# Econ 330: Urban Economics

## Lecture 9

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Feb 4th, 2020

# Lecture 9: Urban Labor Markets I

# Schedule

## Today

0) **Rehash model from last class**

1) **Labor Markets and Urban Econ**

2) **Urban Labor Demand**

3) **Urban Labor Supply**

4) **Equilibrium**

## Upcoming

- **Read**
- **HWII** due next class ⚠️⚠️⚠️
- **Midterm**: one week from today ⚠️⚠️⚠️

# Model from Last Class

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# Checklist

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# 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, lets 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**™ (on what?)

- The structure of the labor market (production proccesses, 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*?

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# 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?

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

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 to labor is positive.

- **Defn**: Marginal Profit (w.r.t to 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

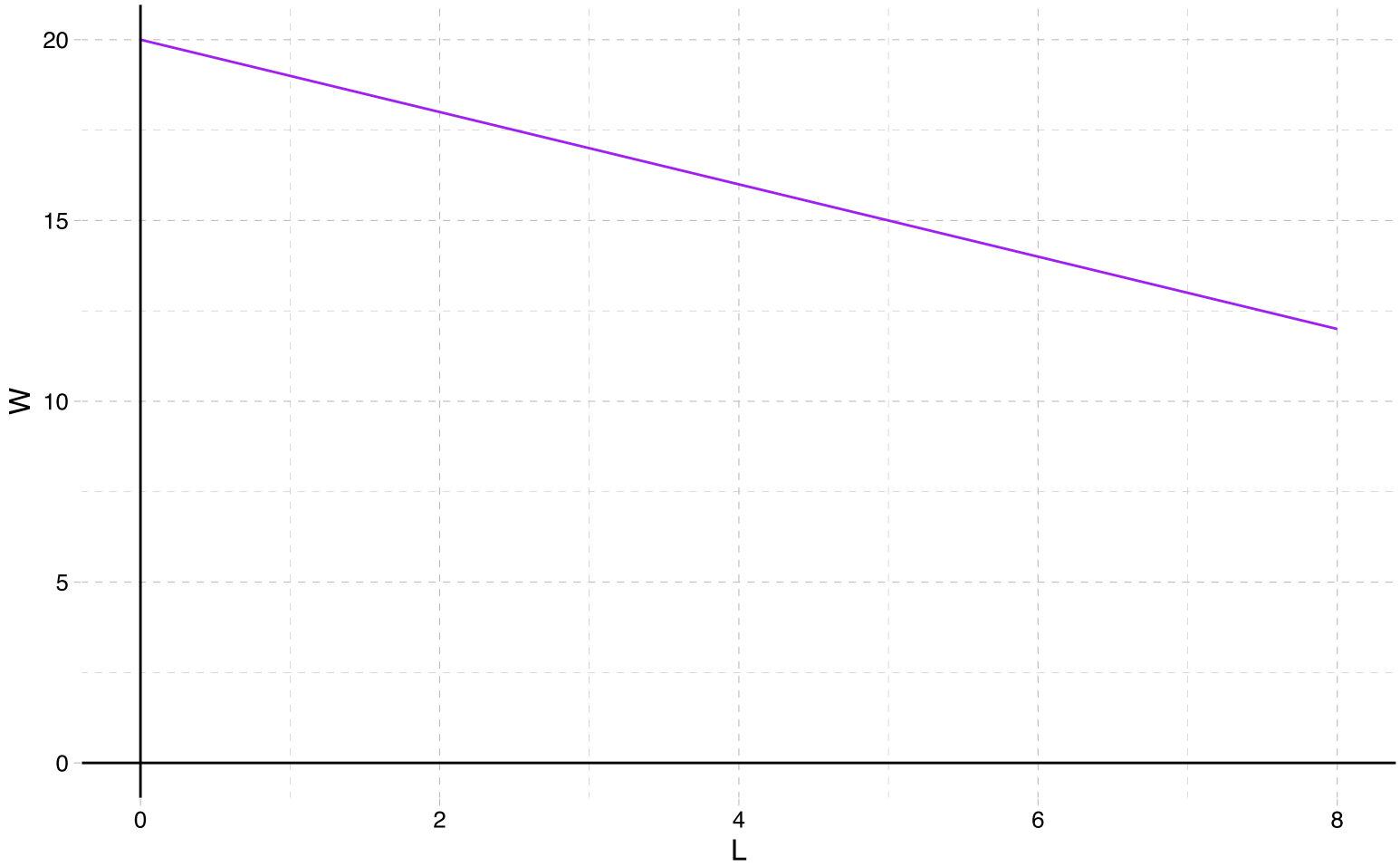
So what is $\frac{\Delta \pi}{\Delta L}$?

