



Factors of Health Service
Production:
Labor Markets

EE 474 Health Economics
Semester 1/2012

Topics

- o The Demand for and Supply of Health Care Labor
- o Factor Productivity and Substitution Among Factors
- o Health Manpower Availability and the Meaning of Shortages
- o Licensure and Monopoly Rents

Demand for Labor

- Health care labor is an important input in the production of health care. But how many of each labor input should the firm (e.g. hospital) demand?
- The firm hires workers as long as the cost of the additional worker is less than what the firm is able to sell the output that the input produces for.
- Example:
 - It costs the firm \$100 to hire another worker (L) for a day
 - The worker produced 10 more units of output: $MP_L^Q = 10$
 - Marginal product the firm was able to sell for \$20 each:
 $MR_Q = \$20$
 - Additional profits: $(10 * \$20) - \$100 = \$200 - \$100 = \$100$.

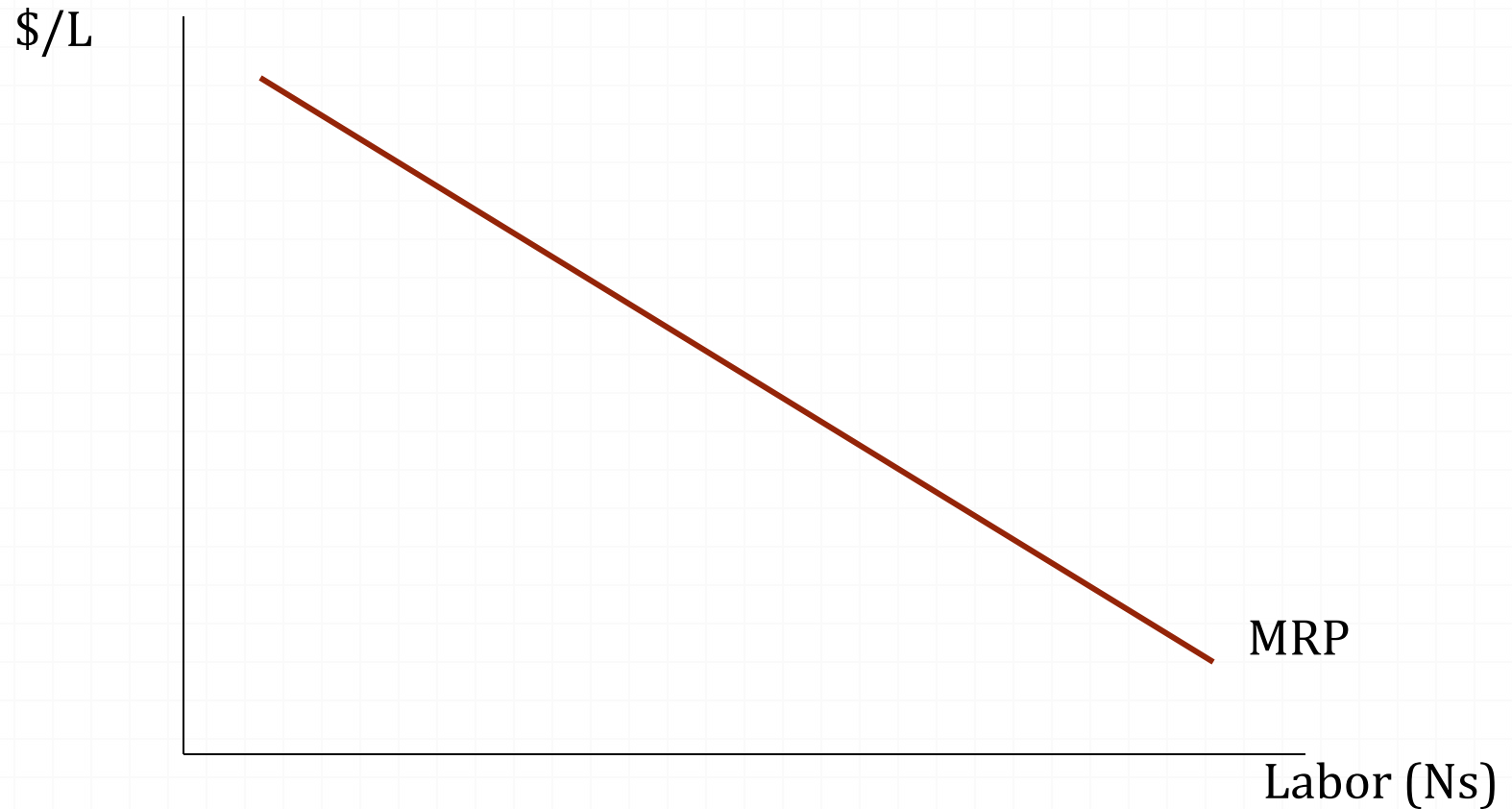
Demand for Labor

- Thus, the firm's demand for labor (or any other input) is related to:
 - The input's **marginal product** (what output the input can produce)
 - The output's **marginal revenue** (what the firm can sell the additional output for on the market)
- Specifically, the firm's demand for an input is its **marginal revenue product (MRP) curve**, where MRP is the additional revenue that results from employing one additional worker.

$$\text{MRP} = \text{MP}_L^Q * \text{MR}_Q$$

- It is assumed that the MP_L^Q is decreasing with labor, so the **MRP curve is also decreasing with labor.**

