

LECTURE 15

MATCHING | LABOR SUPPLY

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MATCHING FUNCTION

- number of matches in one month = $m(U, V)$
- $m(U, V)$ is increasing in U
- $m(U, V)$ is increasing in V
- $m(U, V)$ has constant returns to scale
 - $m(\text{constant} \times U, \text{constant} \times V) = \text{constant} \times m(U, V)$
- Cobb-Douglas example: $m(U, V) = \omega \times U^\eta \times V^{1-\eta}$,
where $\omega > 0$ and $0 < \eta < 1$

LABOR MARKET TIGHTNESS

- new tool: matching function
- new variable: labor market tightness $\theta = V / U$
- labor market tightness determines the probabilities to find a job and fill vacancy
- labor supply and labor demand will depend on wage & labor market tightness
- generalization of the market model from microeconomics

JOB-FINDING RATE

- fraction of unemployed workers finding a job in a month: $f(\theta)$
- $f(\theta) = m(U, V) / U = m(U / U, V / U) = m(1, \theta)$
- $f(\theta)$ is increasing in θ
 - when labor market tightness is lower, it takes longer to find a job
 - because there are a lot of jobseekers relative to vacancies, competition for jobs among workers is strong

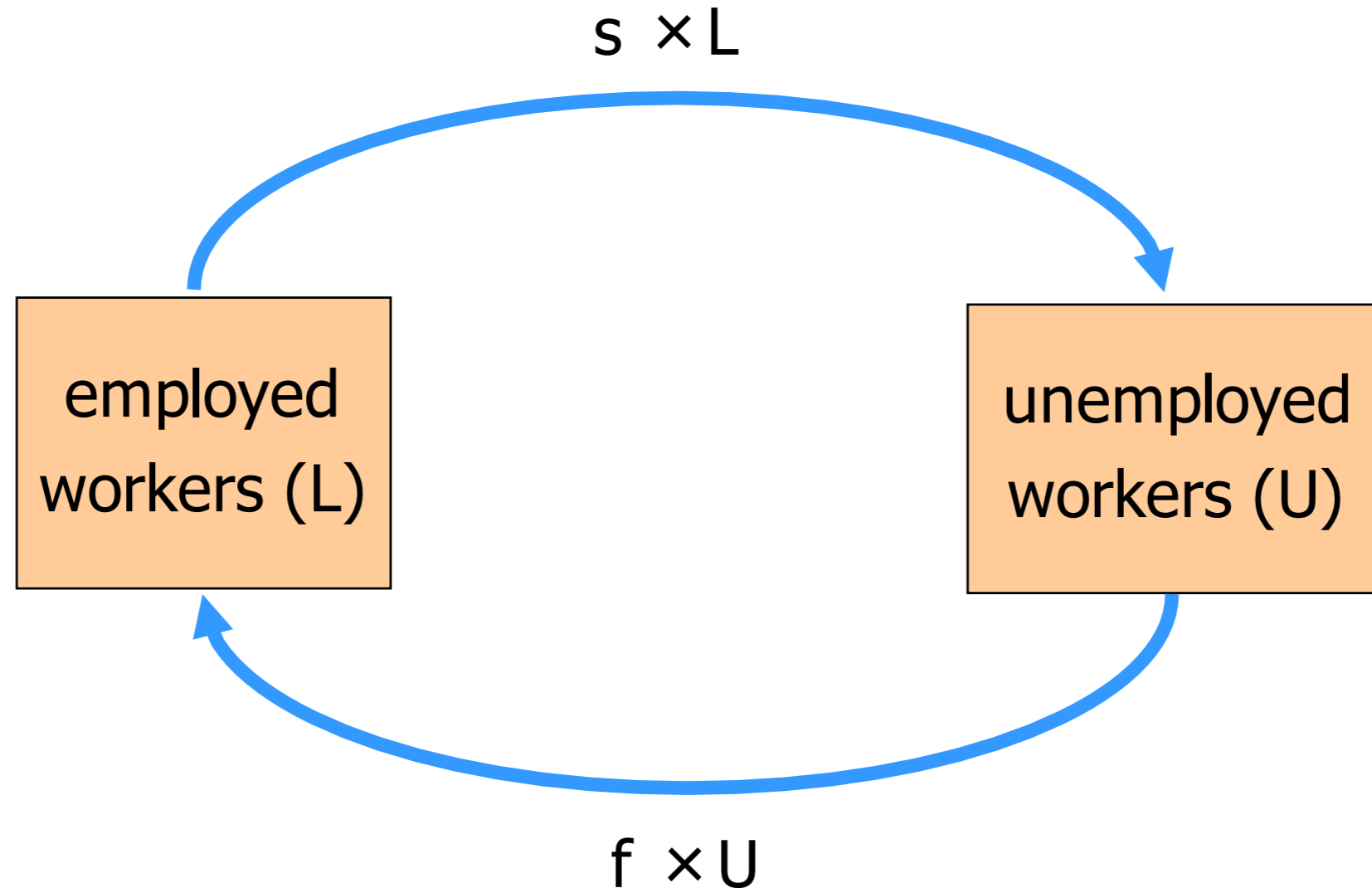
VACANCY-FILLING RATE

- fraction of vacancies filled in a month: $q(\theta)$
- $q(\theta) = m(U, V) / V = m(U / V, V / V) = m(1 / \theta, 1)$
- $q(\theta)$ is decreasing in θ
 - when labor market tightness is higher, it takes longer to fill a vacancy
 - because there are a lot of vacancies posted relative to jobseekers, so competition for workers among firms is strong

LABOR SUPPLY: DEFINITION

- labor supply measures the number of workers who have a job for a given wage and tightness
 - depends on how many people participate in the labor market, how much people search for jobs, and how many jobseekers find jobs
- we assume that people's labor supply does not depend on the wage: once workers find a good job, they accept any wage offer
- so labor supply only depends on tightness

