labor),  $\frac{\Delta\pi}{\Delta L}$ : The change in profit from hiring an additional unit of labor

"Proof" of claim:

- If  $\frac{\Delta\pi}{\Delta L} < 0$ , the added profit from an additional unit of labor is negative (ie a loss), so the firm *should not* hire the next unit
- If  $\frac{\Delta\pi}{\Delta L} > 0$  then the added profit from an additional unit of labor is positive (ie a gain), so the firm should hire the next unit
- If  $\frac{\Delta\pi}{\Delta L} = 0$ , this is optimal for the firm (next unit of labor yields negative profit)

# Reminder

From 201, remember that the following:

- **Marginal Product (of labor)**: The change in output from a one unit change in the amount of labor employed

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

- **Marginal Revenue Product (of labor)**: The *value* of the change in output from a one unit change in the amount of labor employed

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



# Firm Labor Demand: Math

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

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

# Firm Labor Demand: Math

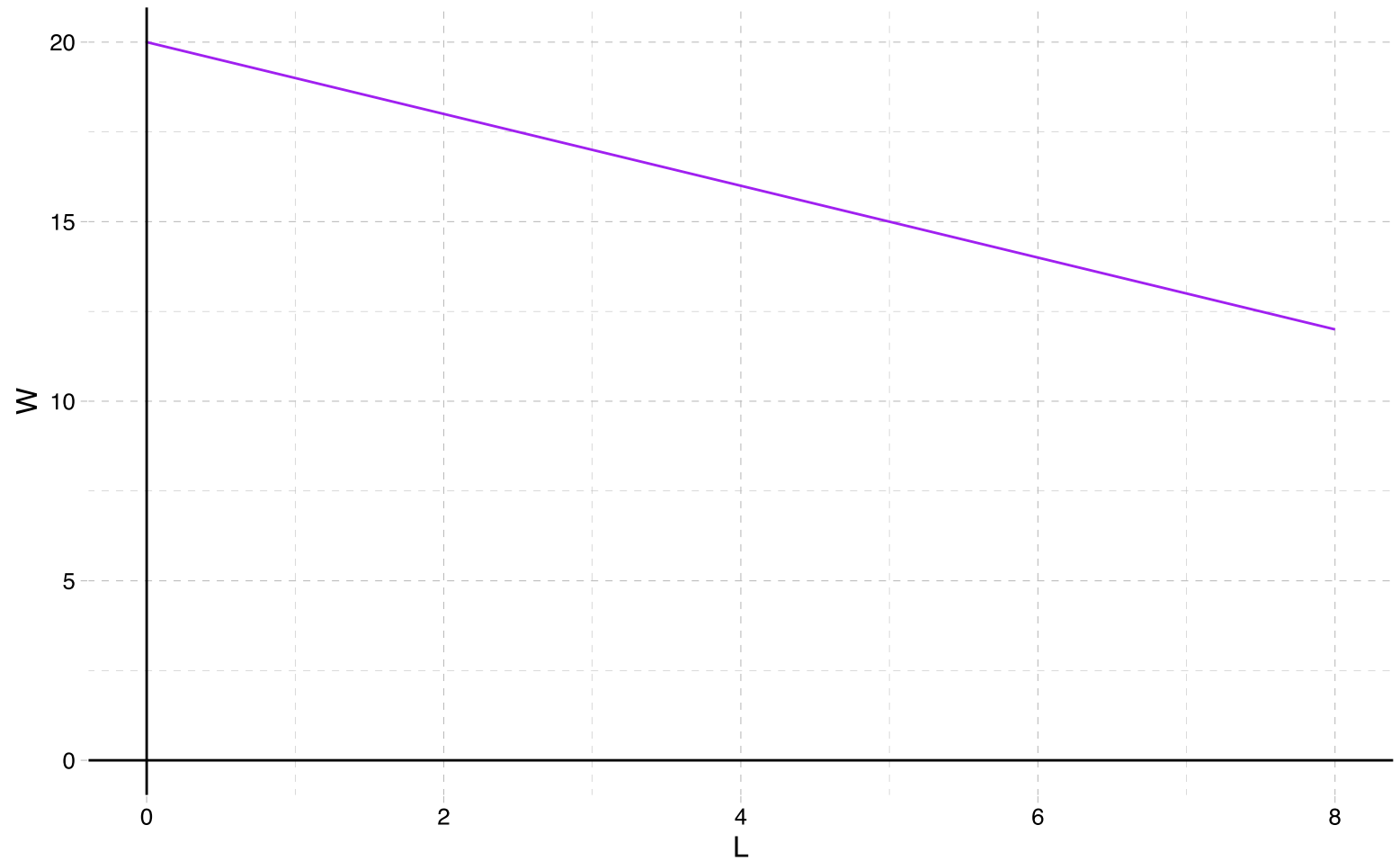
So what is  $\frac{\Delta\pi}{\Delta L}$ ?