The Firm's Marginal Revenue Product Curve for Labor



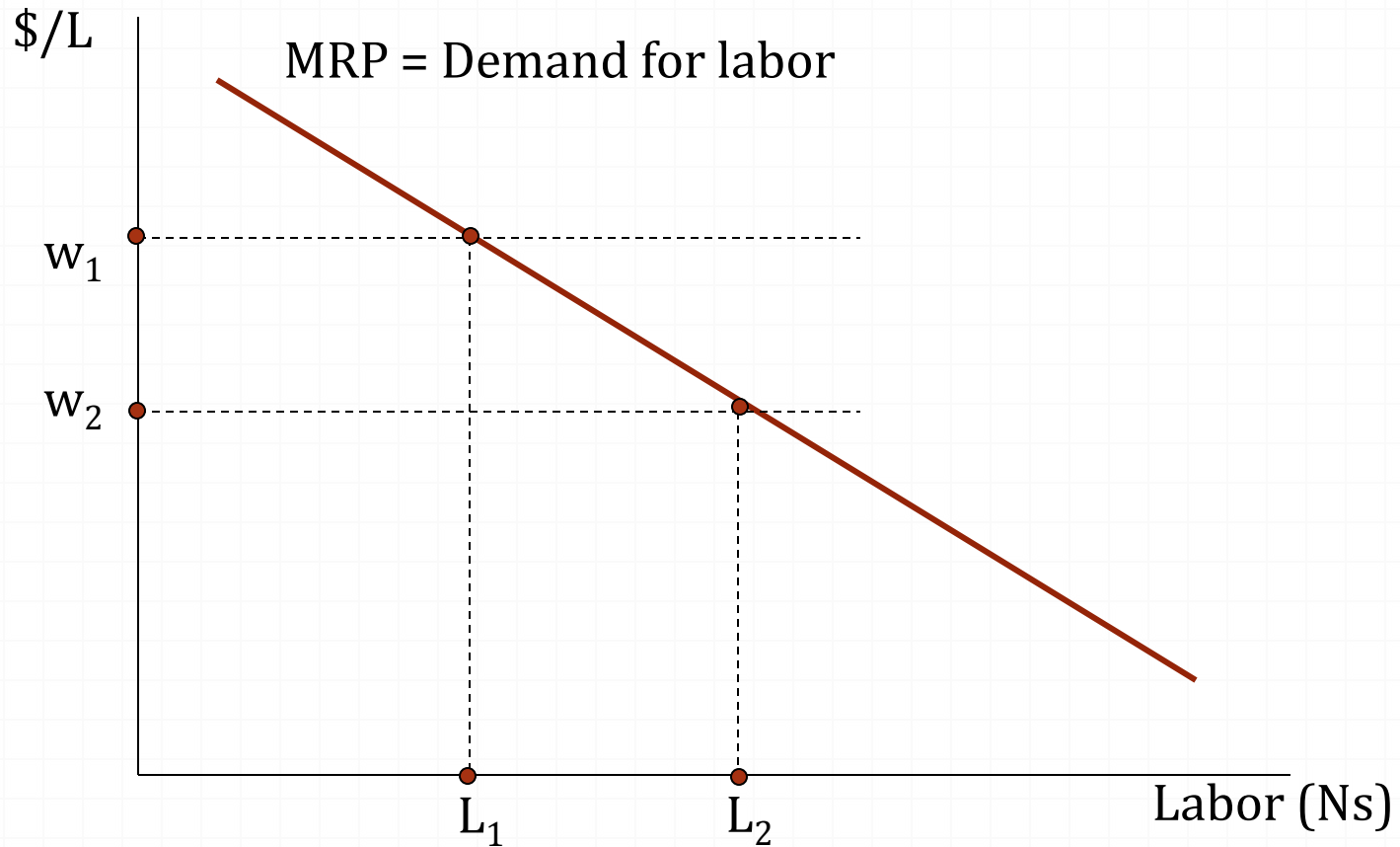
Why the MRP is the Firm's Demand for Labor?

- The **firm's demand for labor** is the relationship between the **wage rate** and the **quantity of labor demanded**.
- The **wage rate** represents the **cost to the firm of purchasing a unit of labor**.
- As long as the wage rate is less than the MRP, the firm will continue to hire workers.
- The **firm will hire workers up to** the point where:

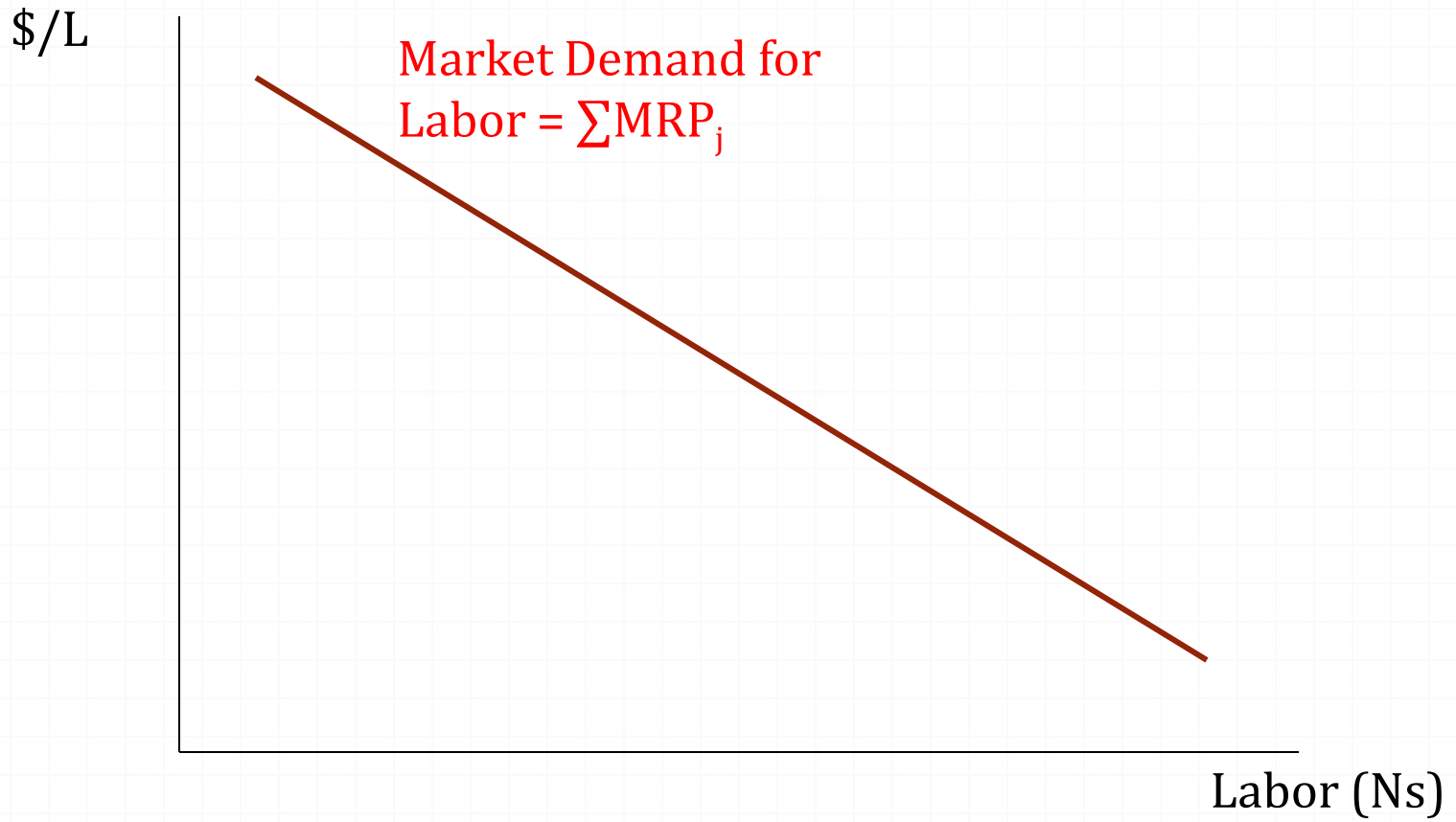
$$\text{MRP} = w.$$

- The relationship between wages and quantity of labor is therefore the MRP curve.

