INTERMEDIATE MACROECONOMICS

MATCHING MODEL OF UNEMPLOYMENT

15. 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(constant×U, constant×V)=constant × 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

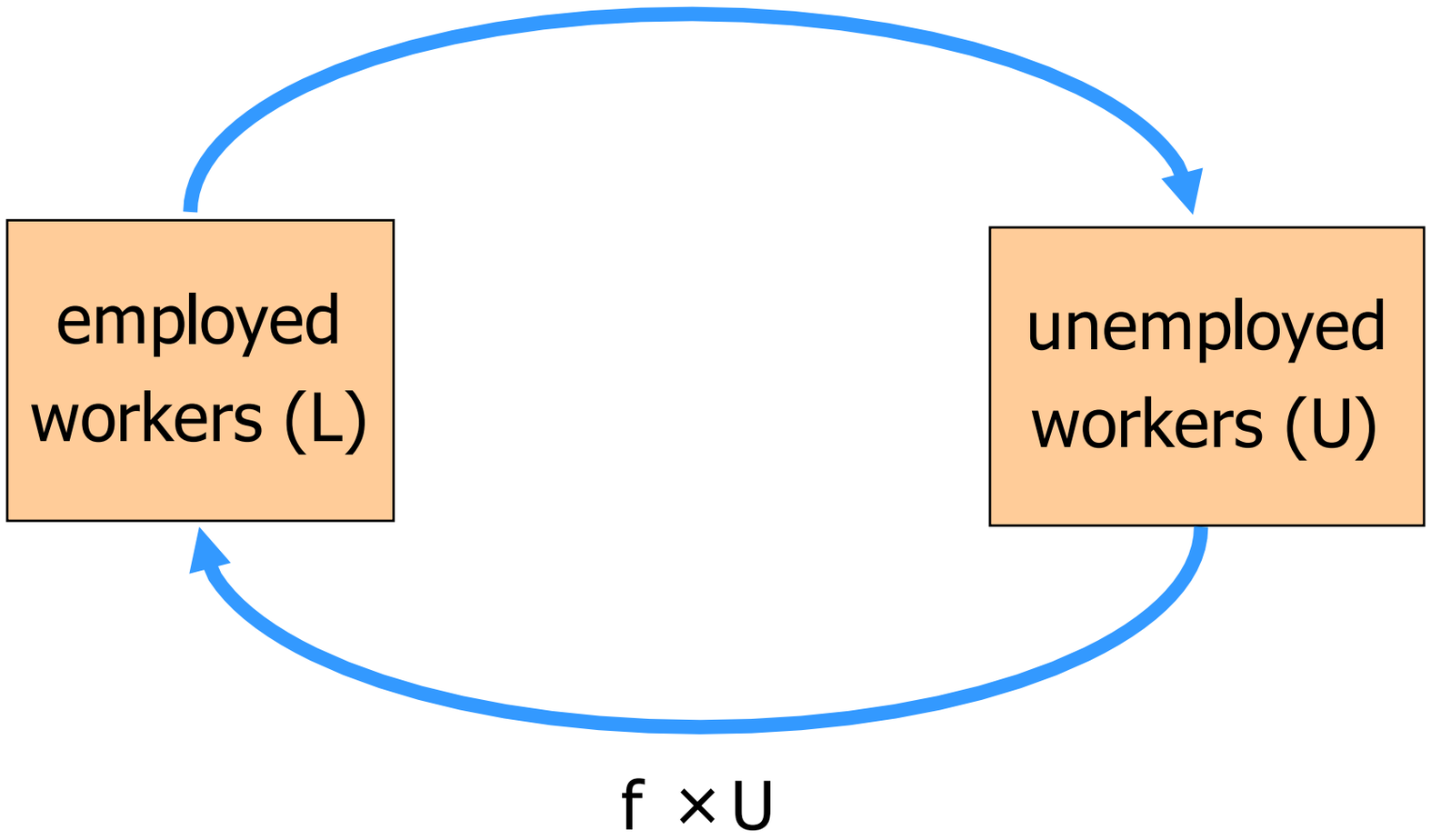
VACANCY-FILLING RATE

- 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