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

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

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

# Urban Labor Demand: Graph



# Demand Variation

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

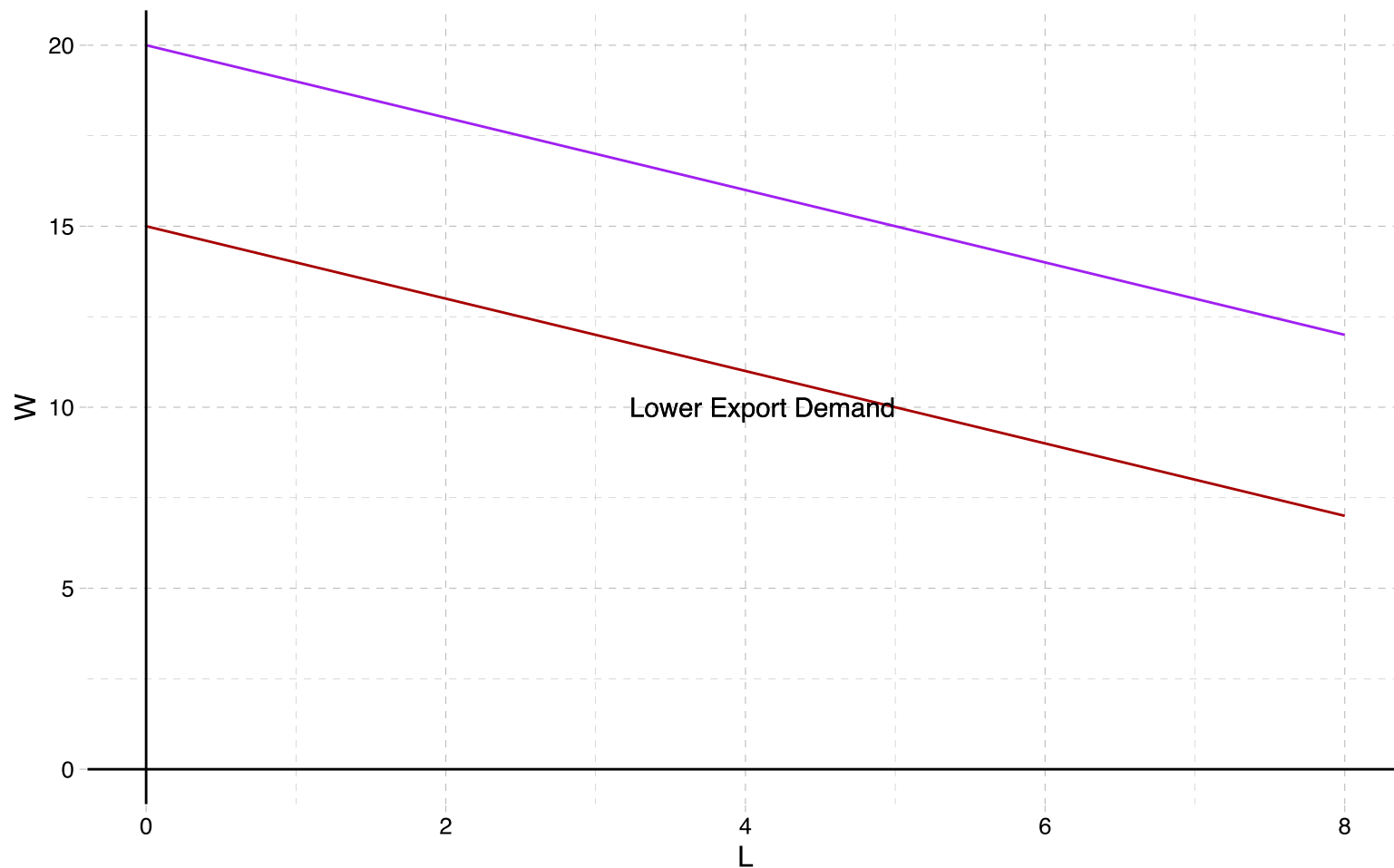
- 1) Differences in productivity across cities (agglomeration)
- 2) Variation in Business Taxes Across cities
- 3) Industrial public service infrastructure (electricity, water, gas pipelines)
- 4) Land use policies (stricter zoning  $\implies$  higher land price  $\implies$  less money for other inputs)
- 5) Demand for cities exports
  - If a particular type of good is manufactured in a given city, and demand for this good increases, demand shifts out

# Labor Demand: Ex 1

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

# Labor Demand: Ex 2

Q: What about a city with lower export demand?



# Checklist

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3) **Urban Labor Supply**

4) **Equilibrium**

# Labor Supply

Labor supply is driven from location decisions of individuals. What generates location choices?

- 1) **Wages**
- 2) Rents
- 3) Amenities
- 4) Other, individual specific stuff (like birth location)



