



# Unemployment

EC121 – Intermediate Macroeconomics  
Brown University  
Monday, October 24<sup>th</sup>

# Overview

- The Natural Rate of Unemployment
  - Definition
    - The LR steady-state rate of unemployment
  - Determinants
    - Rate of job loss/separation
    - Rate of job finding
  - Components
    - Frictional unemployment ← due to job search frictions
    - Structural unemployment ← due to real wage rigidities

# Defining the Natural Rate

- Def: The average rate of unemployment around which an economy fluctuates in the SR:
  - actual rate  $>$  natural rate  $\Leftrightarrow$  Recession
  - actual rate  $<$  natural rate  $\Leftrightarrow$  Boom
- Def: The unemployment rate towards which the economy gravitates in the LR, given labor market imperfections that impede workers from instantly finding jobs.

# A Simple Model of the Natural Rate

## ■ Notation

- $L$   $\equiv$  number of workers in the labor force
- $E$   $\equiv$  number of workers employed
- $U$   $\equiv$  number of workers unemployed
  
- $s$   $\equiv$  instantaneous rate of job loss/separation
  - (fraction of  $E$  losing jobs every instant).
- $f$   $\equiv$  instantaneous rate of job finding
  - (fraction of  $U$  finding jobs every instant).

# A Simple Model (cont.)

## ■ Model Basics

- $L \equiv E + U$

- Since every worker is either employed or unemployed

- Rate of unemployment  $\equiv U/L$

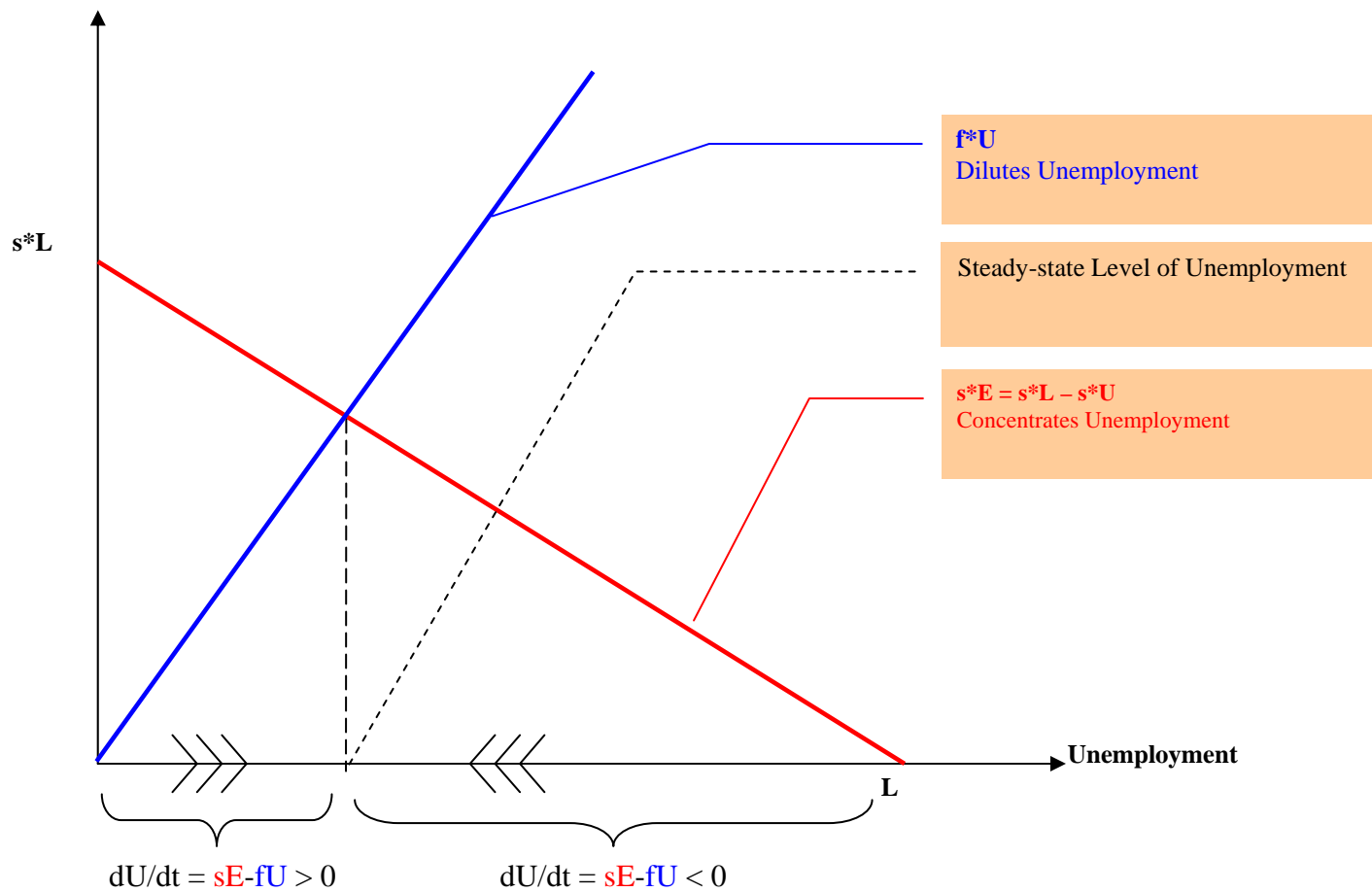
- Note:  $U$  represents the LEVEL of unemployment