Firm Demand for Labor



Market Demand for Labor With Many Firms Buying Labor

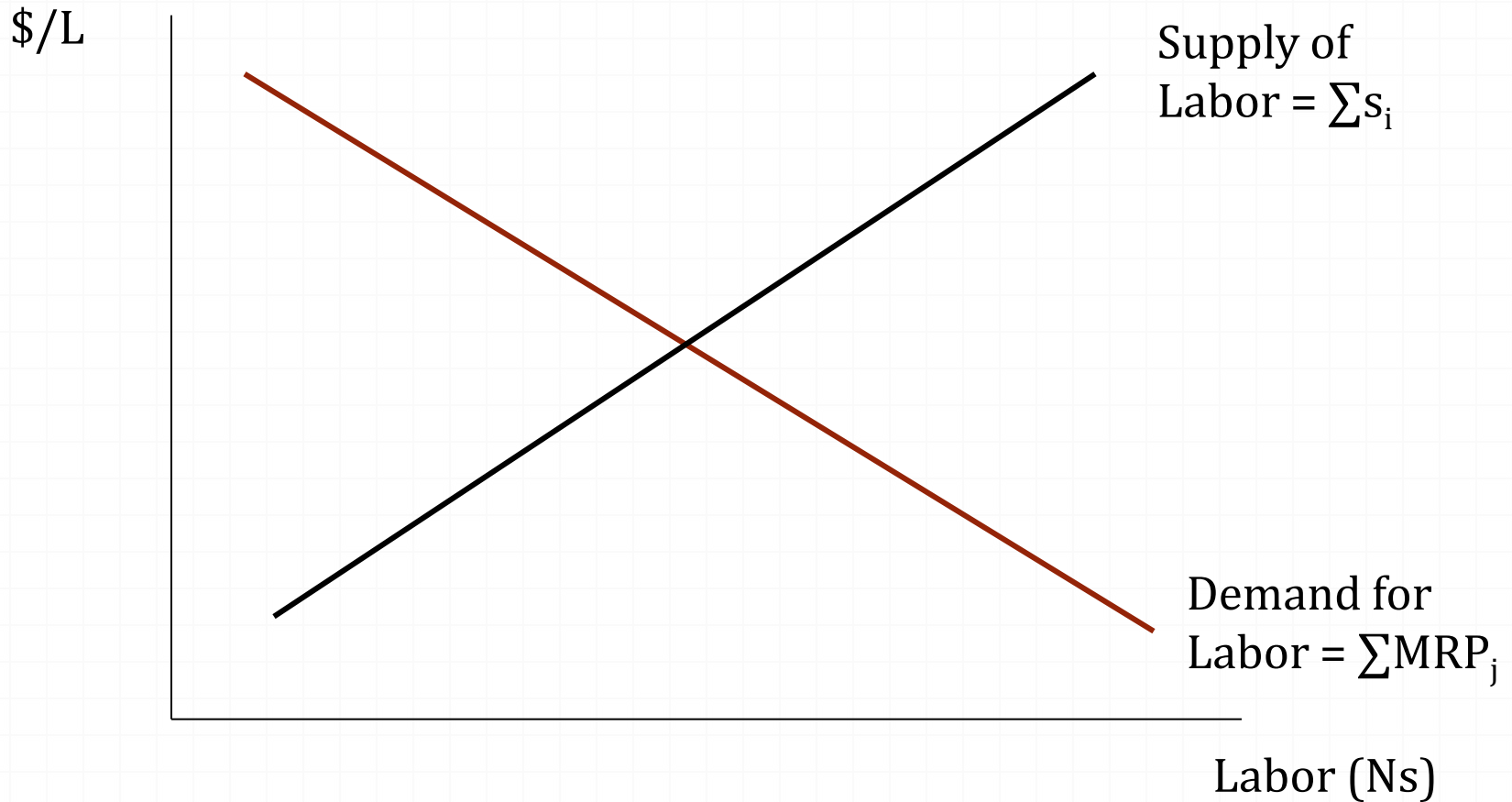


The Supply of Labor

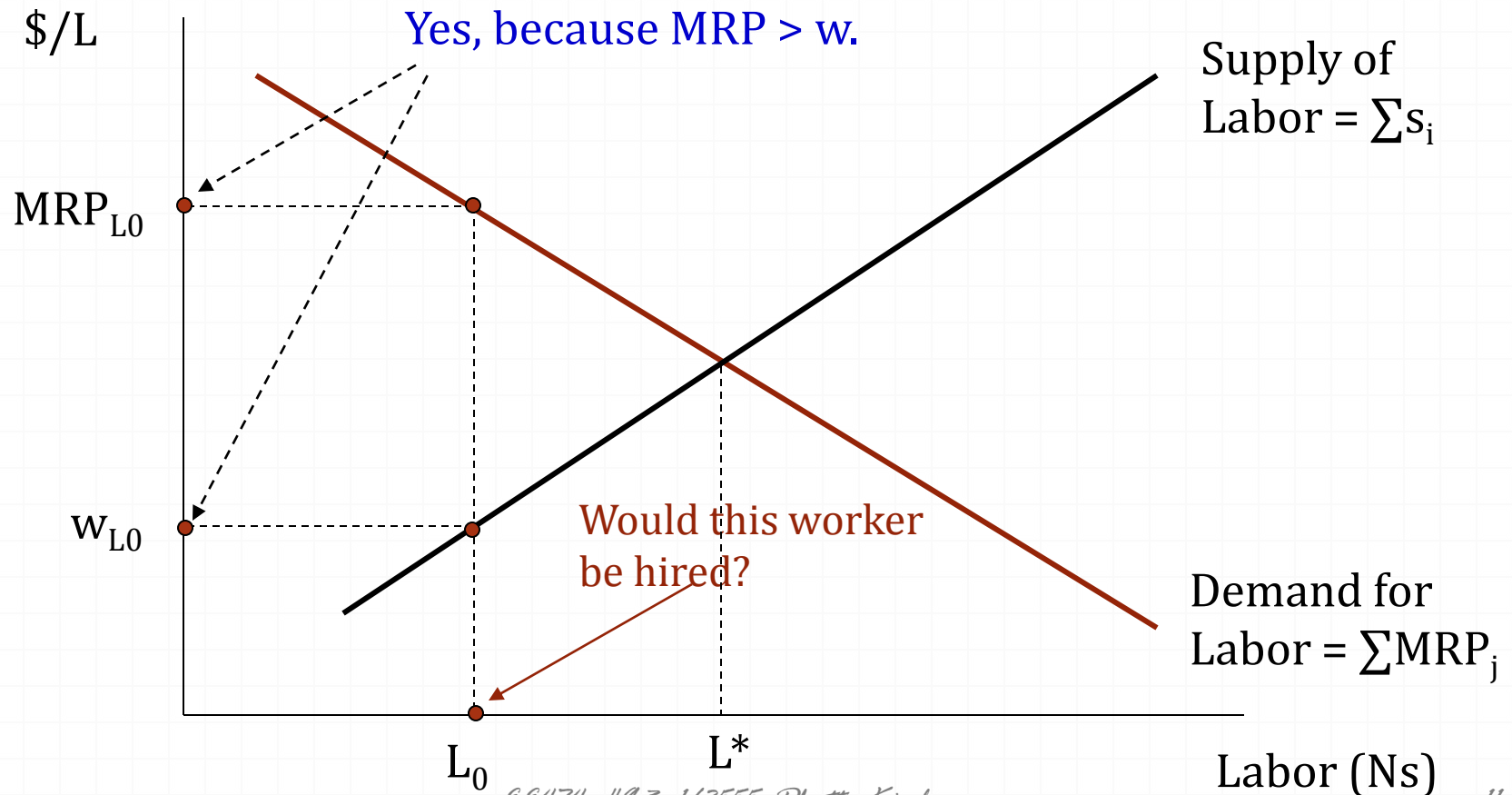
- The higher the wage rate, the greater the quantity of work that will be supplied by the existing workers in the labor force. (ie. Upward-sloping curve)
 - Some workers who are already working will work longer hours.
 - Similar workers maybe attracted into the market from elsewhere.
 - Movement along labor supply curve
- New workers that have recently joined the labor force would add more workers at each wage rate (add another s_i to the Σ).
 - Labor supply curve shift