# 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?

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

# Labor Supply

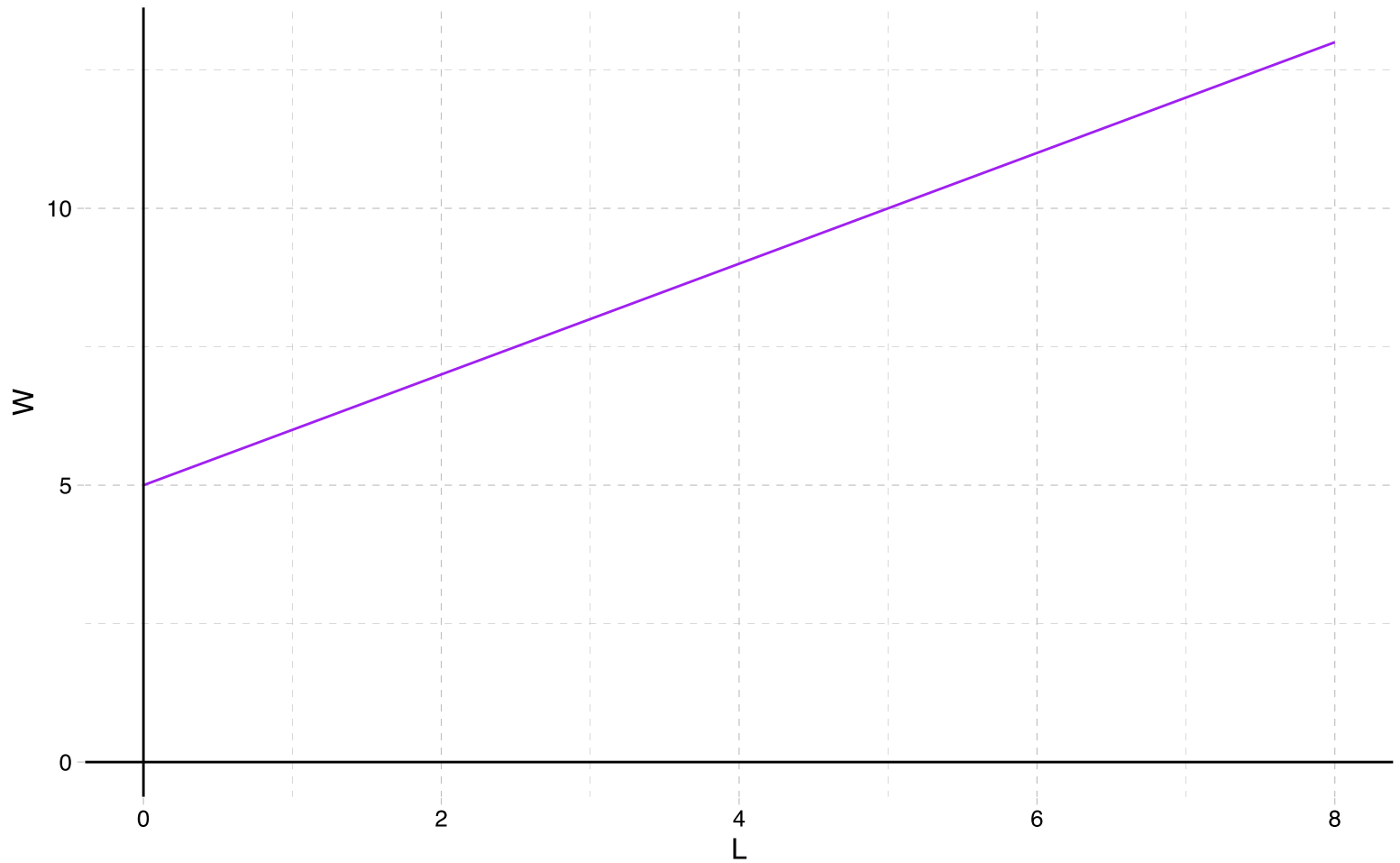
Knowing how responsive workers are to changes in wages is key for vast swaths of policies

- 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?

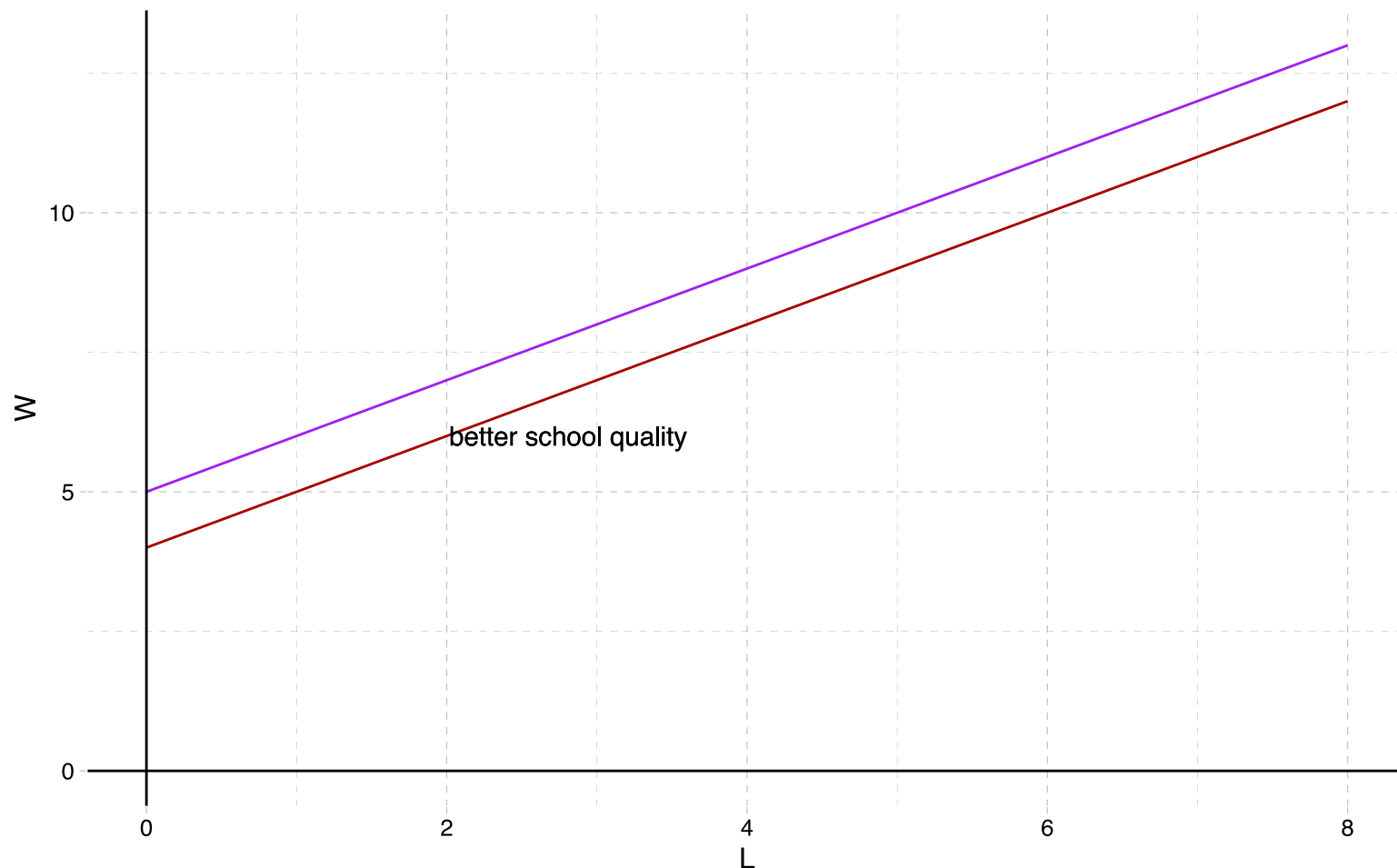
- College educated individuals are more responsive to changes in wages w.r.t their location decisions