- Law of motion of  $U$ :

- $dU/dt = s^*E - f^*U = s^*(L - U) - f^*U$

- Recall the law of motion of  $k$  in the Solow model

# A Simple Model (cont.)



# A Simple Model (cont.)

- Solving for the Steady State

At the SS,  $dU/dt = 0$  so:

$$s^*E = f^*U$$

Substituting  $E = L - U$  above gives:

$$s^*(L - U) = f^*U$$

Solving for  $U$  above gives the SS level:

$$U = s^*L / (s + f)$$

Finally, dividing both sides by  $L$  yields the SS rate:

$$U/L = s / (s + f)$$

# A Simple Model (cont.)

## ■ Results

□ Natural Rate ( $NR$ ) =  $s / (s + f)$

- Directly related to the rate of job loss/separation
- Inversely related to the rate of job finding

□ Example:

$s = 0.01$  (1% of employed lose current their jobs)

$f = 0.20$  (20% of unemployed find new jobs)

Then, Natural Rate =  $0.01/0.21 = 0.0476 = 4.76\%$

□ Usually  $s$  is small ( $< 0.1$ ) so as  $f \rightarrow 1$ ,  $NR \rightarrow 0$

# A Simple Model (cont.)

## ■ Policy Implications

- A policy aimed at lowering the natural rate must either lower  $s$  or increase  $f$  or both.
- A policy that inadvertently affects either  $s$  or  $f$  (or both) also affects the natural rate.
  - Unemployment Insurance, while alleviating lower standards of living for the jobless actually increases the natural rate by reducing  $f$ .

# Frictional Unemployment

- What causes it?
  - Job-worker matching is not instantaneous i.e. it takes time to search for new jobs ( $f < 1$ ).
- Why does it take time to search for jobs?
  - Workers have different abilities, preferences
  - Jobs have different skill requirements
  - Workers are not geographically mobile
  - The flow of information about vacancies and job candidates is not perfect

# Frictional Unemployment (cont.)

## ■ Sectoral Shifts

- Def: Changes in the composition of demand amongst industries or regions
- Examples:
  - Late 1800's: Shift from agriculture to industry
  - Late 1900's: Shift from industry to service sector
  - 1970's: Energy crisis shifted demand away from larger cars to smaller (more efficient) cars

# Frictional Unemployment (cont.)

## ■ Sectoral Shifts (cont.)

- Implications: It takes time for workers to move between sectors so sectoral shifts are a direct cause of frictional unemployment.