FLOWS IN AND OUT OF UNEMPLOYMENT

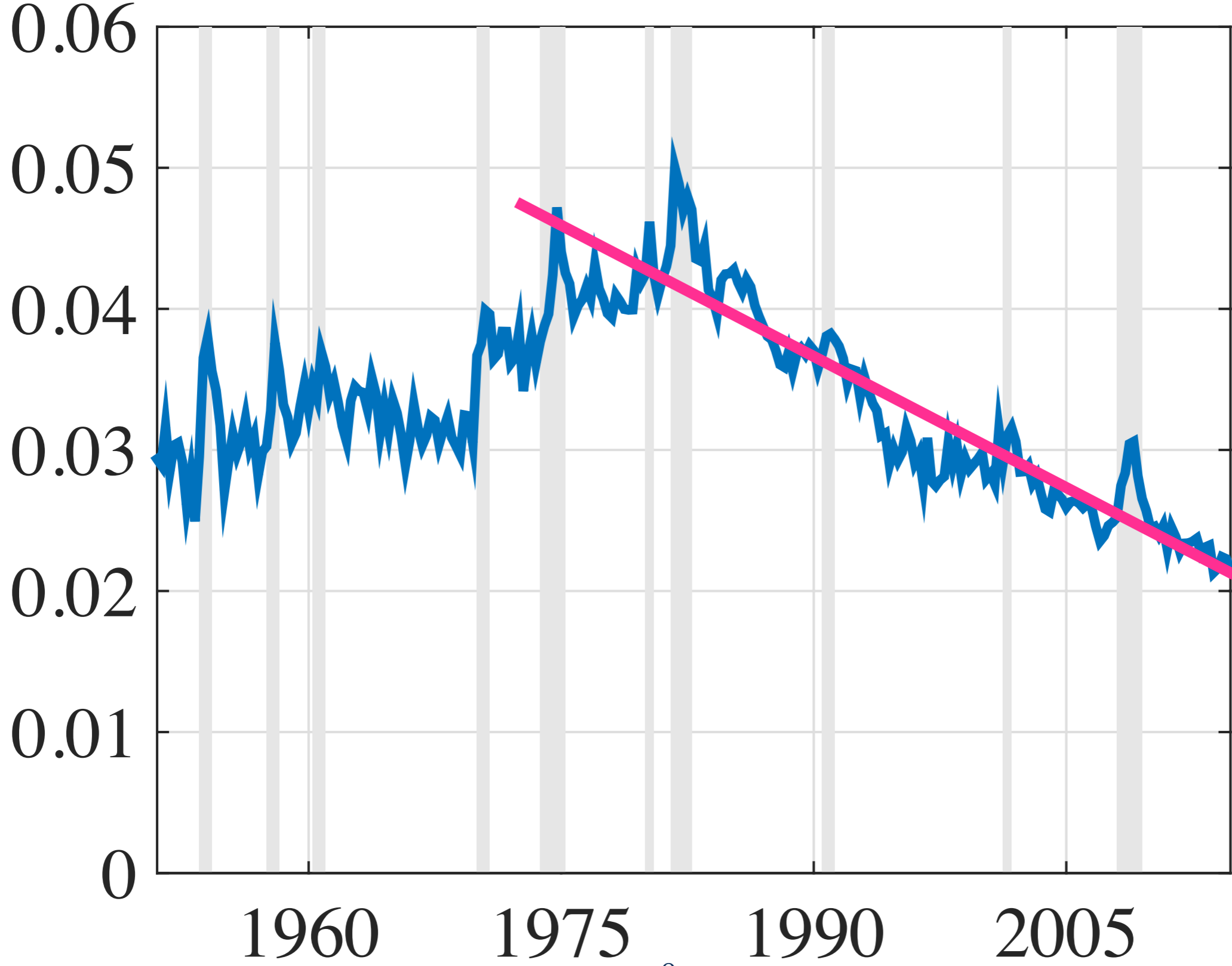


- s : job-separation rate = fraction of employed workers who lose their jobs in a month
- $f(\theta)$: job-finding rate = fraction of unemployed workers who find a job in a month

JOB-SEPARATION RATE

- based on US data: s is quite stable over time
 - in the US for 1951–2014: $s \sim 3.5\%$
- we model $s > 0$ as a parameter
- the job-separation rate captures the random reasons why a job may be terminated or a worker may quit
 - new technology, fewer customers, poor worker-job fit
 - joint location with spouse, parental leave, retirement