# Labor Supply Example



# Labor Supply

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



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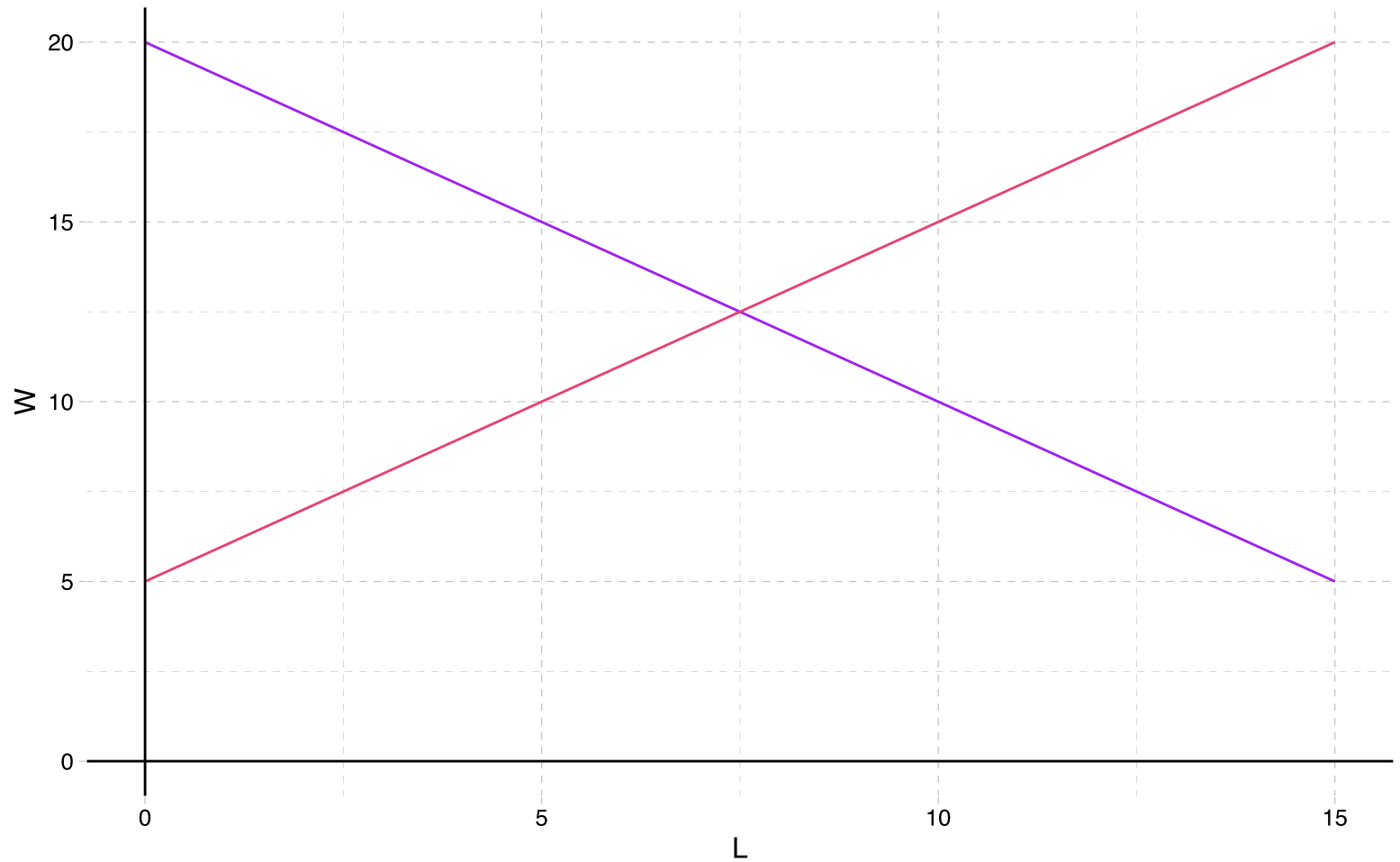
# Equilibrium

## Defn

- A **labor market equilibrium** is a pair of points  $(L^*, W^*)$  such that:
  - labor supply = labor demand
- In other words: 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 eqs can be different across cities

# Equilibrium: Example



# Min Wage Refresher

Recall from EC201: minimum wages are a form of **price controls**. Specifically, a minimum wage is a:

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

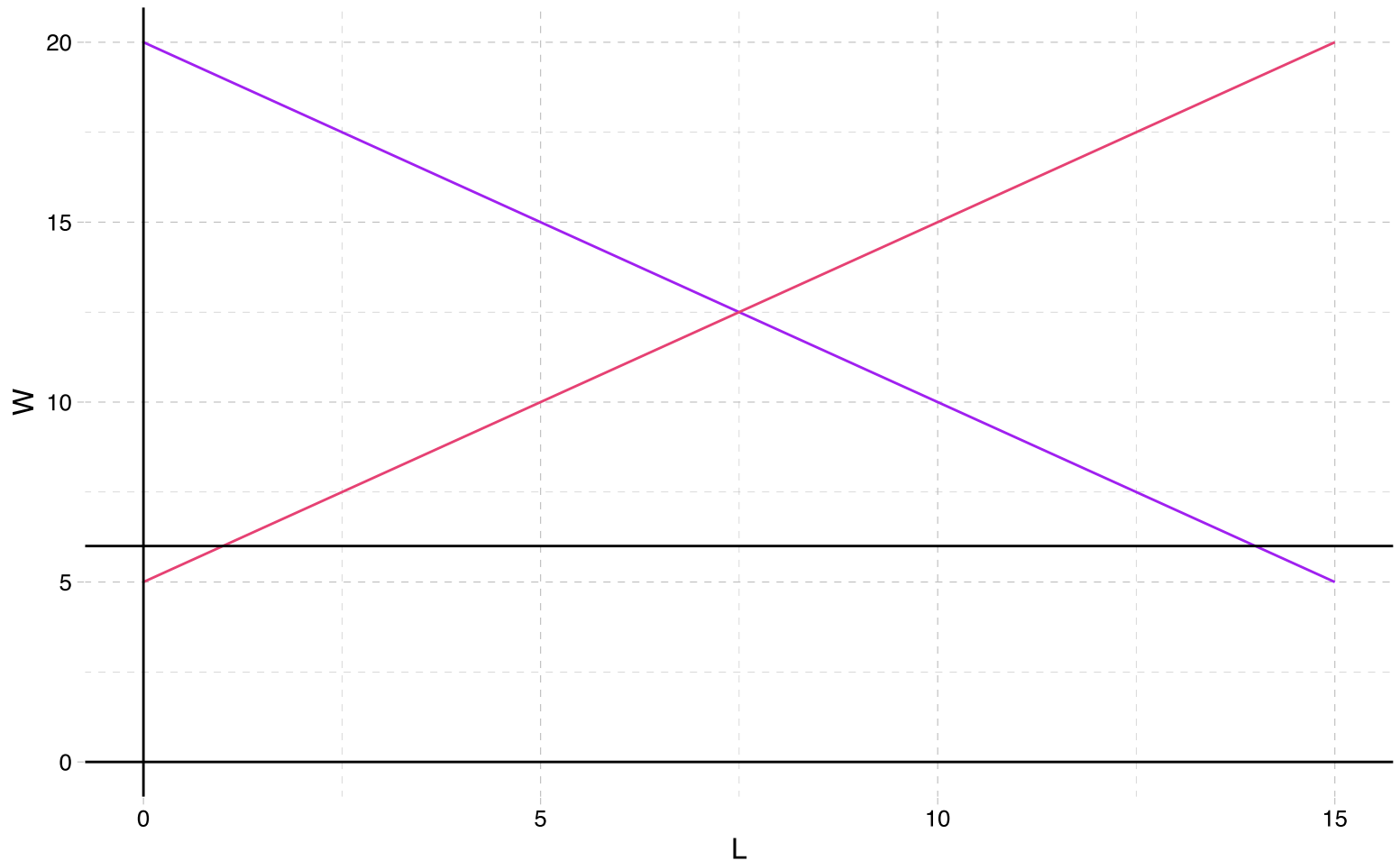
We say that a price floor is **effective** if it has an impact on the market equilibrium