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

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 infastructure (electricity, water, gas pipelines)

4) Land use policies (stricter zoning $\Longrightarrow$ higher land price $\Longrightarrow$ less money for other inputs)

5) Demand for cities exports

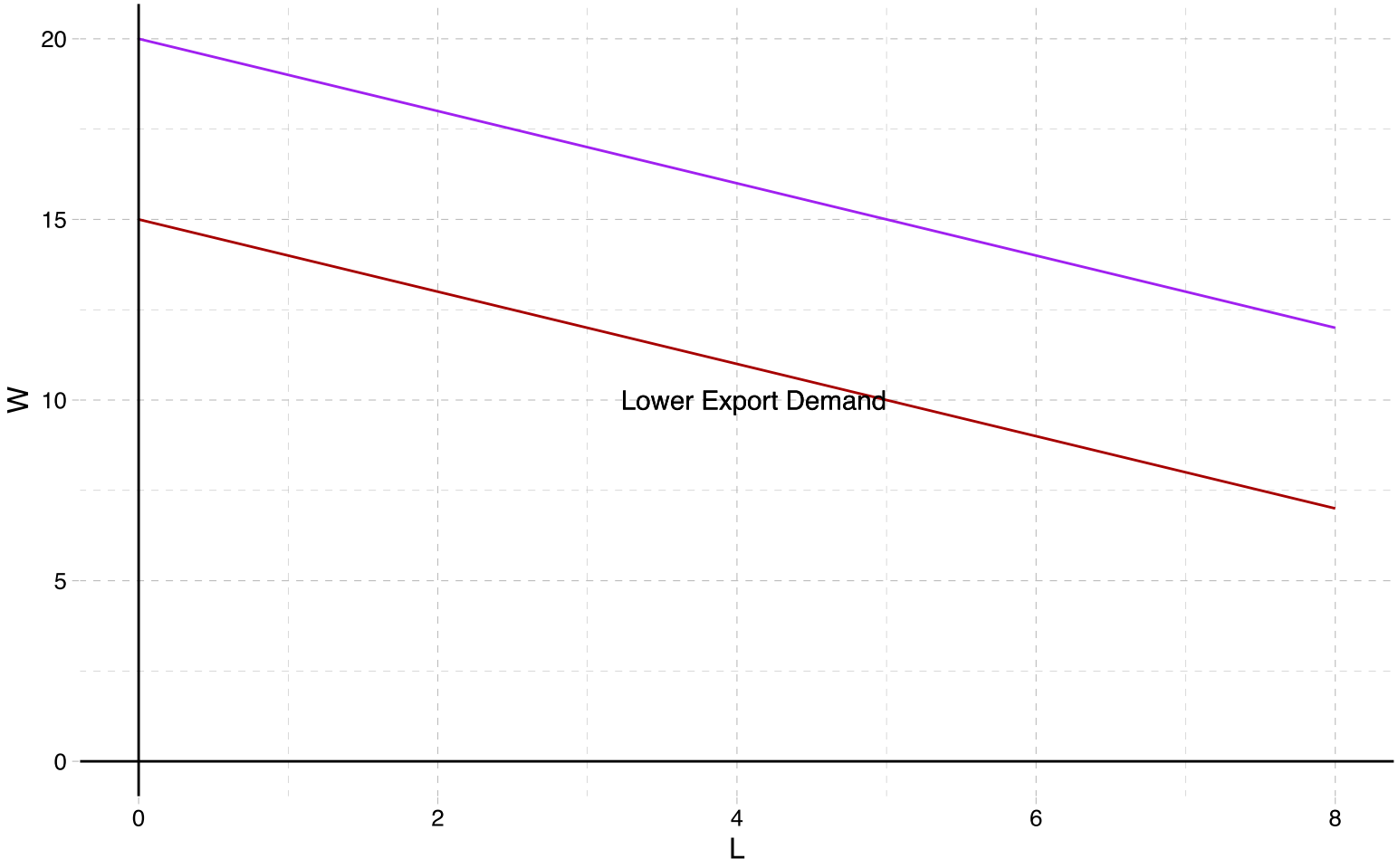
- If a particular type of good is manufactured in a given city, and demand for this good increases, demand shifts out

# 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?



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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