MONTHLY JOB-SEPARATION RATE



UNEMPLOYMENT RATE WITH BALANCED FLOWS

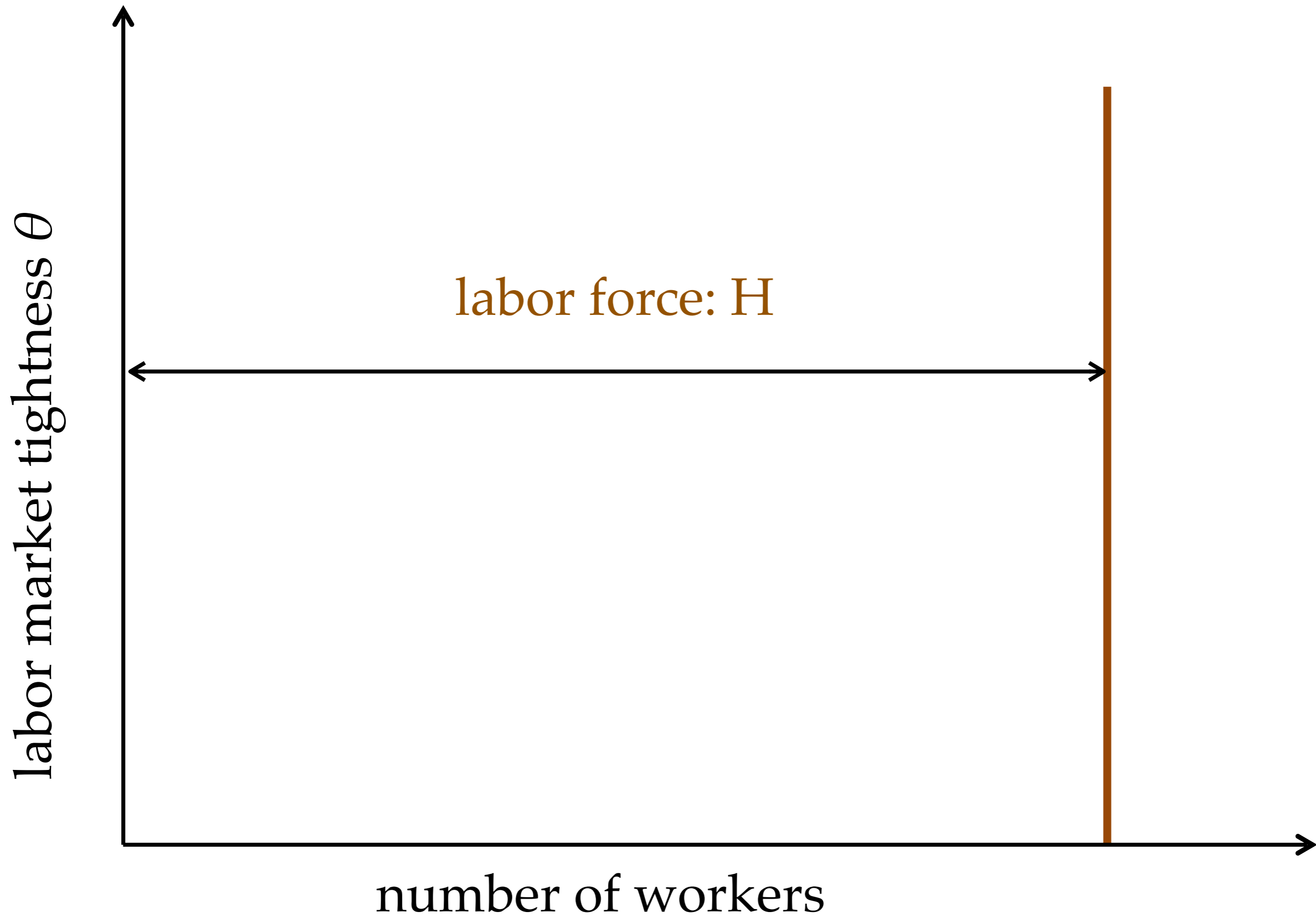
- assumption: labor market flows are balanced
 - inflows to U = outflows from U
 - employment / unemployment have stabilized
- then we have: $s \times L = f(\theta) \times U$
 - $s \times (H - U) = f(\theta) \times U$
 - $s \times (1 - U/H) = f(\theta) \times U/H$
 - $s - s \times u = f(\theta) \times u$
 - hence the unemployment rate is $u = s / [s + f(\theta)]$

LABOR SUPPLY: DERIVATION

- labor market flows are balanced: inflows to unemployment = outflows from unemployment
- $s \times L = f(\theta) \times U$
- $s \times L = f(\theta) \times (H - L)$
- $(s + f(\theta)) \times L = f(\theta) \times H$
- hence we obtain the labor supply:
 - $L^s(\theta) = H \times f(\theta) / [s + f(\theta)]$
- the labor supply is always positive but less than H

LABOR SUPPLY: PROPERTIES

- $L^s(\theta) = H \times f(\theta) / [s + f(\theta)]$
- labor supply is increasing in θ
 - because $f(\theta)$ is increasing in θ
 - when tightness is higher, jobseekers are more likely to find a job, so the labor supply rises
- labor supply rises when s decreases
 - with longer job tenures, workers are more likely to be employed
- labor supply rises when H increases
 - larger labor force leads to more employment