Market for Labor

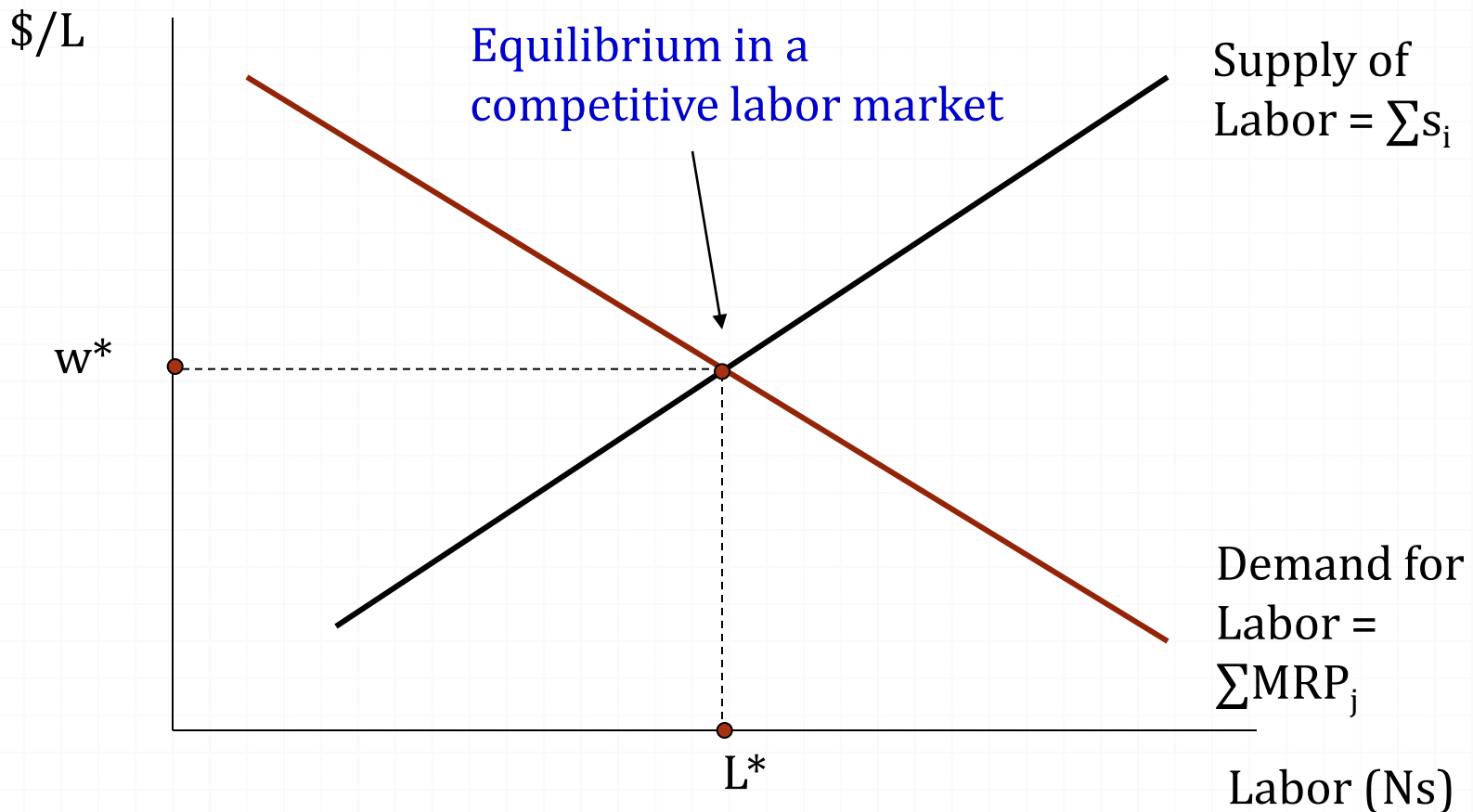
With Many Buyers and Sellers



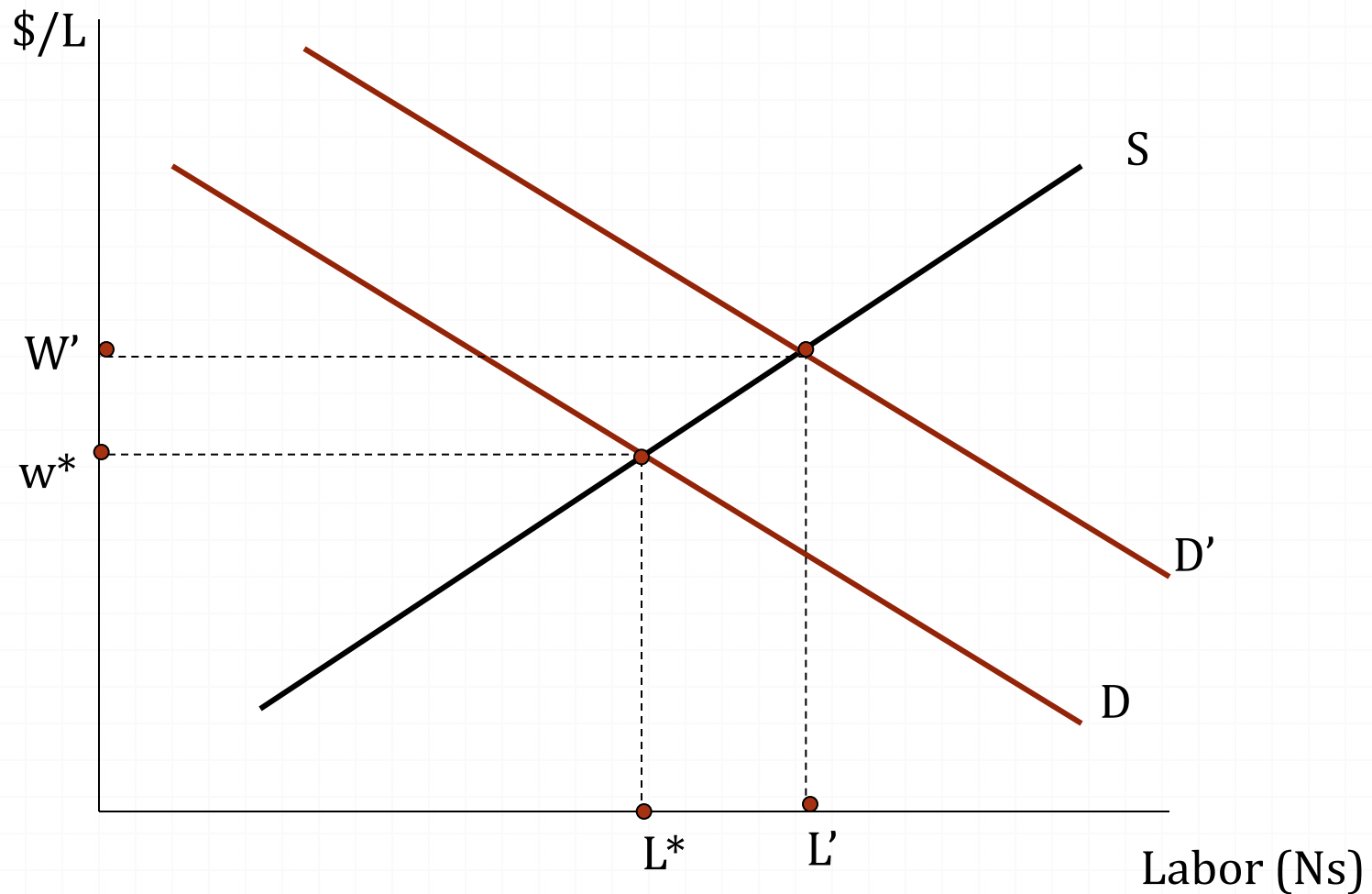
Market for Labor With Many Buyers and Sellers



Equilibrium in Competitive Market for Labor



Increase in Demand for Labor



Factor Productivity and Substitution among Factors

- Productivity of labor input is a major determinant of supply.
 - Productivity improvements increase output (i.e. same level of output can be produced with fewer inputs).
- The productivity of an input factor can be measured as the average product of the factor:

$$\text{Average product of labor} = Q/L$$

- In measuring factor productivity labor, one needs to estimate the incremental output resulting from the additional unit of that labor in the production process.

Marginal Products and Efficiency of Input Use

Input	All Physicians		Solo Physicians		Group Physicians	
	MP	MP/W	MP	MP/W	MP	MP/W
Physician	2.967	0.114	2.686	0.102	2.793	0.110
Secretary	0.192	0.043	0.253	0.058	0.105	0.023
Registered nurse	0.585	0.104	0.628	0.109	0.625	0.114
Practical nurse	0.542	0.129	0.533	0.132	0.485	0.109
Technician	0.320	0.067	0.321	0.059	0.278	0.057
Physician assistant	0.231	0.040	-0.014	-0.003	1.082	0.192