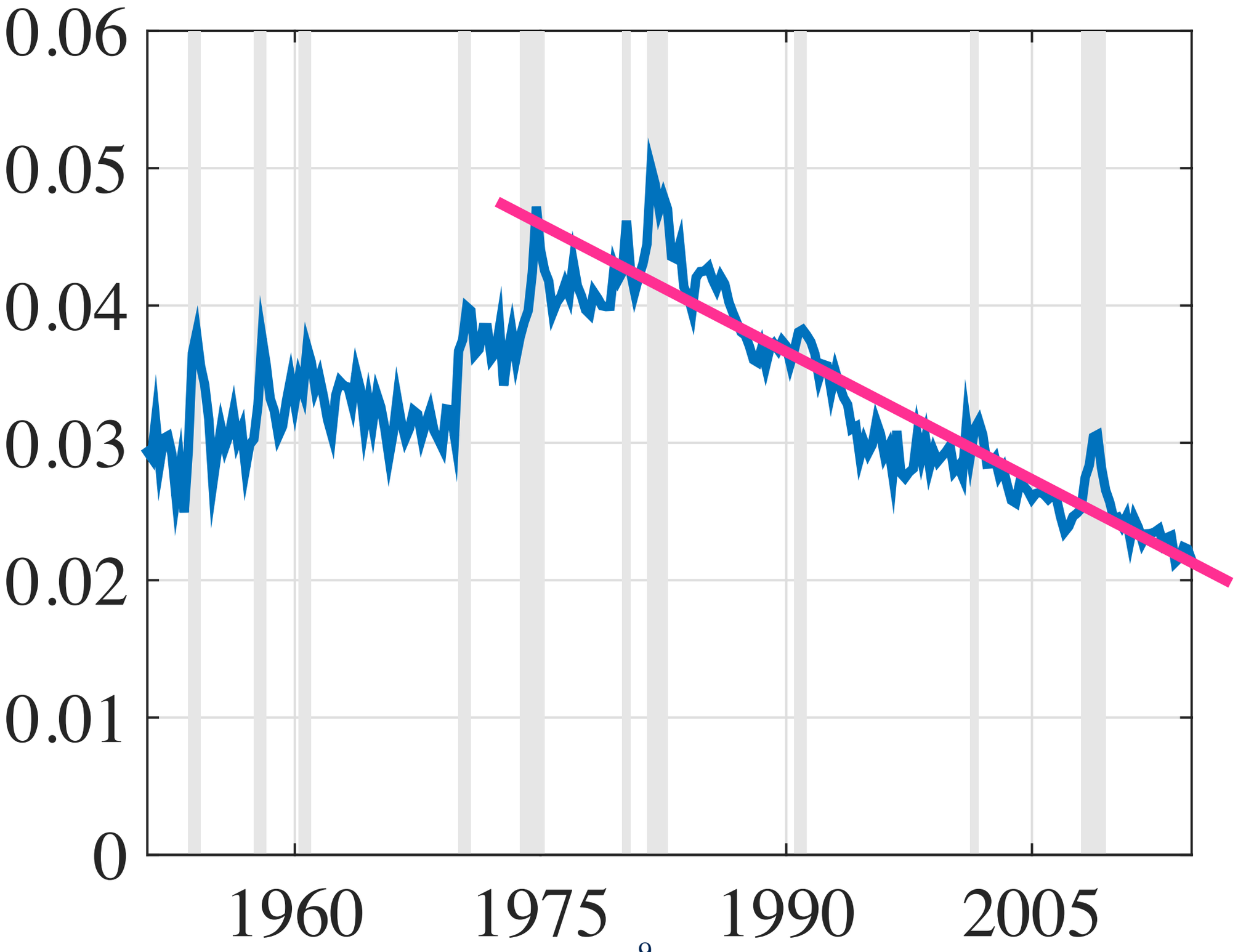


- s: job-separation rate = fraction of employed workers who lose their jobs in a month
- f(θ): job-finding rate = fraction of unemployed workers who find a job in a month

JOB-SEPARATION RATE

- based on US data: s is quite stable over time
  - in the US for 1951–2014: s ~ 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