labor force: H

number of workers

$$L^s(\theta) = \frac{f(\theta)}{s + f(\theta)} \cdot H$$

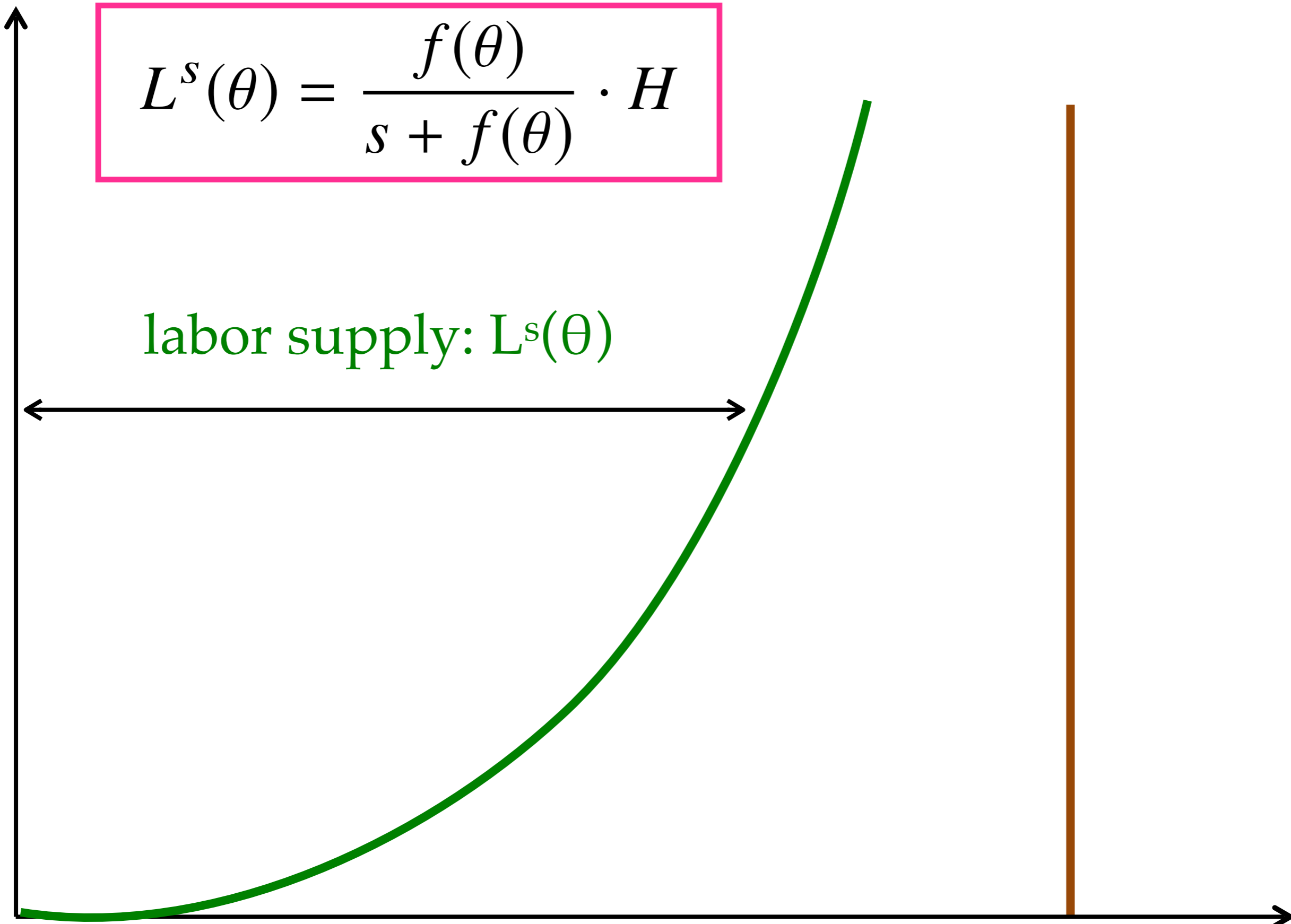
labor supply: $L^s(\theta)$