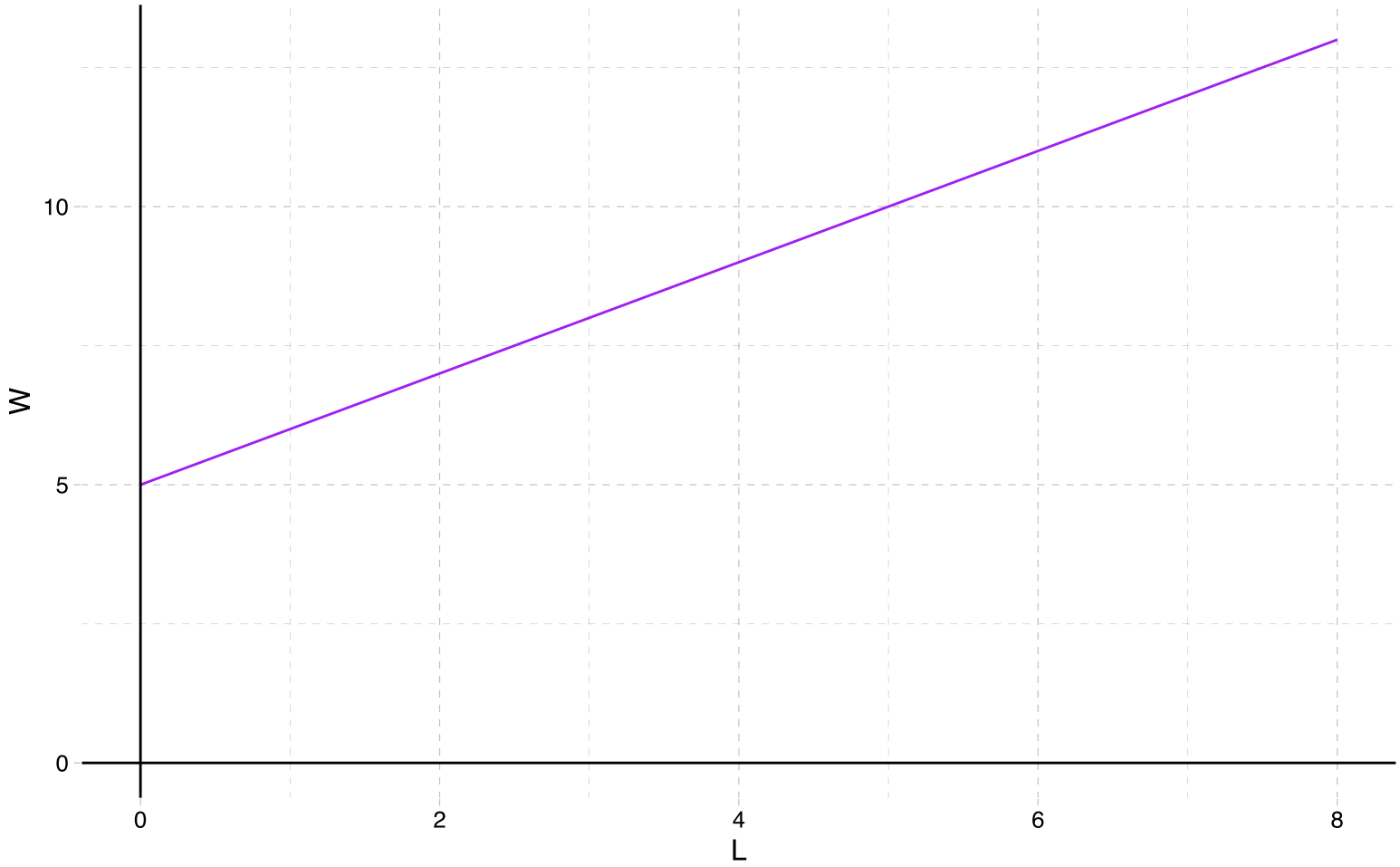
Knowing how responsive workers are to changes in wages is key for vast swaths of policies

- Estimates for labor supply elasticities are pretty big
- If $\varepsilon_{\text{workforce,wage}} = 2$, 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?

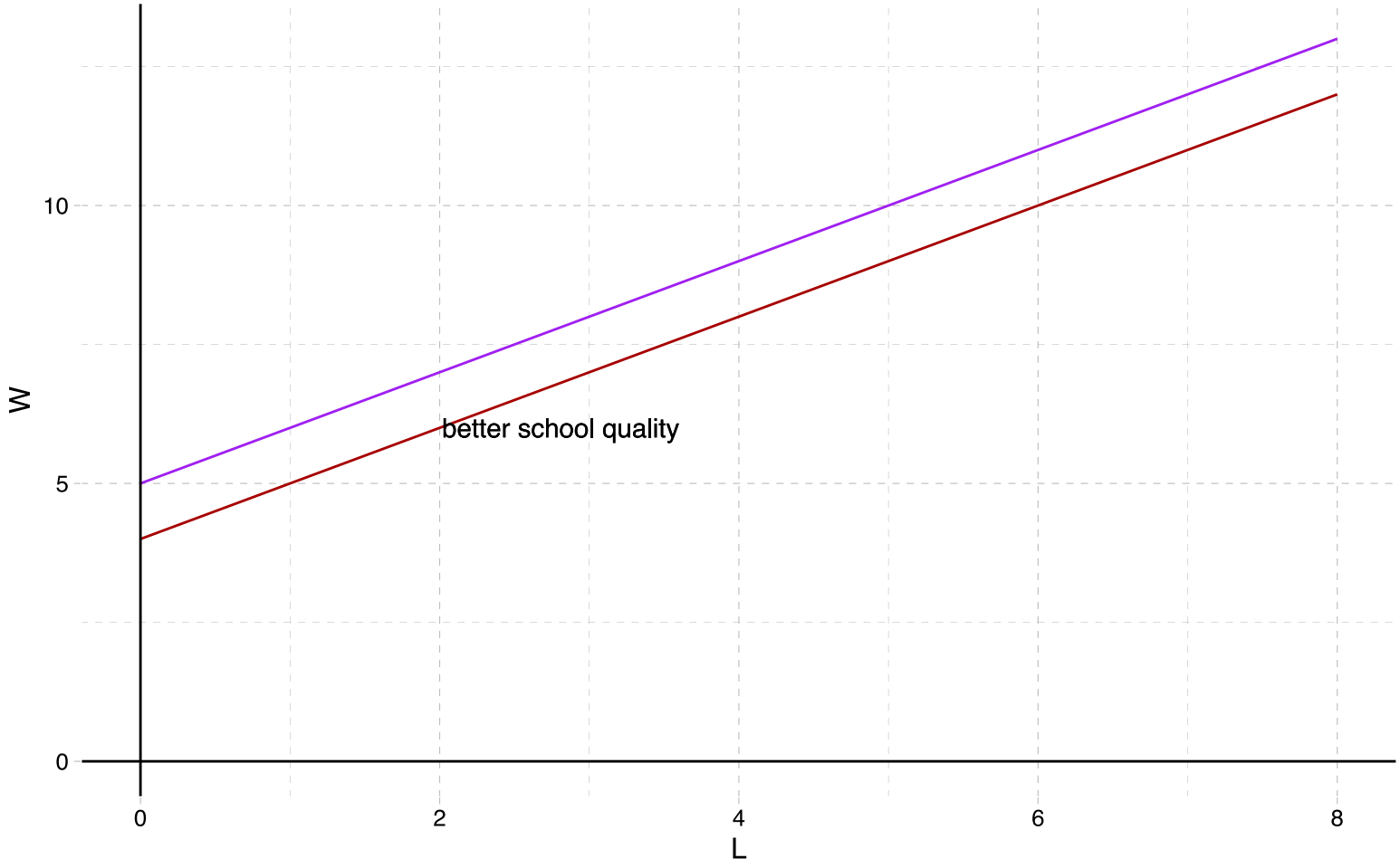
- College educated individuals are more responsive to changes in wages w.r.t to their location decisions

