

# The Labor Market

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# Issues

- ▶ We move from the short run to the medium run
- ▶ Short run:
  - ▶ supply is elastic; we don't have to worry about it
  - ▶ only demand matters
- ▶ Medium run: supply depends on prices
  - ▶ price setting mechanisms push output towards trend
  - ▶ demand and supply matter
- ▶ Long run: output is on its trend growth path
  - ▶ only supply matters
  - ▶ capital stock is endogenous

# Objectives

In this section you will learn:

1. how wage setting determines unemployment
2. how to set up the AS-AD model
3. how price adjustment pushes the economy towards the long-run trend growth path
4. how to analyze policies and shocks

# Wage Determination: Walrasian Model

# Wage Determination

- ▶ How wages are set determines
  - ▶ the level of unemployment
  - ▶ the adjustment path towards full employment
- ▶ We start with a standard Walrasian view
  - ▶ there is no unemployment
  - ▶ this approach is useful for the long run, but not for the medium run
- ▶ We then introduce the key labor market friction that generates unemployment

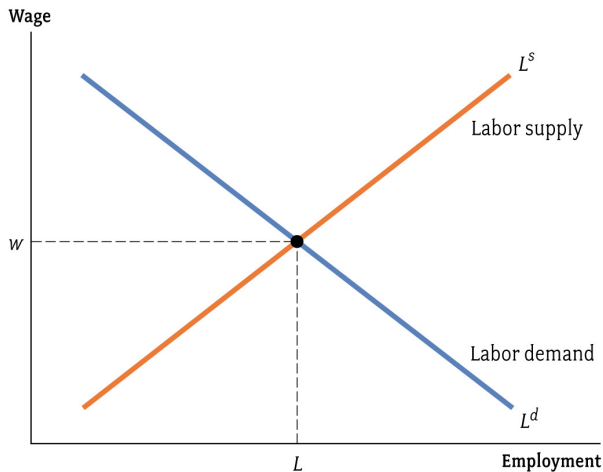
# Labor Demand

- ▶ Firms hire labor until real wage equals marginal product of labor.
- ▶ The labor demand curve is the  $MPL$  curve.
- ▶ Example:  $Y = \bar{A}K^\alpha L^{1-\alpha}$ 
  - ▶  $MPL = dY/dL = (1 - \alpha)\bar{A}K^\alpha L^{-\alpha}$ .
  - ▶ The firm sets  $w = MPL$ .
  - ▶ Everything else  $(\bar{A}, K)$  equal, labor demand is downward sloping in  $L$ .
- ▶ What shifts labor demand?

# Labor Supply

- ▶ We should derive labor supply from the household's decision how much to work / how much leisure to consume.
- ▶ For now, we just assume that higher wages are associated with more labor supply.

# Labor Market Equilibrium

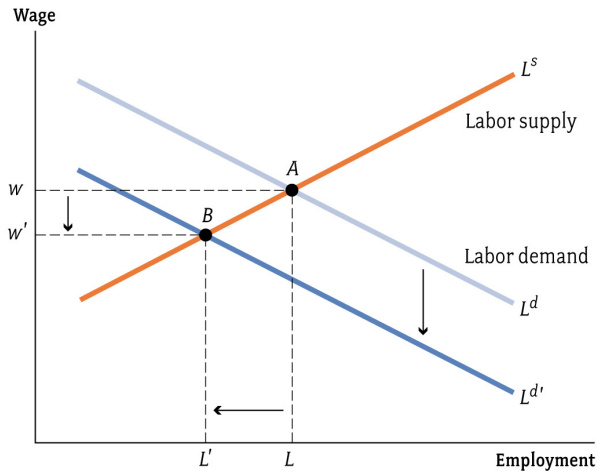


**FIGURE 7.3** The Labor Market

*Macroeconomics*, Charles I. Jones  
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# Change in labor demand



**FIGURE 7.5 A Reduction in Labor Demand**

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# Where is unemployment?

Which workers are unemployed?

In what sense?

Insight:

We are missing a friction that prevents workers from finding jobs.