labor market tightness θ

0

number of workers

H



$$L^s(\theta) = \frac{f(\theta)}{s + f(\theta)} \cdot H$$

labor market tightness θ

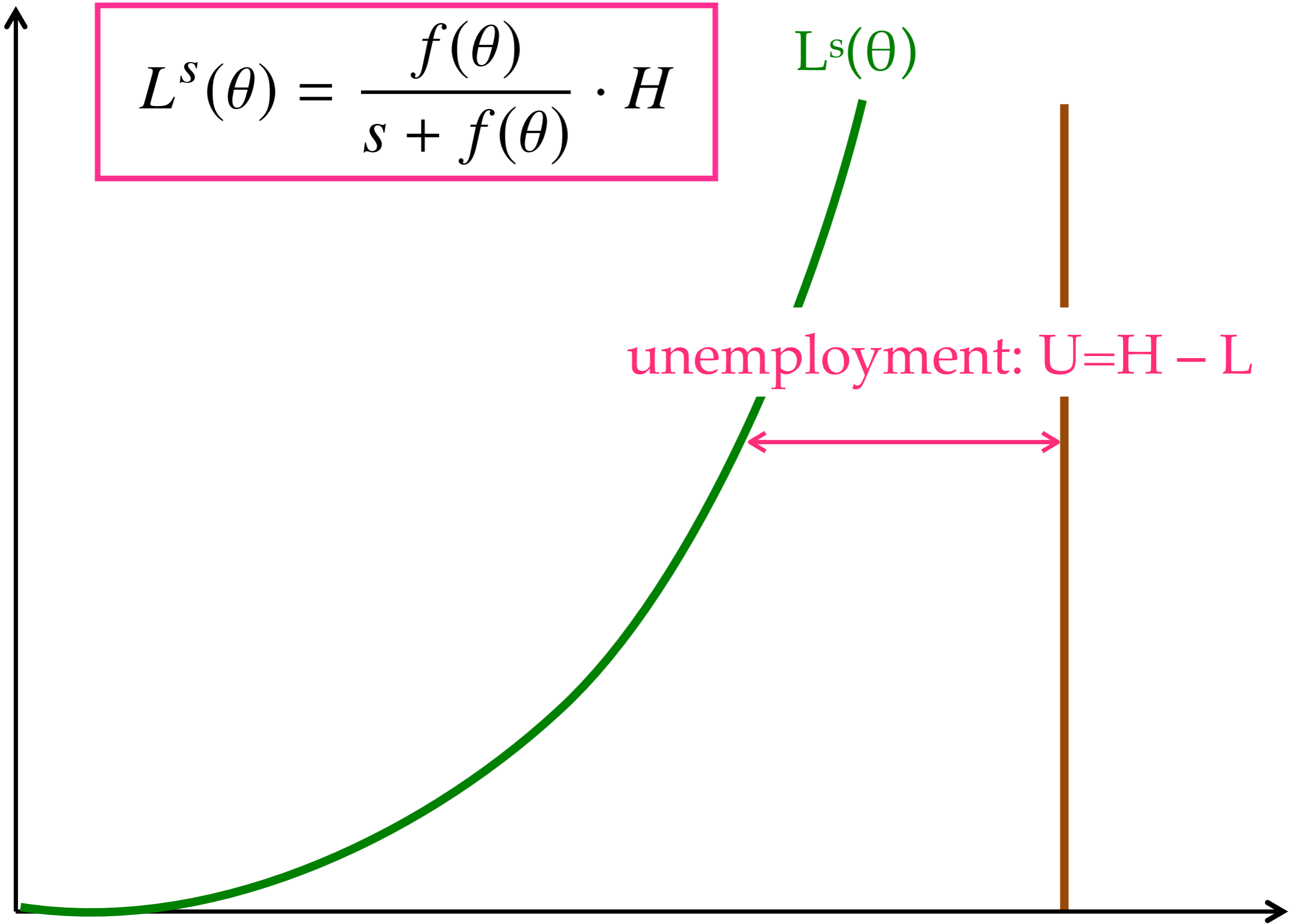