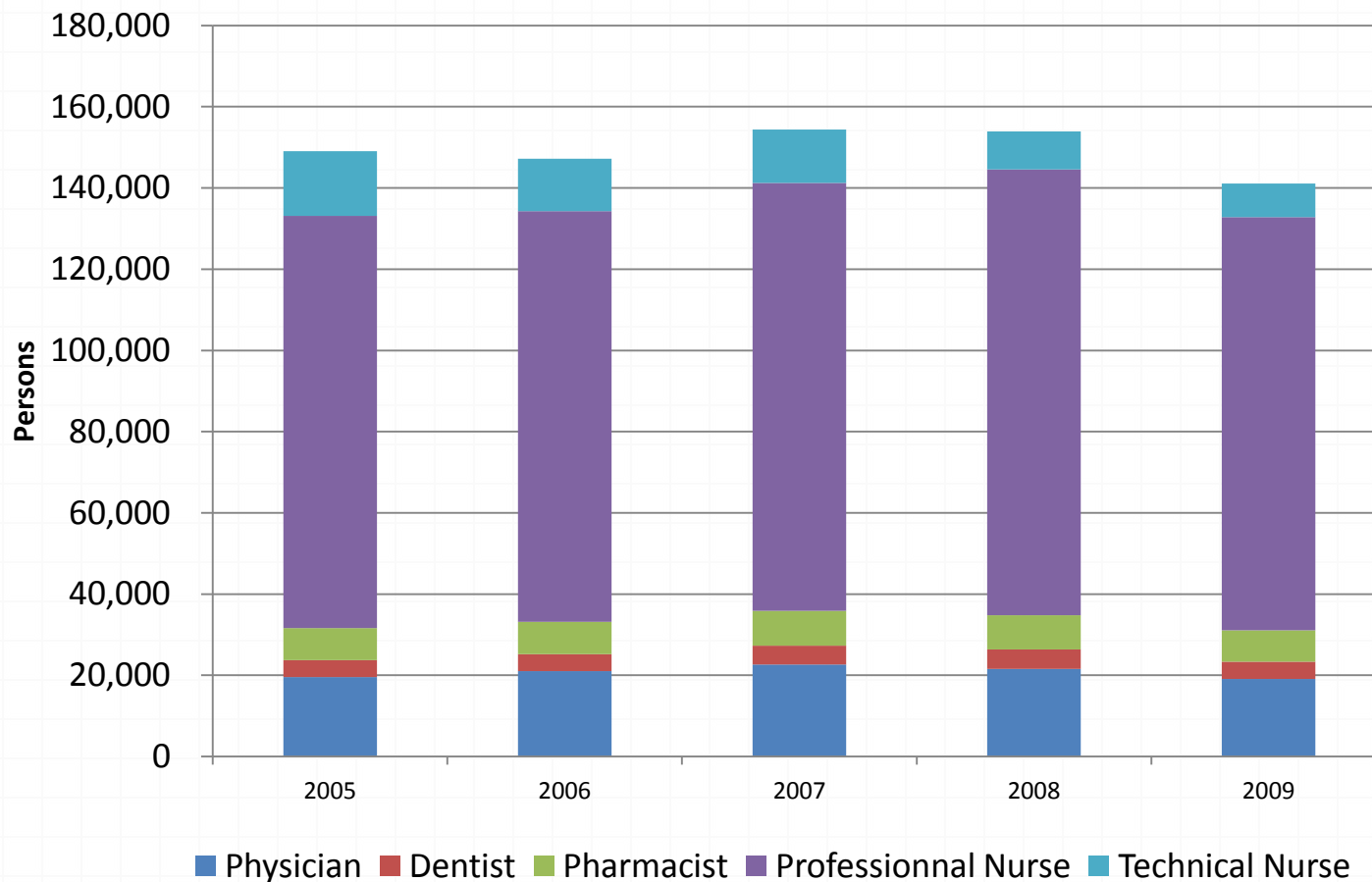
Note: MP = Marginal product

MP/W = Marginal product per dollar wages spent on input

Nurses were Underutilized.

Source: Reprinted from the *Journal of Human Resources*. Douglas M. Brown, "Do Physicians Underutilize Aides?" Originally published in the *Journal of Human Resources* 23 (1988): 342-55. © 1998 by the Board of Regents of the University of Wisconsin System. Reproduced by the permission of the University of Wisconsin Press.

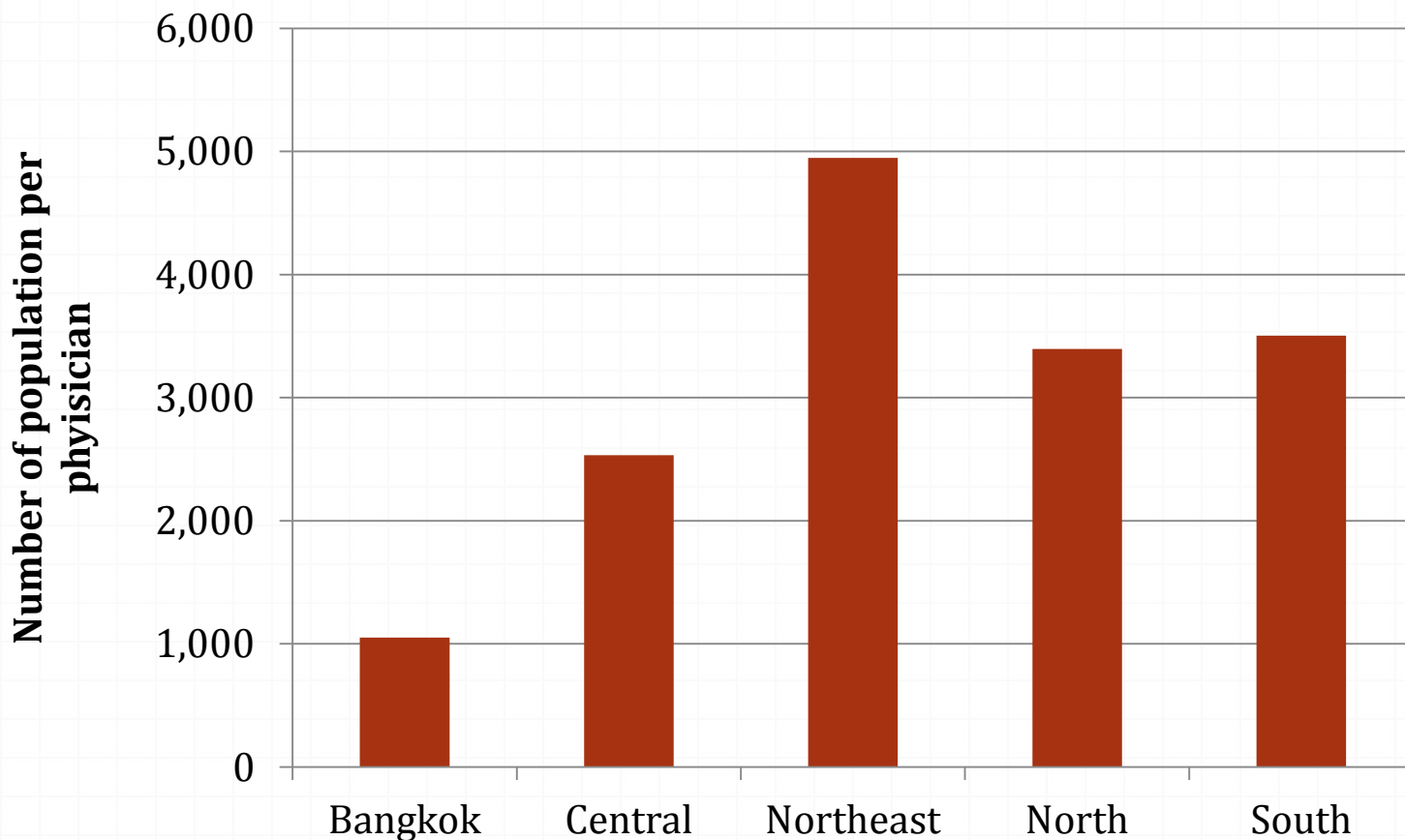
Health Manpower Availability: Health Care Labor in Thailand