- $s \times L = f(\theta) \times U$

- $s \times L = f(\theta) \times (H - L)$

- $(s + f(\theta)) \times L = f(\theta) \times H$

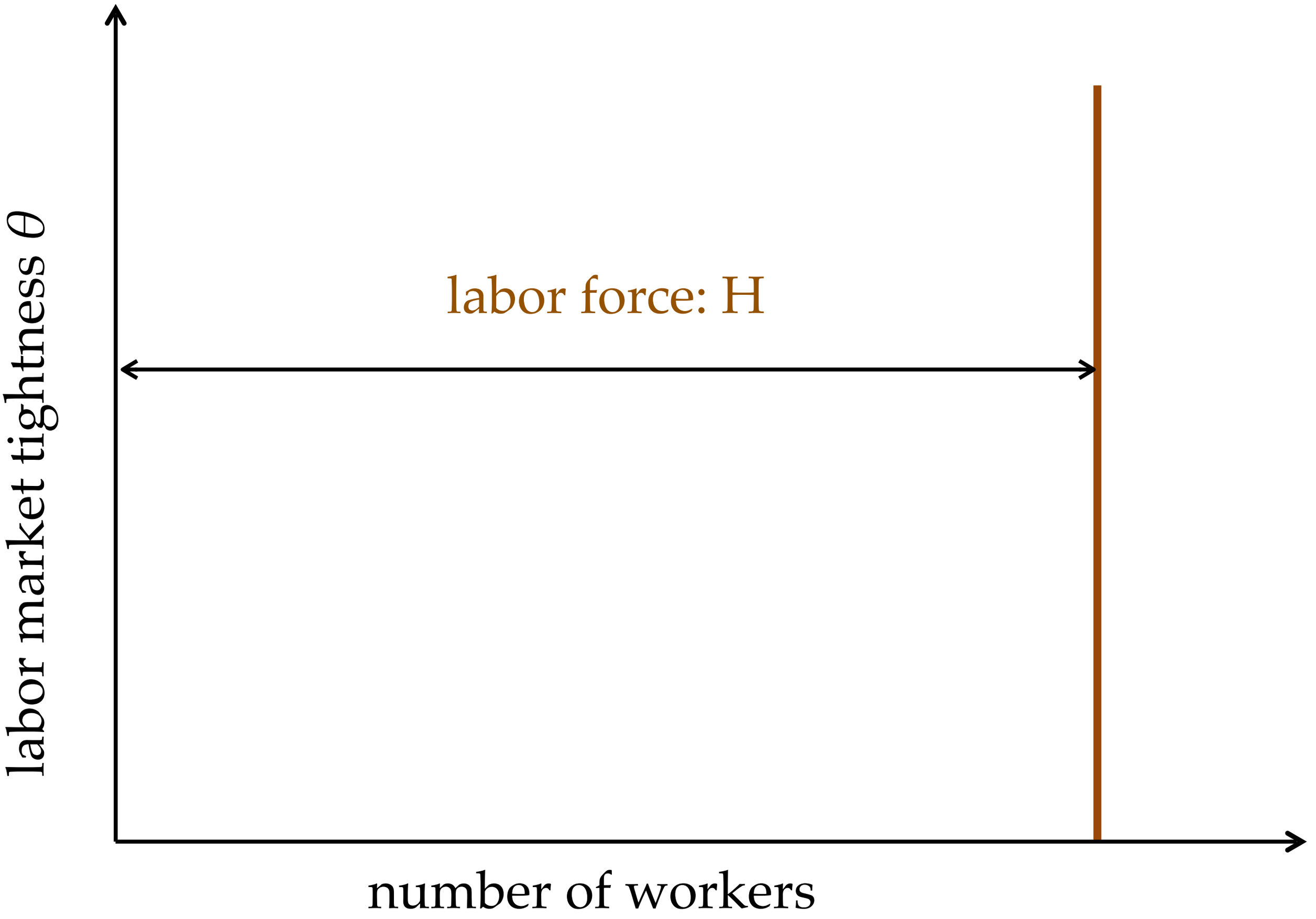
- hence we obtain the labor supply:

  - $L^S(\theta) = H \times f(\theta) \; / \; [s + f(\theta)]$

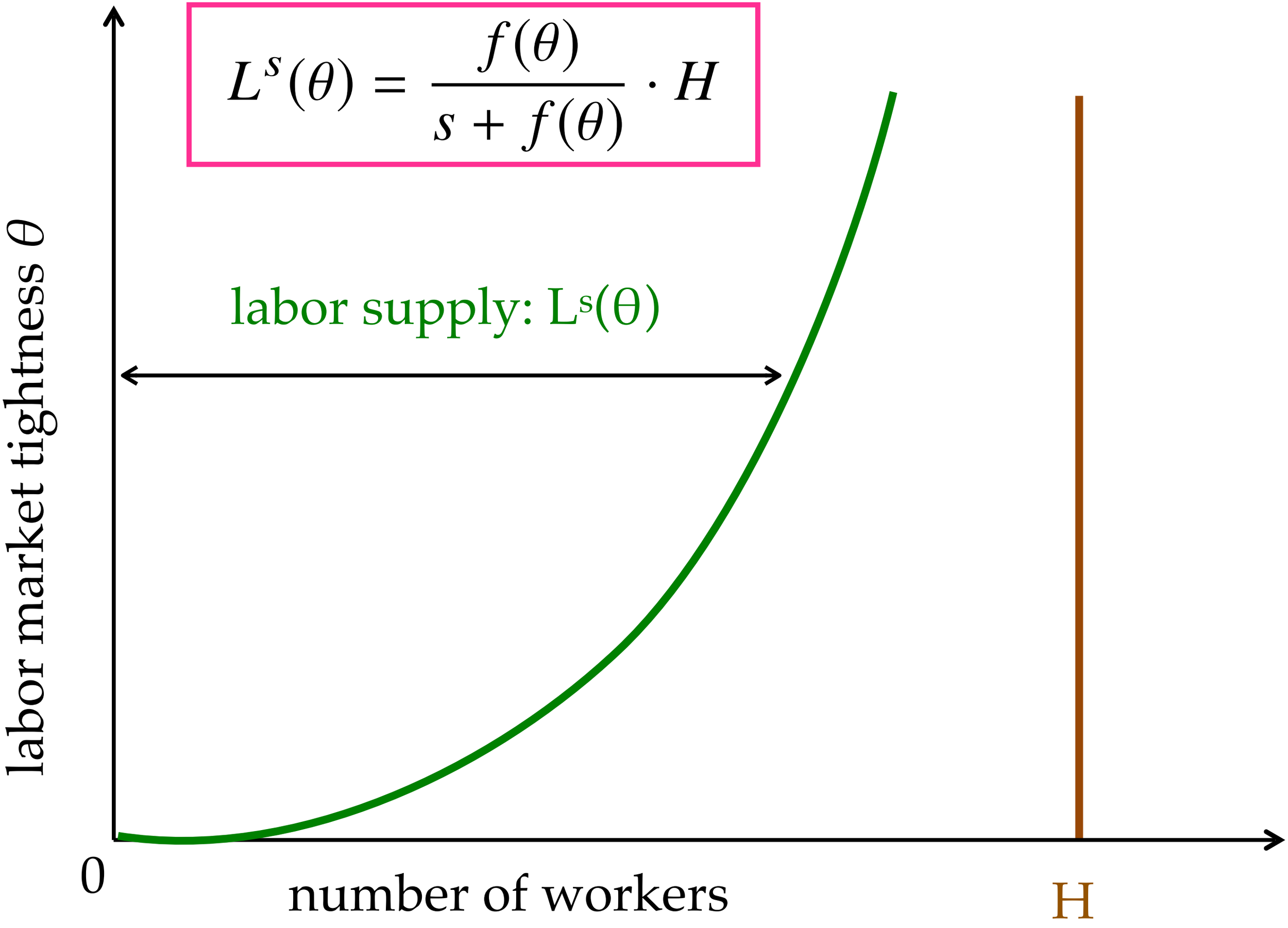
- the labor supply is always positive but less than H