- Price floors that are below the market price are ineffective



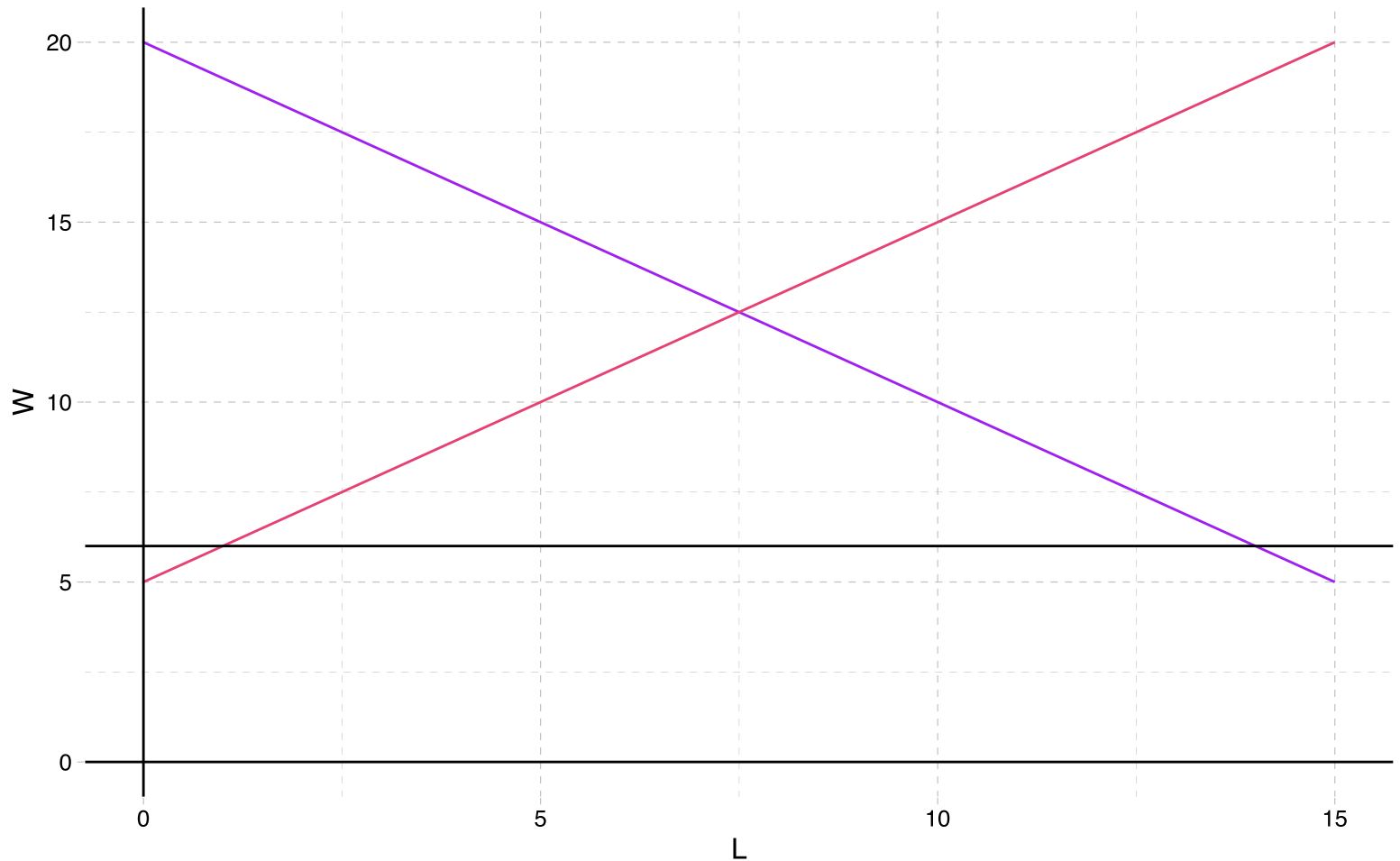
# Min Wage Refresher

Is the following effective/ineffective?:



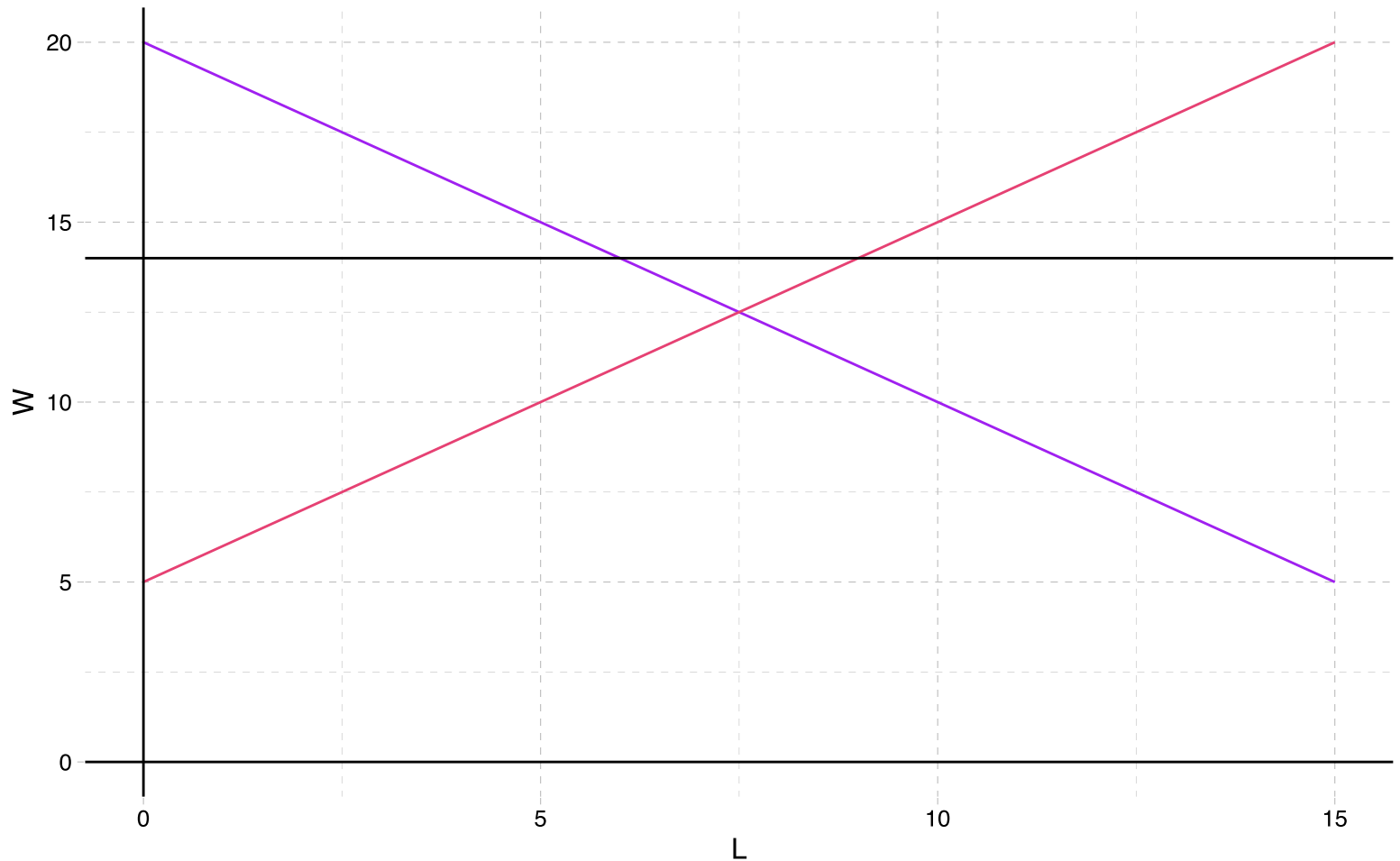
# Min Wage Refresher

The following is **ineffective**



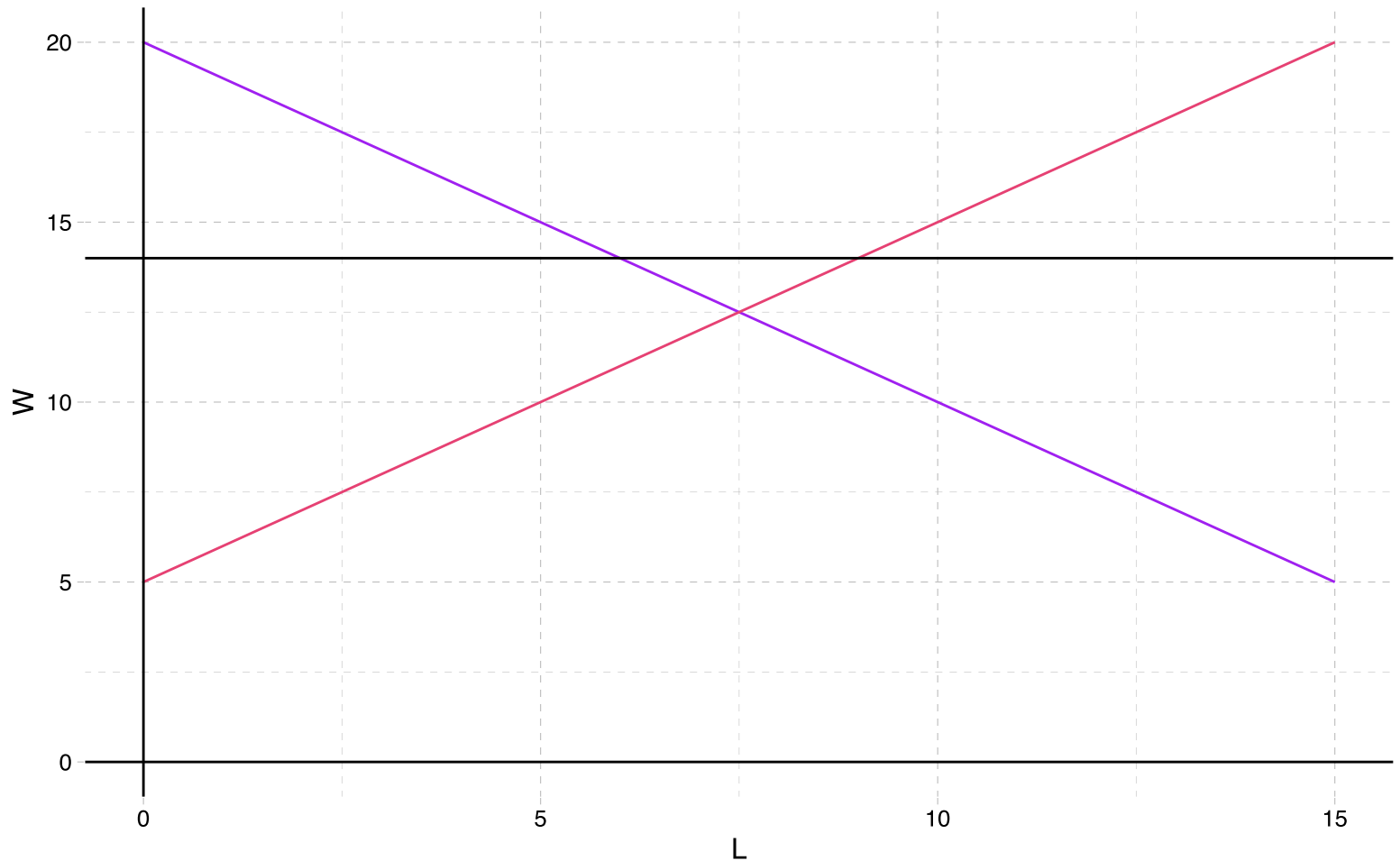
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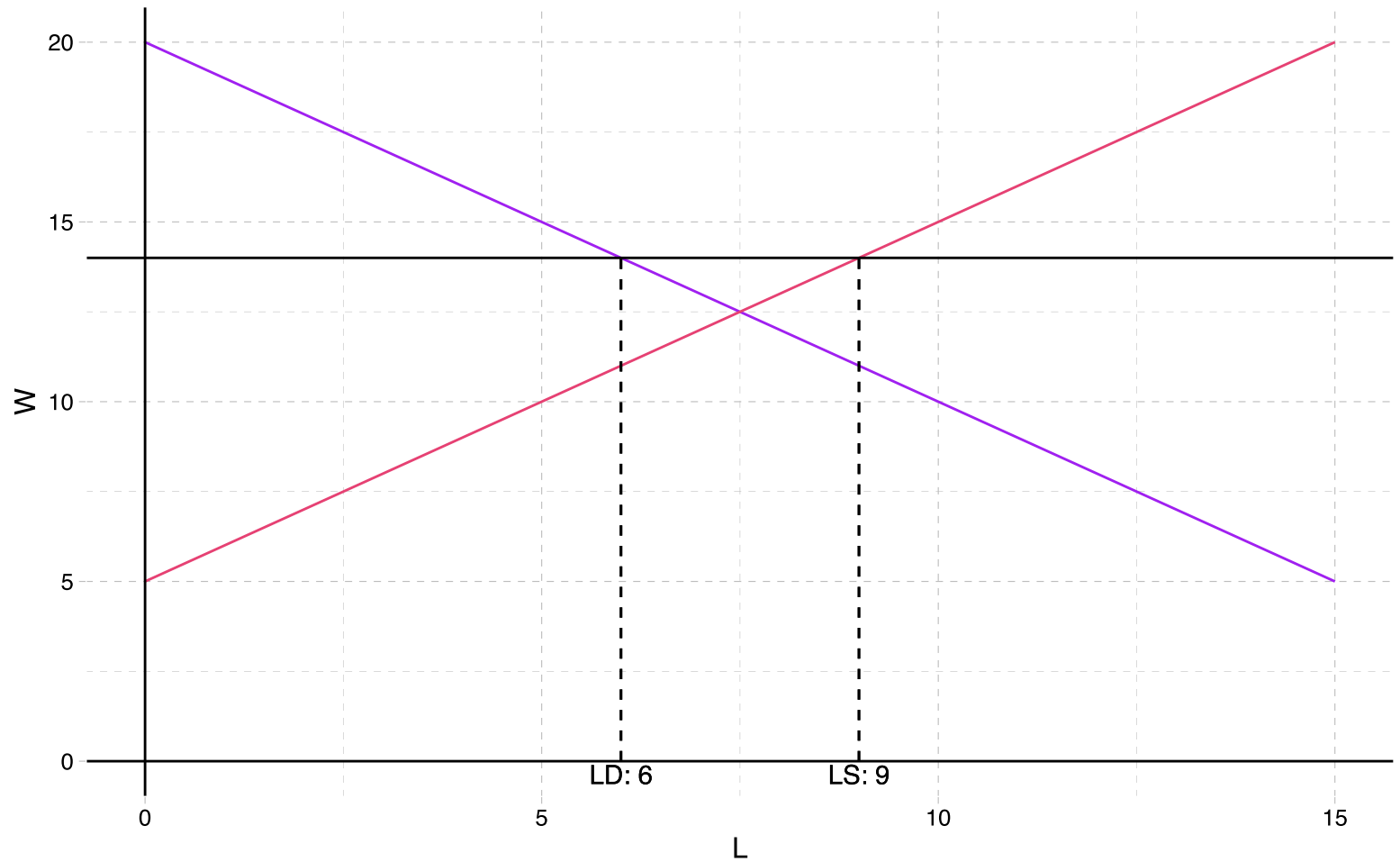