Sources: Office of the Permanent Secretary for Public Health, Ministry of Public Health

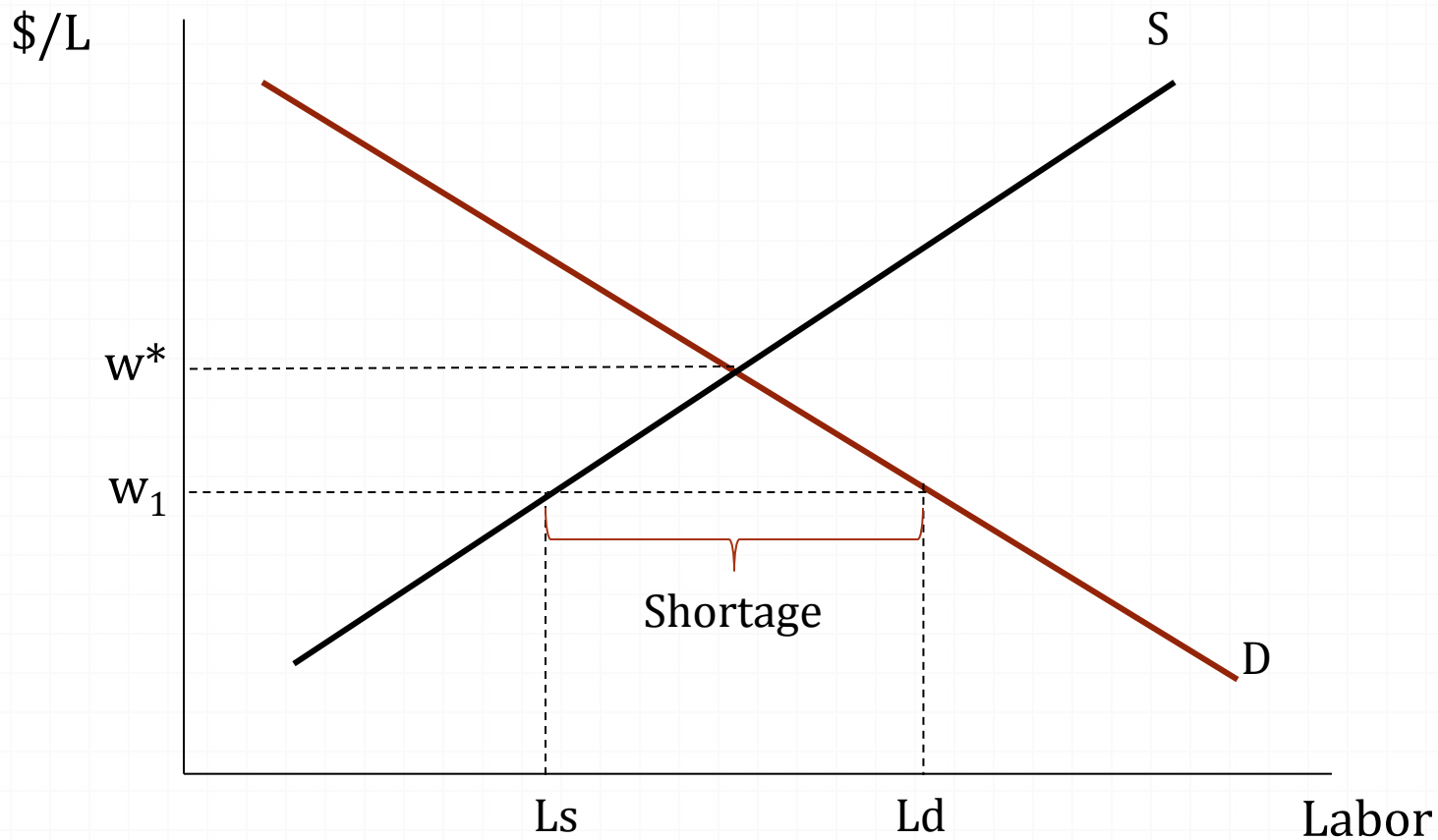
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Availability of Physicians (2010): Number of Population per Physician