# Labor Supply Example



# Labor Supply

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



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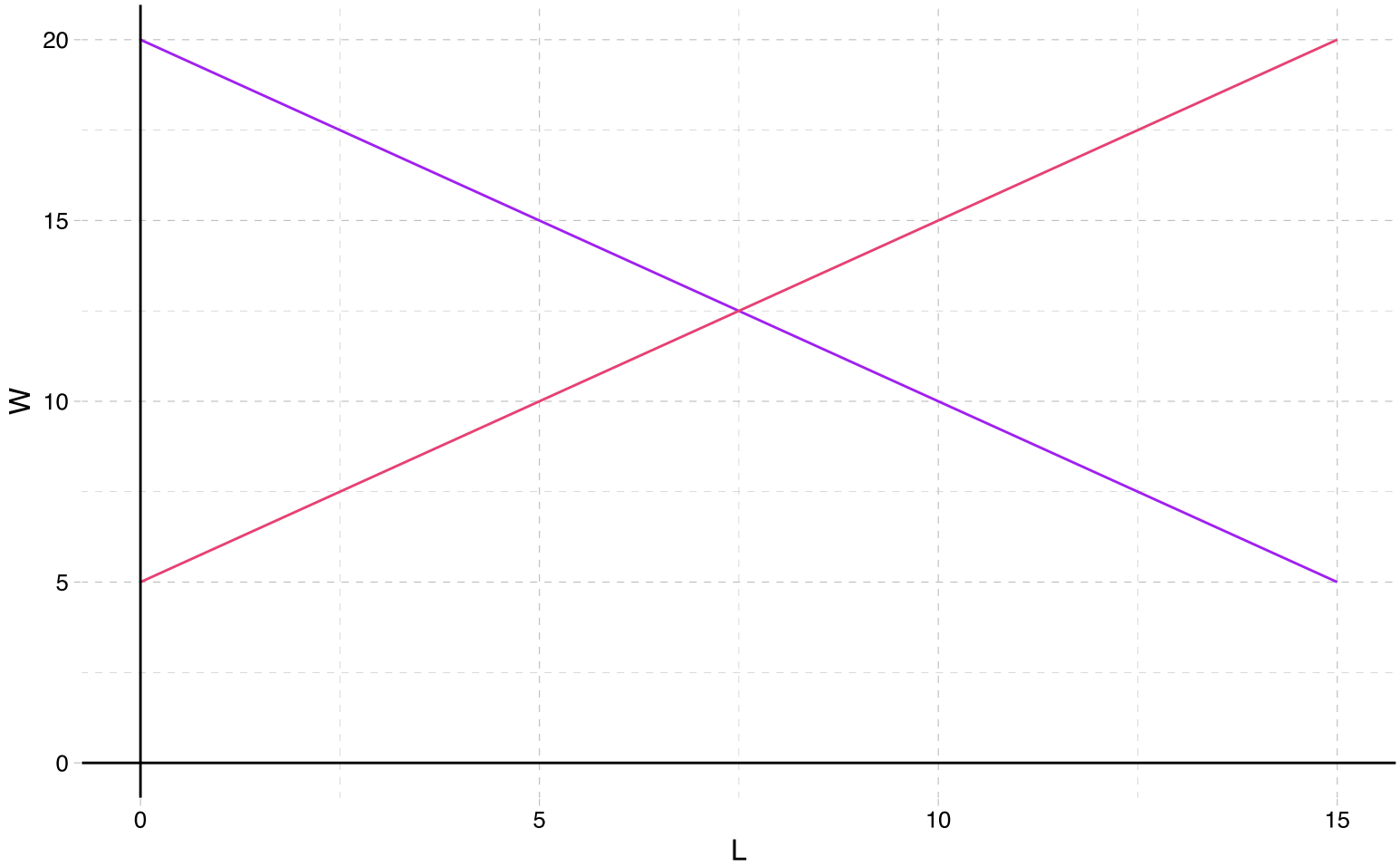
# Equilibrium

**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 "seperate" 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:

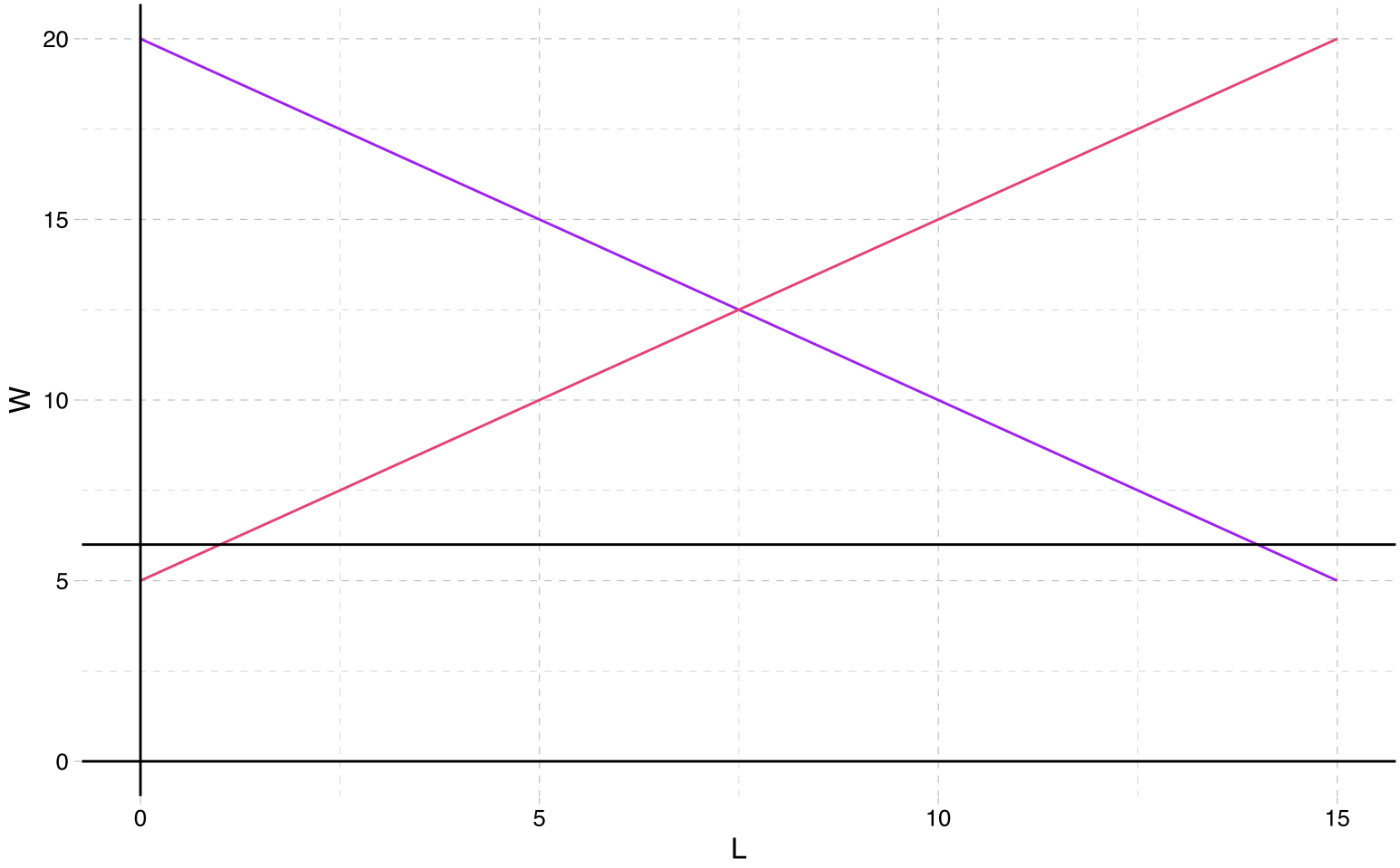
- Price floor: dictates the *minimum* allowed price for transactions in a marketplace