LABOR SUPPLY: PROPERTIES

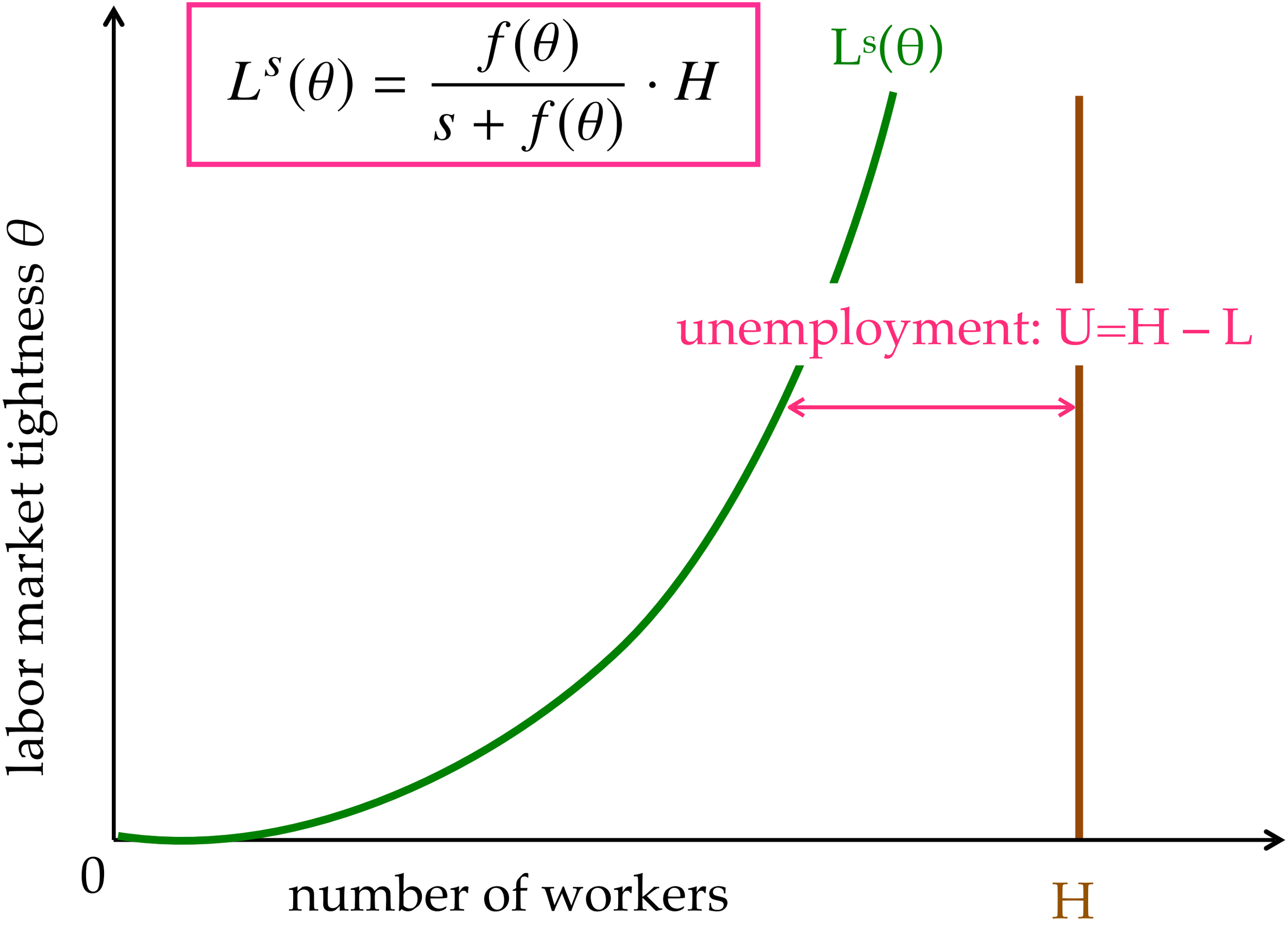
- $L^S(\theta) = H \times f(\theta) \,/\, [s + f(\theta)]$
- labor supply is increasing in θ
  - because $f(\theta)$ is increasing in θ
  - when tightness is higher, jobseekers are more likely to find a job, so the labor supply rises
- labor supply rises when s decreases
  - with longer job tenures,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