# Would measured unemployment be zero?

## Insight

Unemployment is an arbitrary concept.

Caution when interpreting unemployment rates.

# A Model With Frictions

# The Story

The model **tries** to tell the following story:

Wage bargaining sets **nominal wages** for a period of time.

Workers set the nominal wage  $W$  to get a desired **real wage**  $W/P$ .

But they don't know what prices will be.

So they set  $W/P^e$  to some target level.

If “economic conditions” are good, the target  $W/P^e$  is high.

# The Story

If workers knew  $P$  in advance, then  $P = P^e$  and workers would always get their target  $W/P$ .

- ▶ That's the Walrasian model.

If workers get  $P^e$  wrong, they set the wrong  $W$ .

Inflation then erodes  $W/P$ .

That induces firms to hire more (cheap) workers.

Inflation can stimulate the economy.

# What Happens in the Model

The model contains a different version of the story (for simplicity).

Firms set prices as multiples of the wage.

- ▶ so the real wage  $W/P$  is fixed
- ▶ labor demand is perfectly elastic

Workers set **labor supply** as an increasing function of the real wage

But: they use **expected prices** to compute the real wage ( $W/P^e$  instead of  $W/P$ ).

If inflation is higher than expected, workers think the real wage is high.

They supply more labor and employment rises.

# Labor Supply

Labor supply:

$$N^s = \hat{F}(W/P^e, z) \quad (1)$$

$z$ : labor market conditions

- ▶ unemployment benefits, taxes, etc

Key:  $N^s$  depends on the real wage evaluated at  $P^e$  (not  $P$ ).



# Why Does Labor Supply Increase in the Wage?

1. Efficiency wages
2. Centralized wage bargaining
  - 2.1 labor unions bargain with employers
  - 2.2 their objective is to get the highest wage for the largest number of workers
3. Search and Matching
  - 3.1 if the unemployment rate is high, jobs are hard to find, but vacancies are easy to fill
  - 3.2 this gives firms bargaining power, which drives down wages

## Labor Demand

Output is produced from labor only:  $Y = N$

Marginal cost is constant at  $W$ .

Assumption: Firms set prices as a markup over marginal cost.

$$P = (1 + m)W \quad (2)$$

In general: marginal cost is an increasing function of wage  $W$  and employment  $N$ .

Implications:

1. the real wage is **fixed**:

$$W/P = \frac{1}{1 + m} \quad (3)$$

2. labor demand is **perfectly elastic** at this real wage

## Labor Market Clearing

$$N = \hat{F}(W/P^e, z) \quad (4)$$

$$= \hat{F}\left(\frac{W}{P} \frac{P}{P^e}, z\right) \quad (5)$$

$$= \hat{F}\left(\underbrace{\frac{P}{P^e}}_{\text{mistake}}, \underbrace{\frac{1}{1+m}}_{\text{real wage}}, z\right) \quad (6)$$

Employment is increasing in  $P/P^e$  and  $z$ .

# The Book's Representation

Unemployment rate:  $u = \frac{L-N}{L} = 1 - N/L$

Then:

$$N = (1 - u)L = \hat{F}\left(\frac{P}{P^e} \frac{1}{1+m}, z\right) \quad (7)$$

Therefore: unemployment is decreasing in  $P/P^e$  and  $z$ .

We can write:

$$W(u; P^e, z) = P^e F(u, z) \quad (8)$$

# Model Summary

Workers set a labor supply schedule ( $u$  falls in  $W/P^e$ ):