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

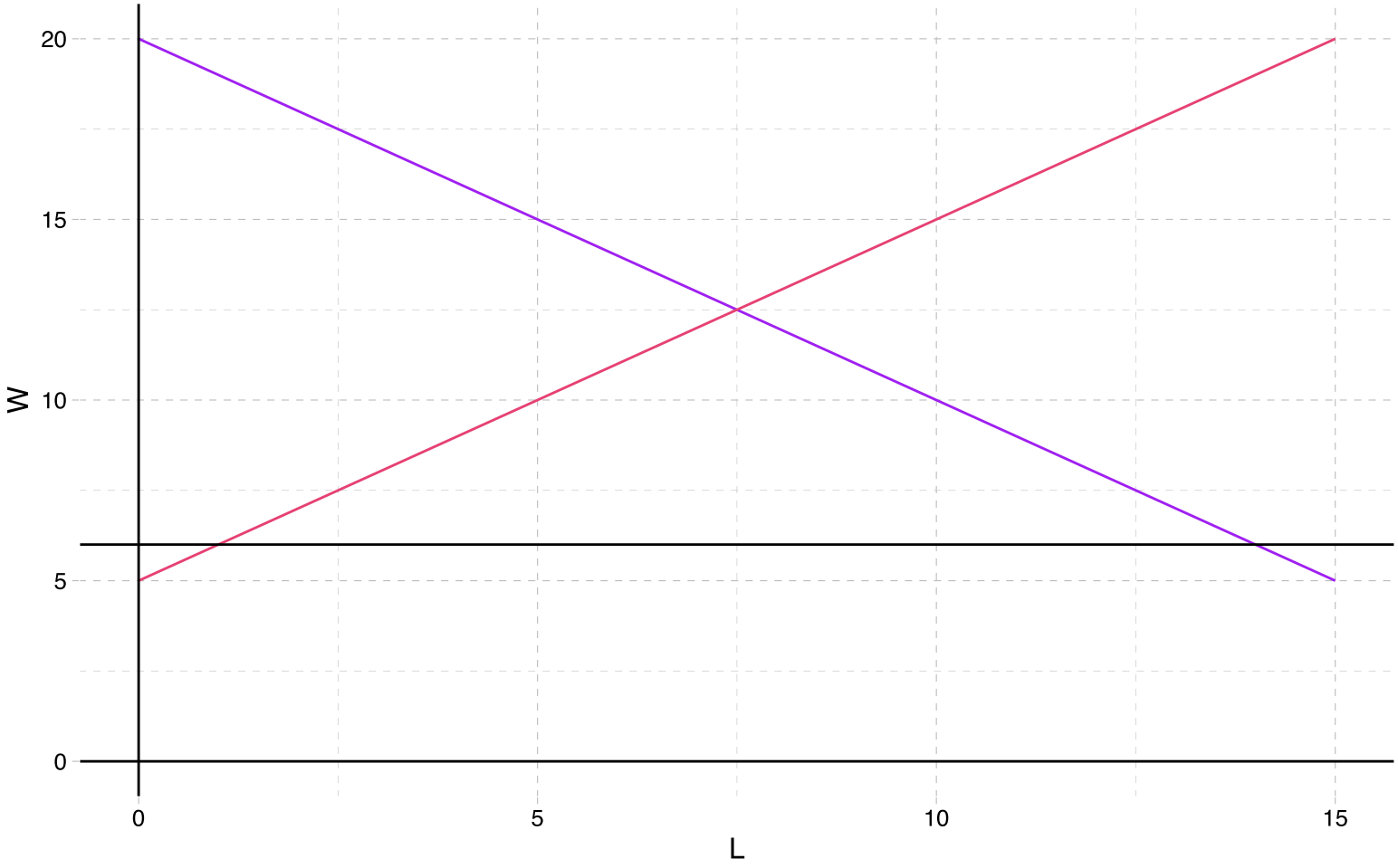
# Min Wage Refresher

Is the following effective/ineffective?:



# Min Wage Refresher

The following is **ineffective**



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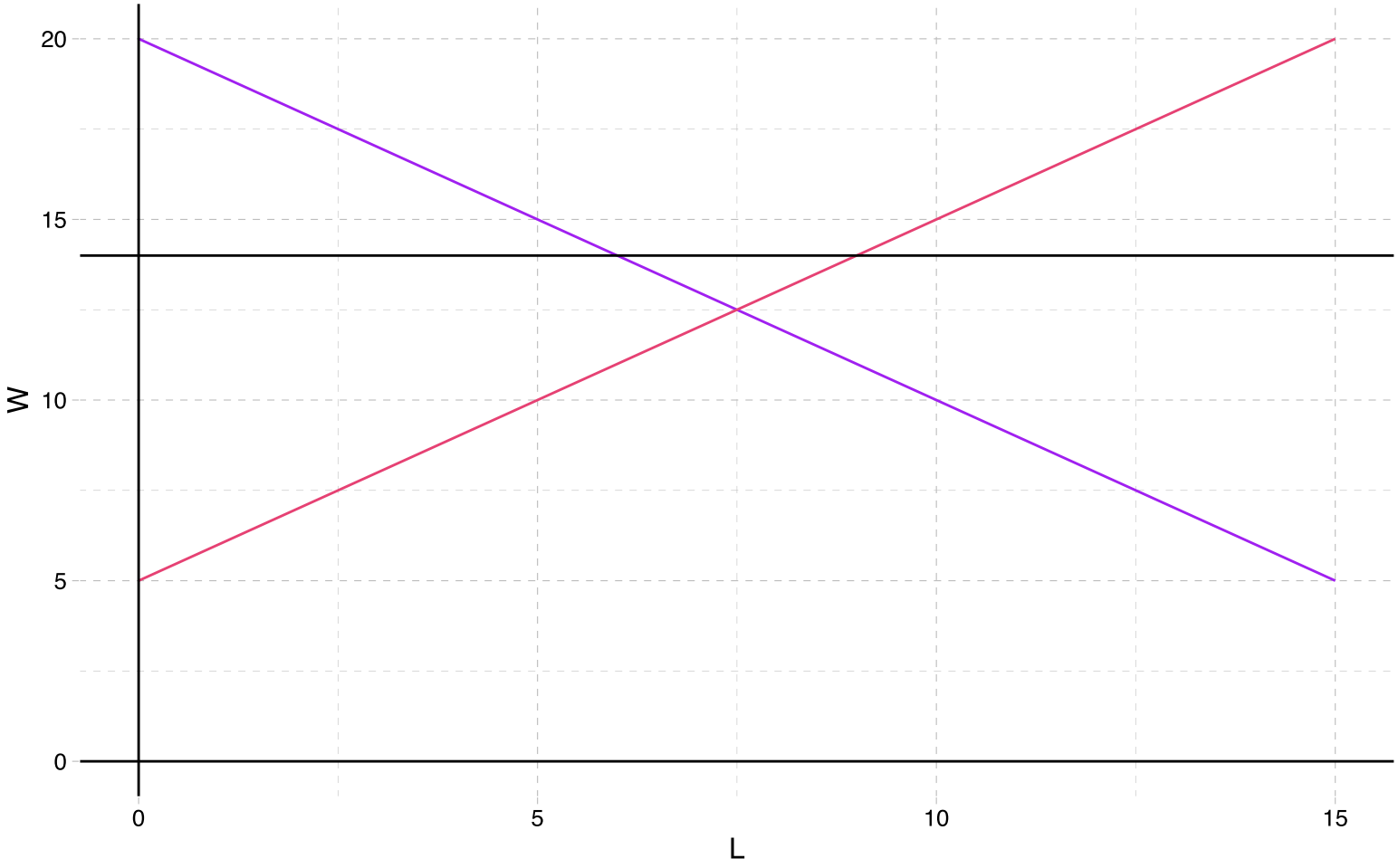
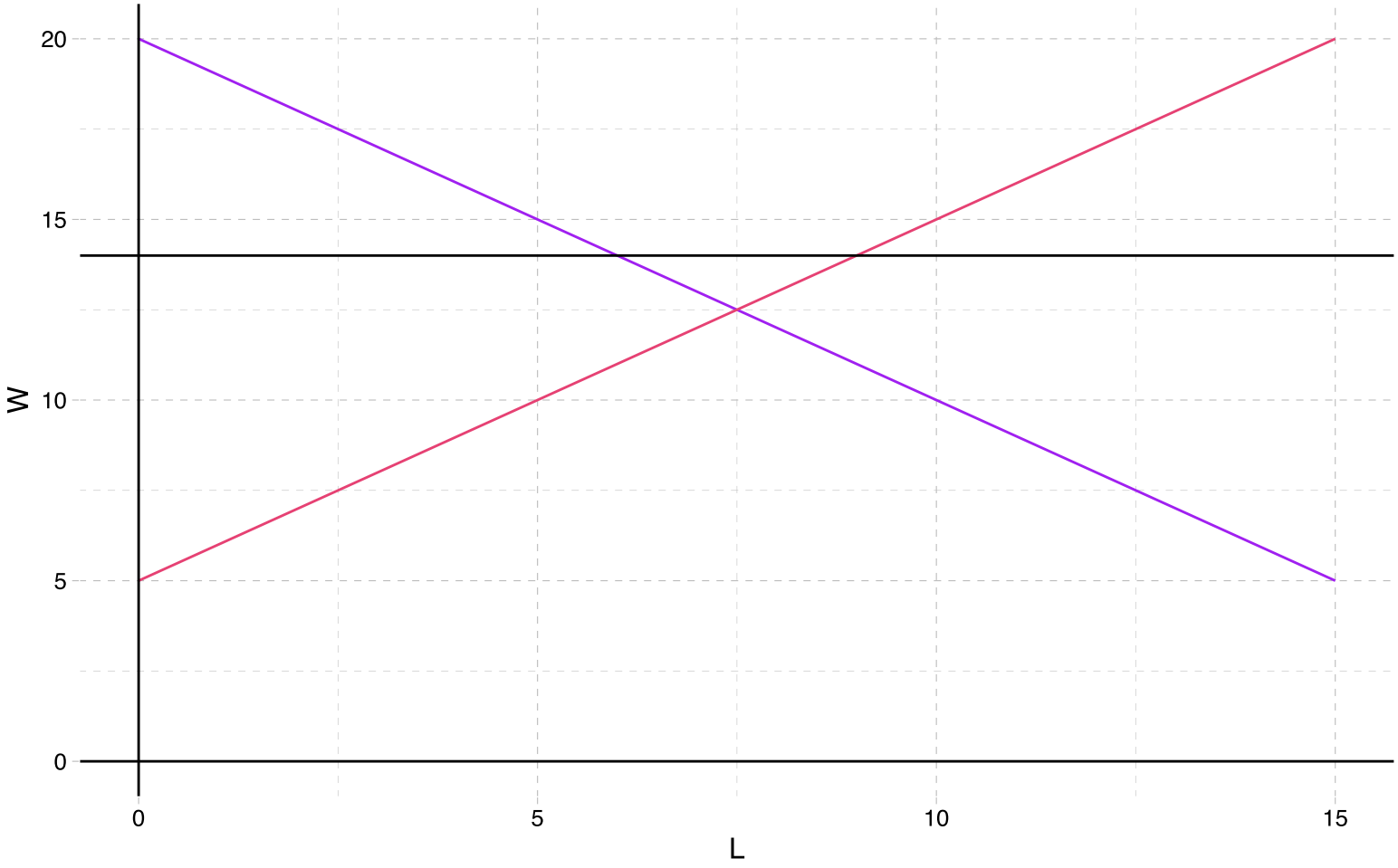