labor market tightness θ
labor force: H
number of workers

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

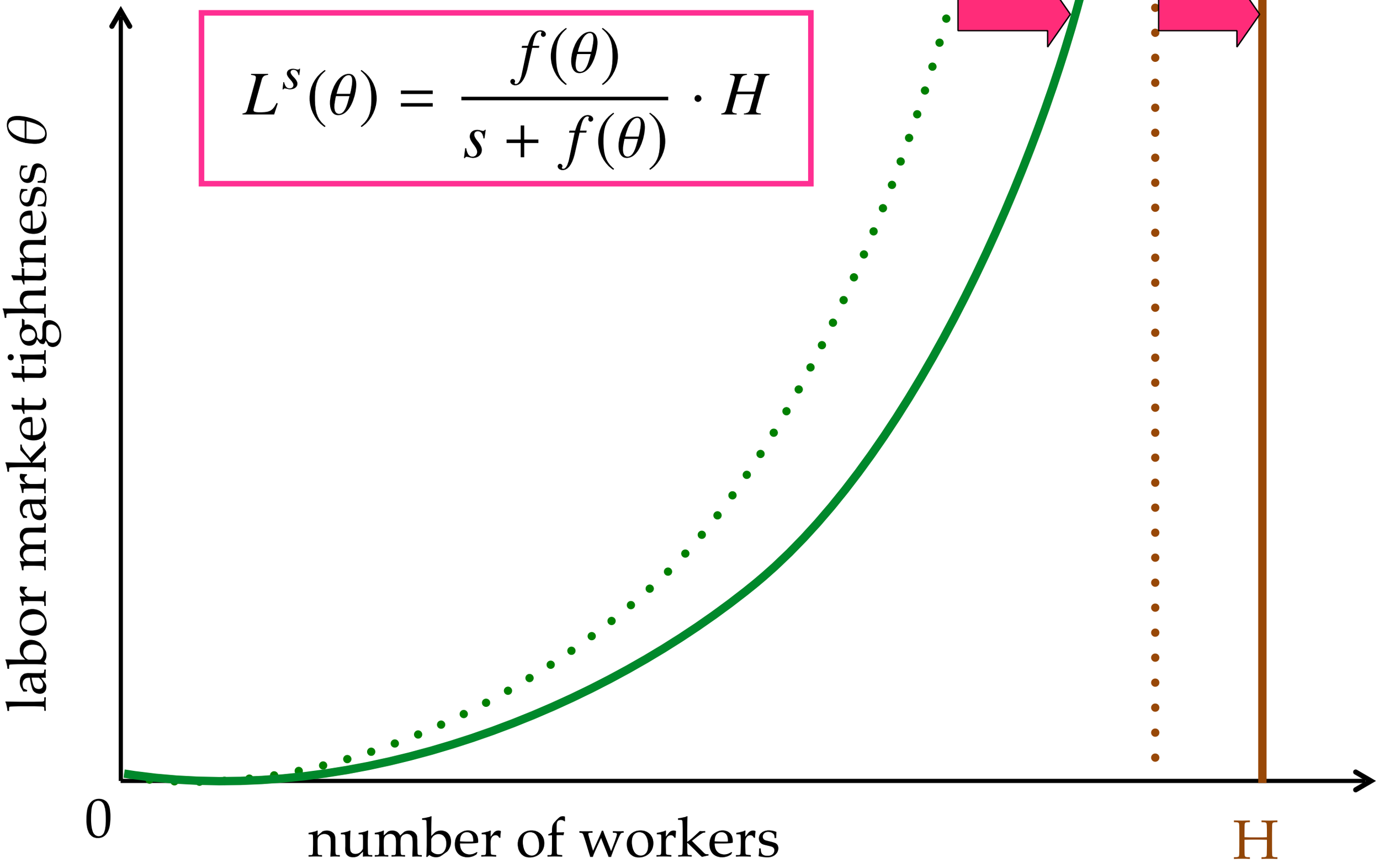


$$L^s(\theta) = \frac{f(\theta)}{s + f(\theta)} \cdot H$$



INCREASE IN LABOR FORCE

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



INCREASE IN JOB-SEPARATION RATE

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