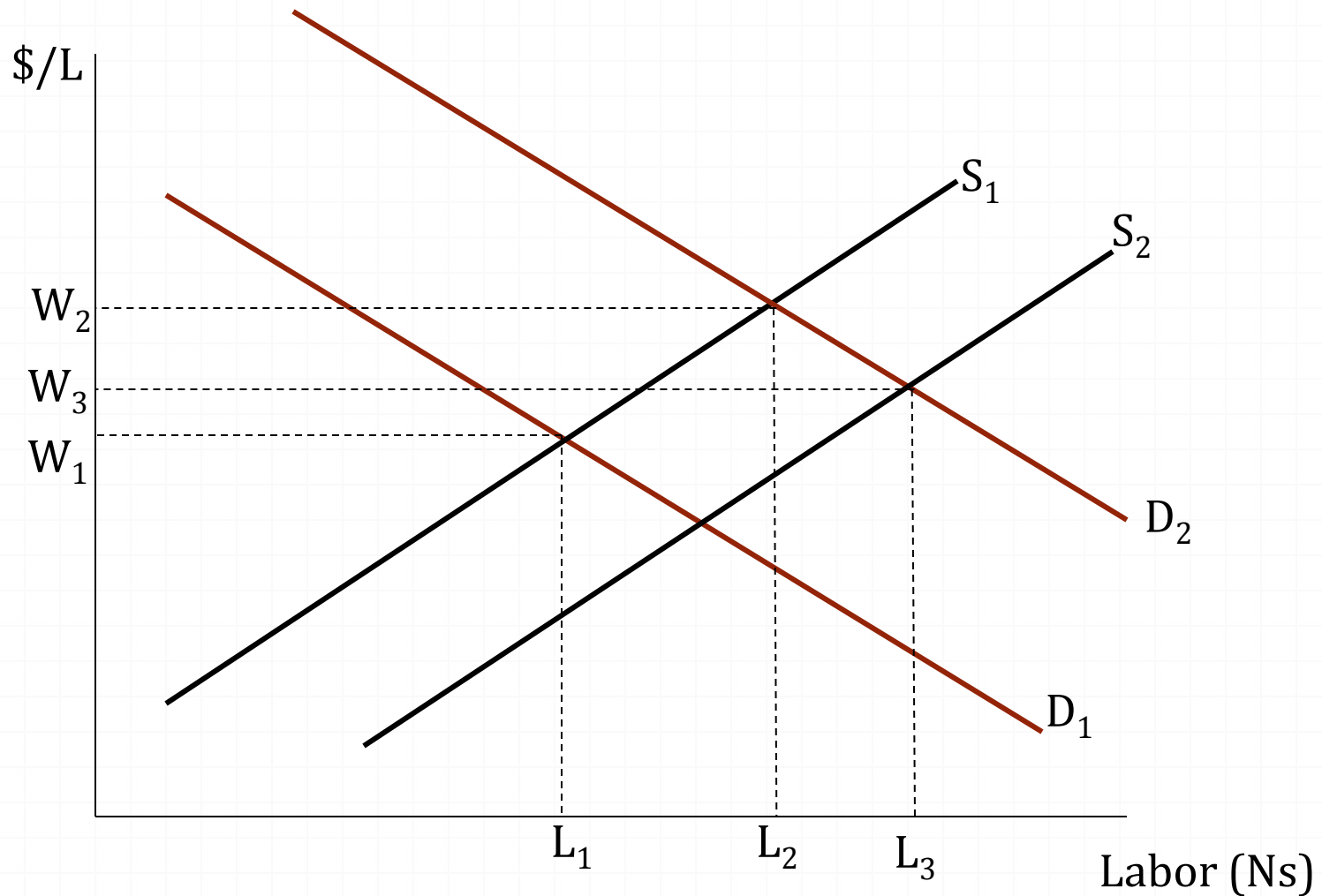


Source: Bureau of Policy and Strategy, Ministry of Public Health

Shortages of Health Professionals



Changes in Equilibrium over Time



Rate of Return and Shortage

- o The **internal rate of return** is the **discount rate** that equates the present value of the stream of costs to the stream of revenues from education.
- o Let R = internal rate of return, then R satisfies:

$$0 = (B_0 - C_0) + \frac{(B_1 - C_1)}{1 + R} + \frac{(B_2 - C_2)}{(1 + R)^2} + \dots + \frac{(B_n - C_n)}{(1 + R)^n} = \sum_{t=0}^n \frac{(B_t - C_t)}{(1 + R)^t}$$

when B_t = Revenue at time t and C_t = Cost at time t .