# Min Wage Refresher

The following is **effective**



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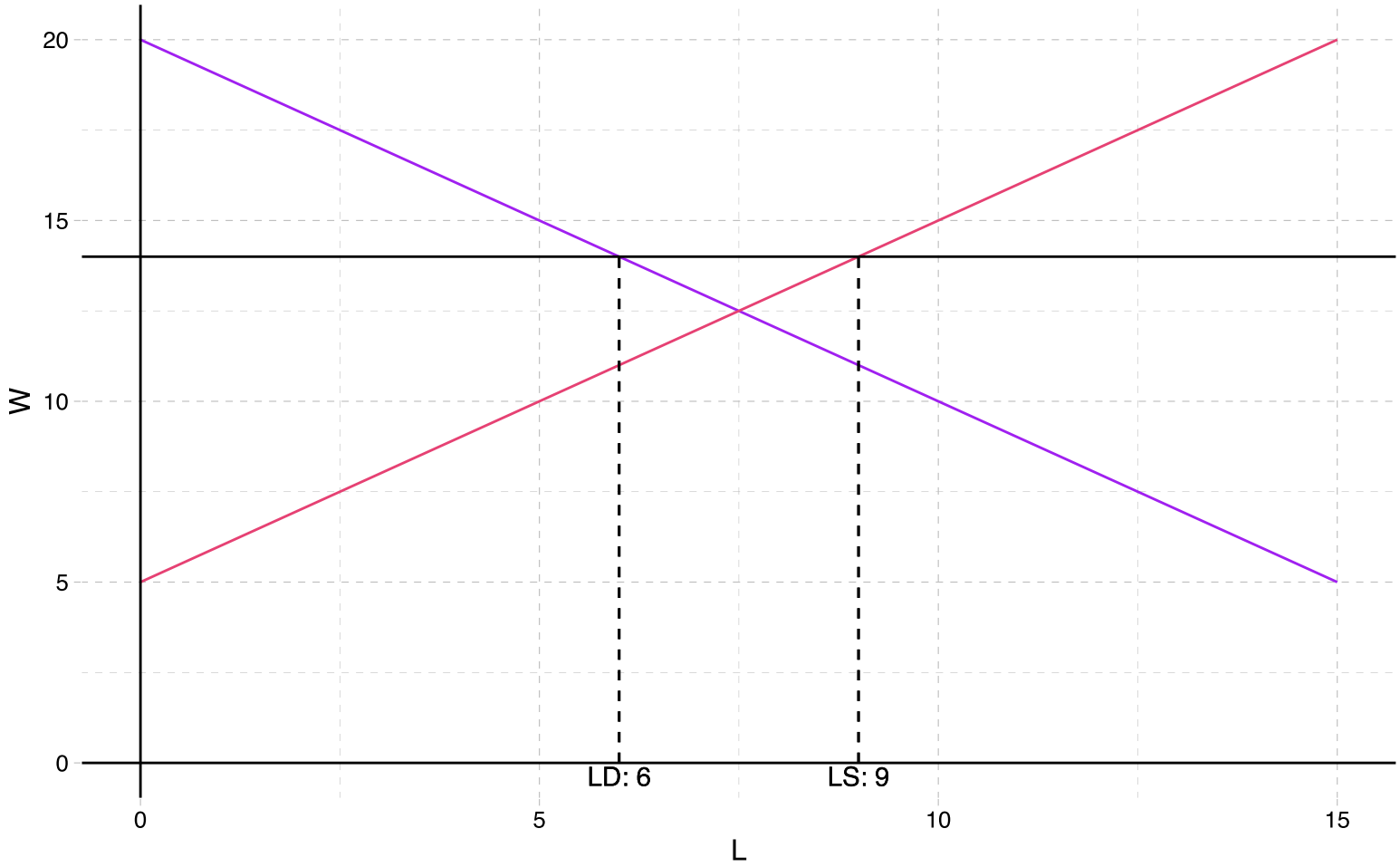
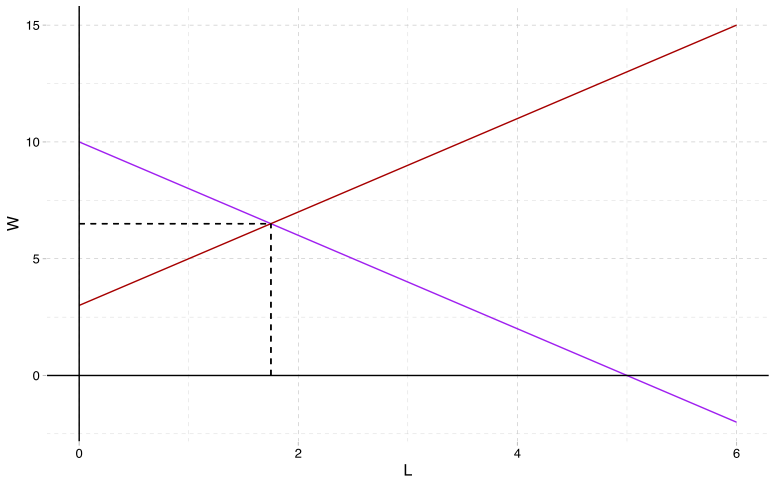
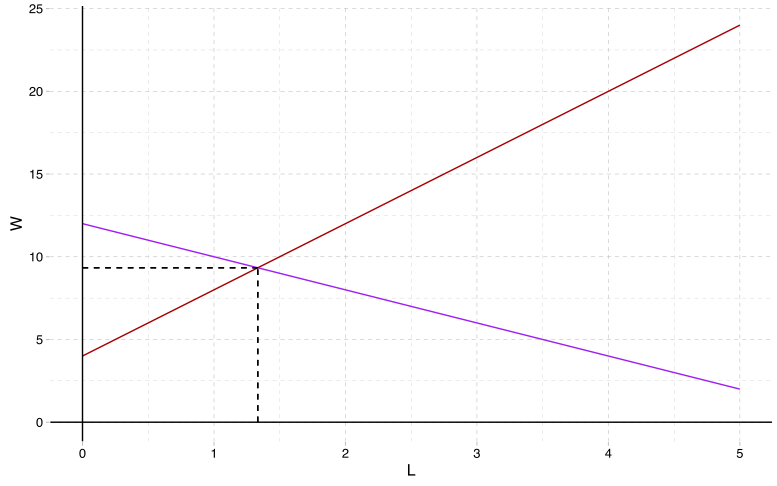


# Example: Two Cities

If we treat cities as two *seperate* 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

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