# Min Wage Refresher

The following is **effective**

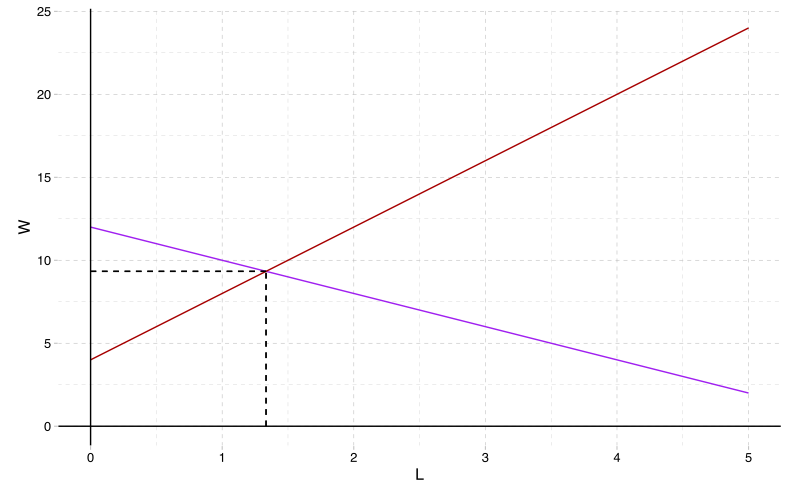
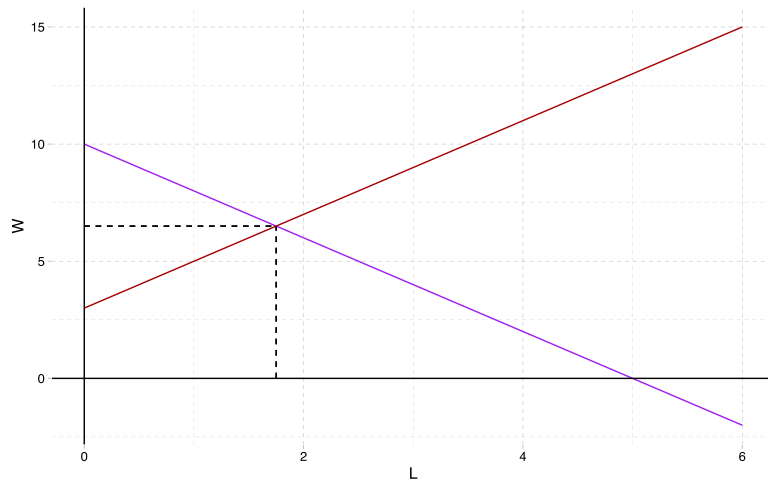


# Min Wage Refresher



# Example: Two Cities

If we treat cities as two *separate* labor markets, have:



# Significance?

## 2 Questions

- Why do we care so much about modeling cities as different labor markets? **Discuss**
- Do you think all labor markets across cities and industries are competitive? **Discuss**

# Some Notes

- All else equal, low tax cities grow faster than high tax cities
- Elasticity (business activity, taxes)
- Across cities: -0.1 to -0.6
- Within cities: -1.0 to -3.0
  - Manufacturers are more sensitive to tax differences



# Checklist

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4) **Equilibrium:** 