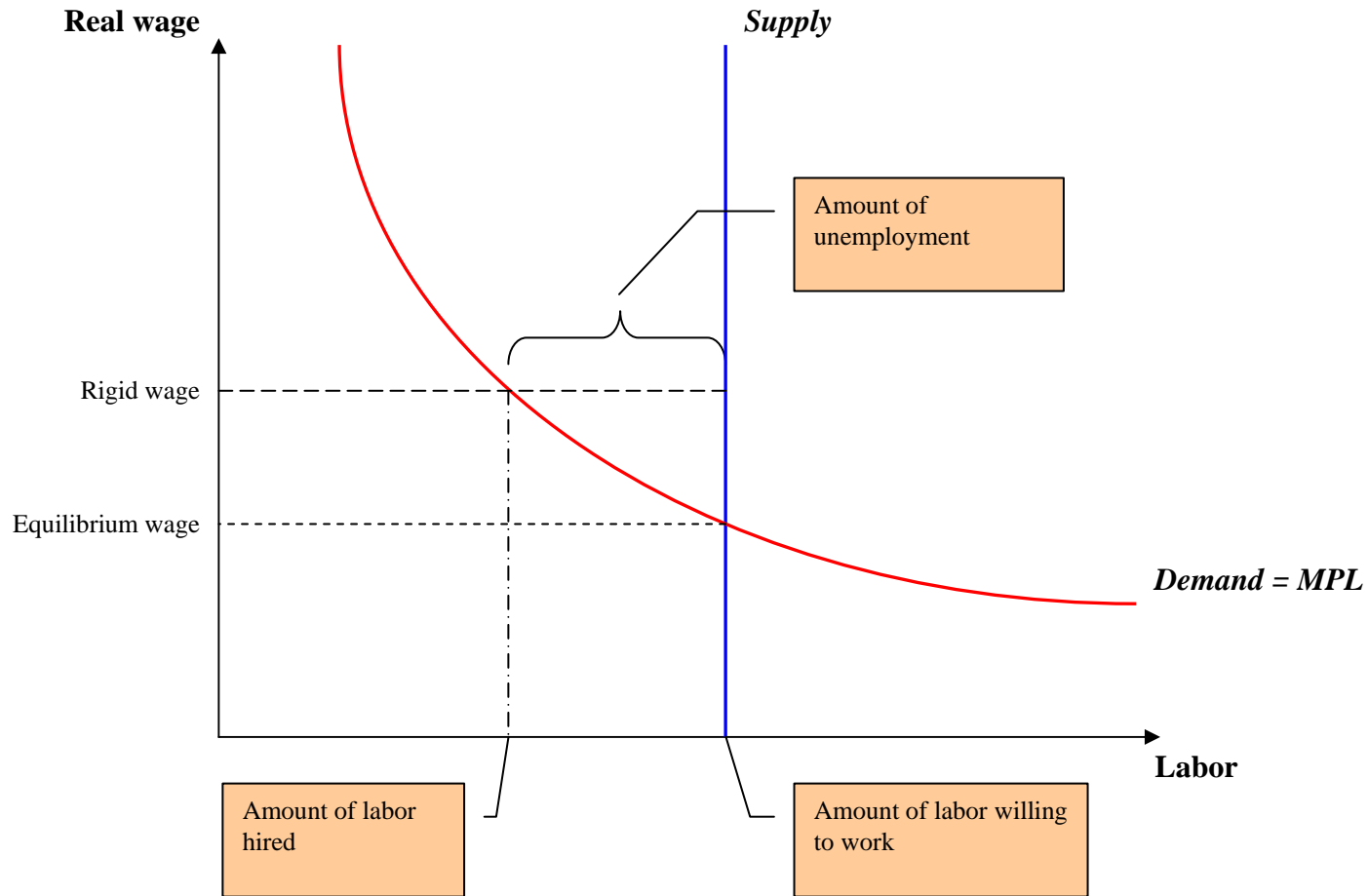
## ■ Public Policy/Government Programs

- Employment agencies – disseminate information about workers and job vacancies to better match workers and jobs (raises  $f$ )
- Public training programs – aid workers displaced from declining industries to get skills for jobs in growing industries (raises  $f$ )
- Unemployment insurance
  - Disadvantage: Reduces incentives to find jobs quickly (lowers  $f$ )
  - Advantage: More search time ensures better matching which, in effect, improves LR productivity and enhances growth (raises  $A$ )

# Structural Unemployment

- What causes it?
  - Real-wage rigidities (i.e. failure of wages to adjust until labor supply equals demand). Structural unemployment results as wages are set artificially high above the market clearing rate.
- What are the sources of such rigidities?
  - Minimum wage laws
  - Labor unions and collective bargaining
  - Efficiency wages

# Structural Unemployment (cont.)



# Structural Unemployment (cont.)

## ■ Minimum-wage

- The minimum wage is well below equilibrium wage for most workers so it can't explain the majority of natural unemployment.
- Minimum wage may exceed the equilibrium wage for unskilled workers (especially teenagers).
- Increases in minimum wage will therefore most likely increase unemployment in these groups.

# Structural Unemployment (cont.)

- Labor Unions and Collective Bargaining
  - Unions use monopoly power to secure higher wages for their members.
  - When the union wage exceeds the equilibrium wage unemployment results.
  - Employed union workers are *insiders* whose interest is to keep wages high.
  - Unemployed non-union workers are *outsiders* whose interest is to lower wages so that labor demand rises to create job vacancies.

# Structural Unemployment (cont.)

## ■ Efficiency wage theory

- Higher wages to increase productivity by:
  - Attracting more higher quality job applicants
  - Increasing worker effort and reducing “shirking”
  - Reducing costly turnover
  - Improving health of workers (in developing countries)
- The increased productivity justifies the cost of paying above market-clearing wages. The result however is higher unemployment.

# Summary

- The “natural” rate of unemployment is the LR steady-state rate of unemployment. It depends on the rate of job separation/loss, and the rate of job finding.
- Natural unemployment consists of frictional unemployment which results from the fact that it takes time for job-seekers to search for the job that best suits their tastes and skills. Various government policies alter the amount of frictional unemployment.
- Natural unemployment also consists of structural unemployment which results when the real wage remains above the equilibrium level. Minimum-wage laws, labor unions and efficiency wages all contribute to wage rigidities.