$L^s(\theta)$

unemployment: $U = H - L$

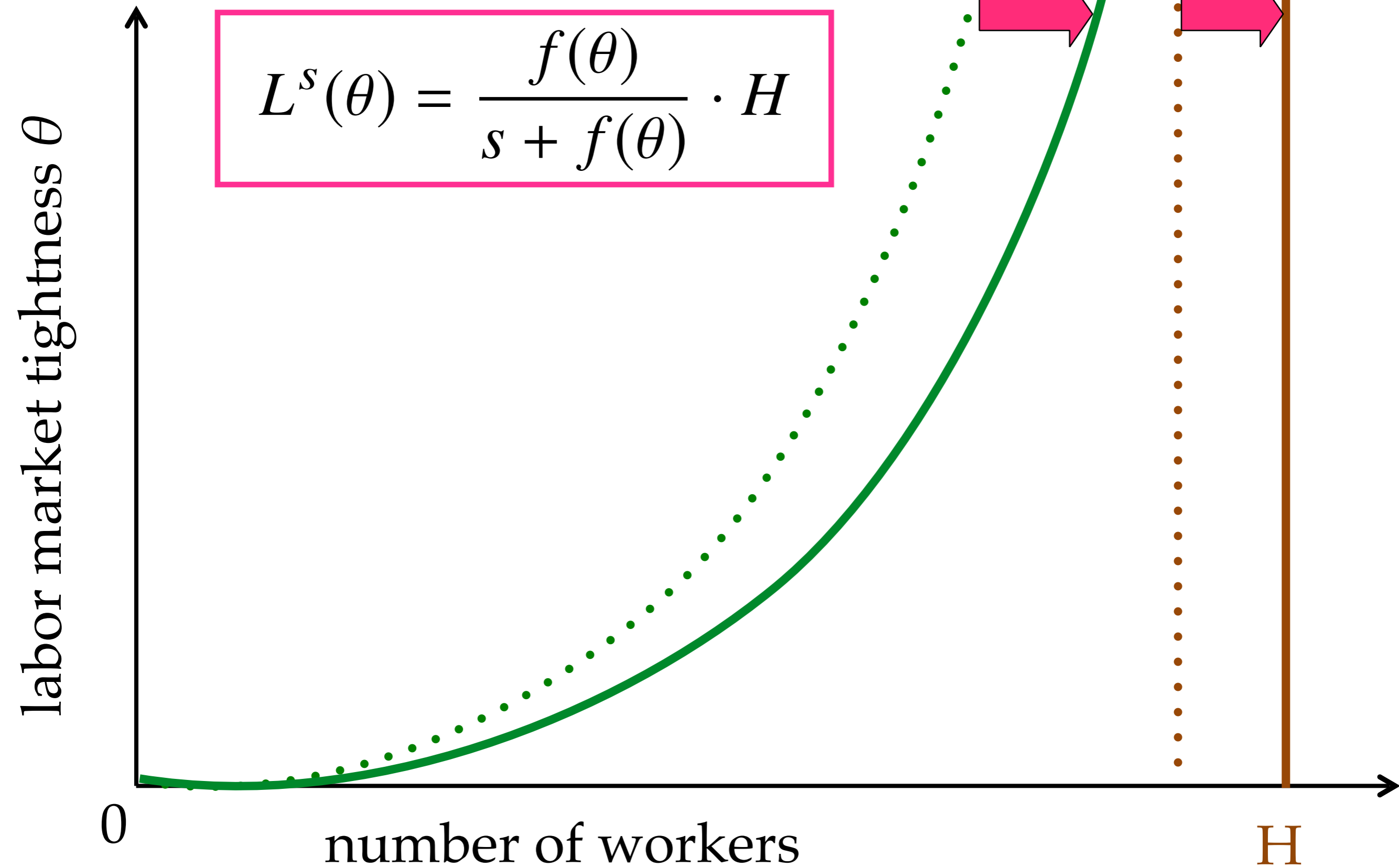
0

number of workers

H



INCREASE IN LABOR FORCE



INCREASE IN JOB-SEPARATION RATE