$$W = P^e F(u, z) \quad (9)$$

Firms set prices, given wages, fixing the real wage

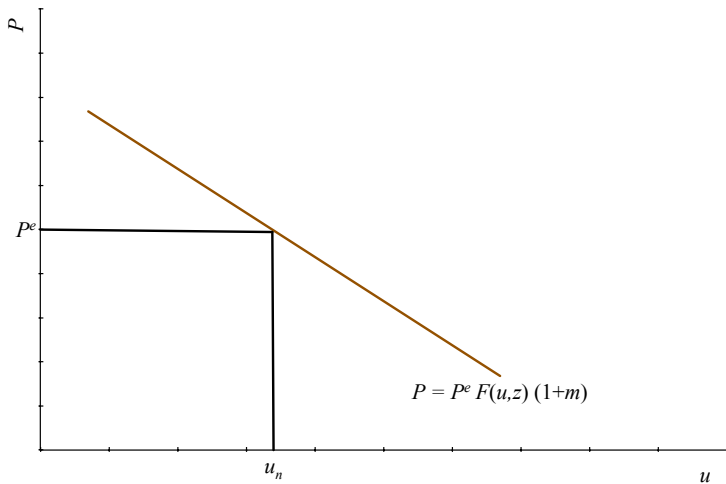
$$W/P = 1/(1 + m) \quad (10)$$

Result:

$$P = P^e F(u, z) (1 + m) \quad (11)$$

High prices  $\implies$  low unemployment, given  $P^e$ .

# Summary



# Intuition

Higher  $P$  lowers unemployment.

The model is designed to capture this channel:

- ▶ workers set  $W$  based on  $P^e$
- ▶ higher  $P$  erodes the real wage and raises labor demand

This does **not** happen here

- ▶ because of the production function, labor demand is perfectly elastic at a fixed  $W/P$ .

# Intuition

Workers see a high nominal wage and think they see a high real wage.

So they supply more labor.

In reality, price setting by firms fixes the real wage

- ▶ Workers are wrong every time.

Until worker's price expectations adjust ( $P^e \rightarrow P$ ), inflation affects employment.



## Exercises

$$W/P = (P^e/P)F(u, z) = \frac{1}{1+m} \quad (12)$$

or

$$P = P^e F(u, z) (1+m) \quad (13)$$

What happens to  $u$  when

1. price expectations are higher?
2. markups rise?
3. unemployment benefits improve?

# Output

With  $Y = N$ :  $u = 1 - N/L = 1 - Y/L$ .

Therefore:

$$W/P = \frac{1}{1+m} = \frac{P^e}{P} F(1 - Y/L, z) \quad (14)$$

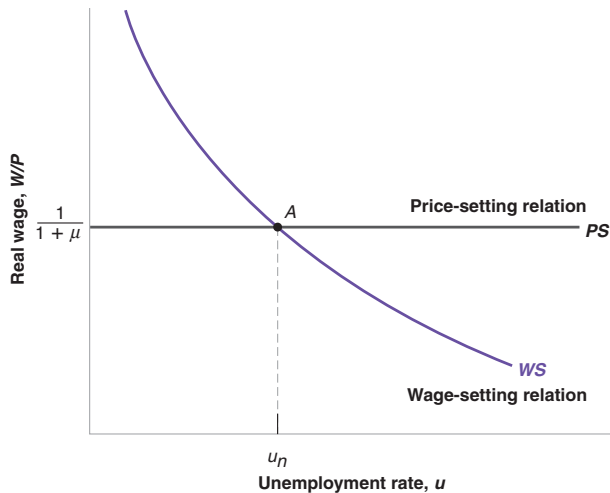
# Natural Rate of Unemployment

- ▶ When price expectations are correct:

$$W/P = \frac{1}{1+m} = F(u_n, z) \quad (15)$$

- ▶ If expectations are on average correct, then the average unemployment rate should be near  $u_n$ .
- ▶  $u_n$  is still affected by distortions to labor markets ( $z$ ) and product markets ( $m$ ).
- ▶ This is the medium-run outcome.

# Natural Rate of Unemployment



This assumes  $P^e = P$ . WS:  $W/P = F(u, z)$ .

# What's Next?

- ▶ If price expectations were always correct, we would be done:
  - ▶ markups and labor productivity determine the real wage
  - ▶ the real wage determines (un)employment
  - ▶ employment determines output
- ▶ This is what happens in the long run
  - ▶ only the supply side matters
- ▶ But what happens when  $P^e \neq P$ ?

# Reading

- ▶ Blanchard / Johnson, *Macroeconomics*, 6th ed, ch. 6

Further Reading:

- ▶ Jones, *Macroeconomics*, ch. 7.