- o **High rates of return** may occur because the **supply of labor fails to responds quickly to changes in demand**. In some cases, this is a **result of barriers to entry** faced by potential health professionals.
 - o Ex: Licensure Law

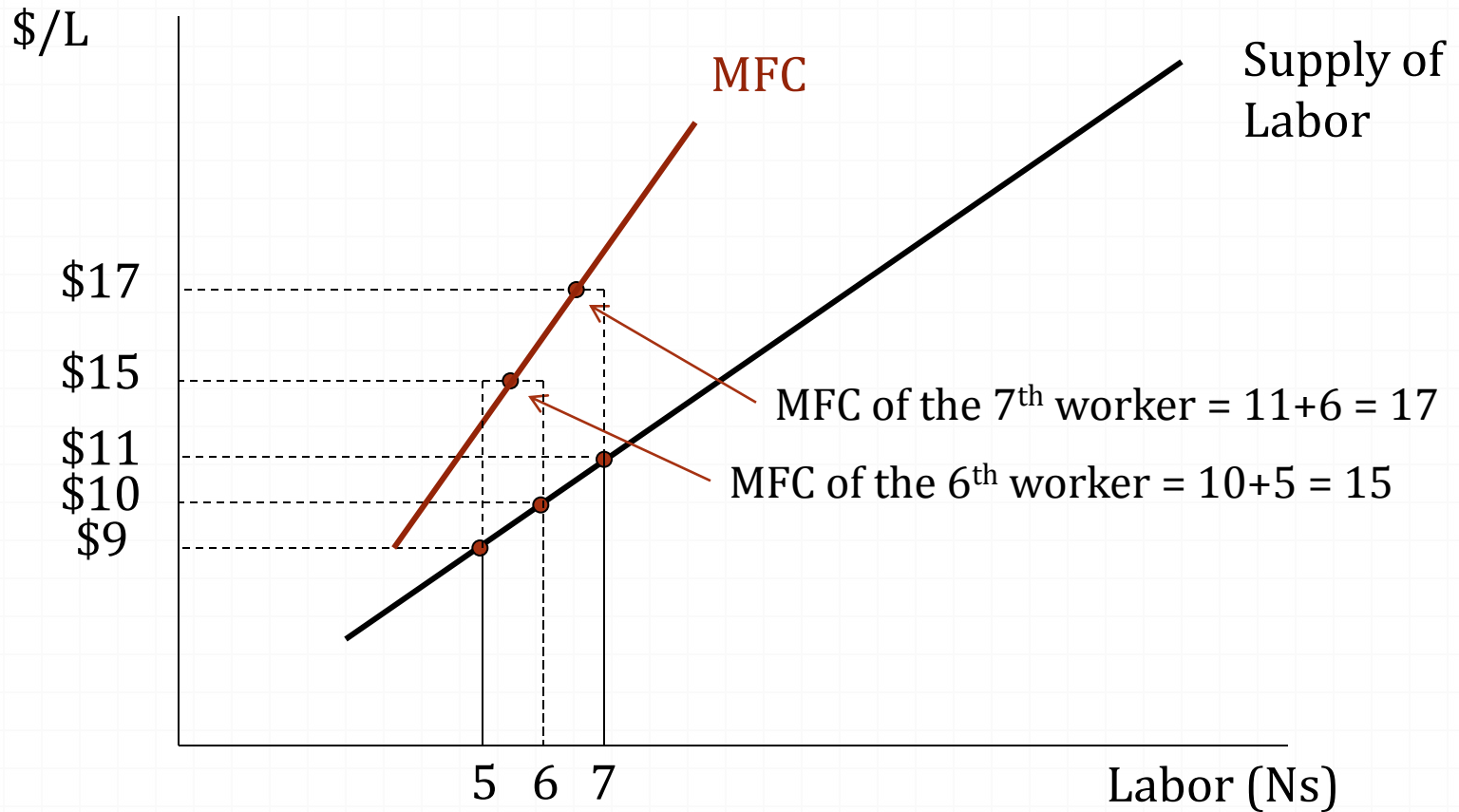
Role of Monopsony Power

- A **monopolist** is a **single seller** of a product in a market.
- A **monopsonist** is a **single buyer** of an input in the market.
- The monopsonist is able to use its market power to reduce the prices it pays for inputs.
- Examples:
 - Hospitals are monopsonists in the market for nurses.
 - Health plans are monopsonists in the market for physicians and hospitals – e.g. Canada's single-payer health system

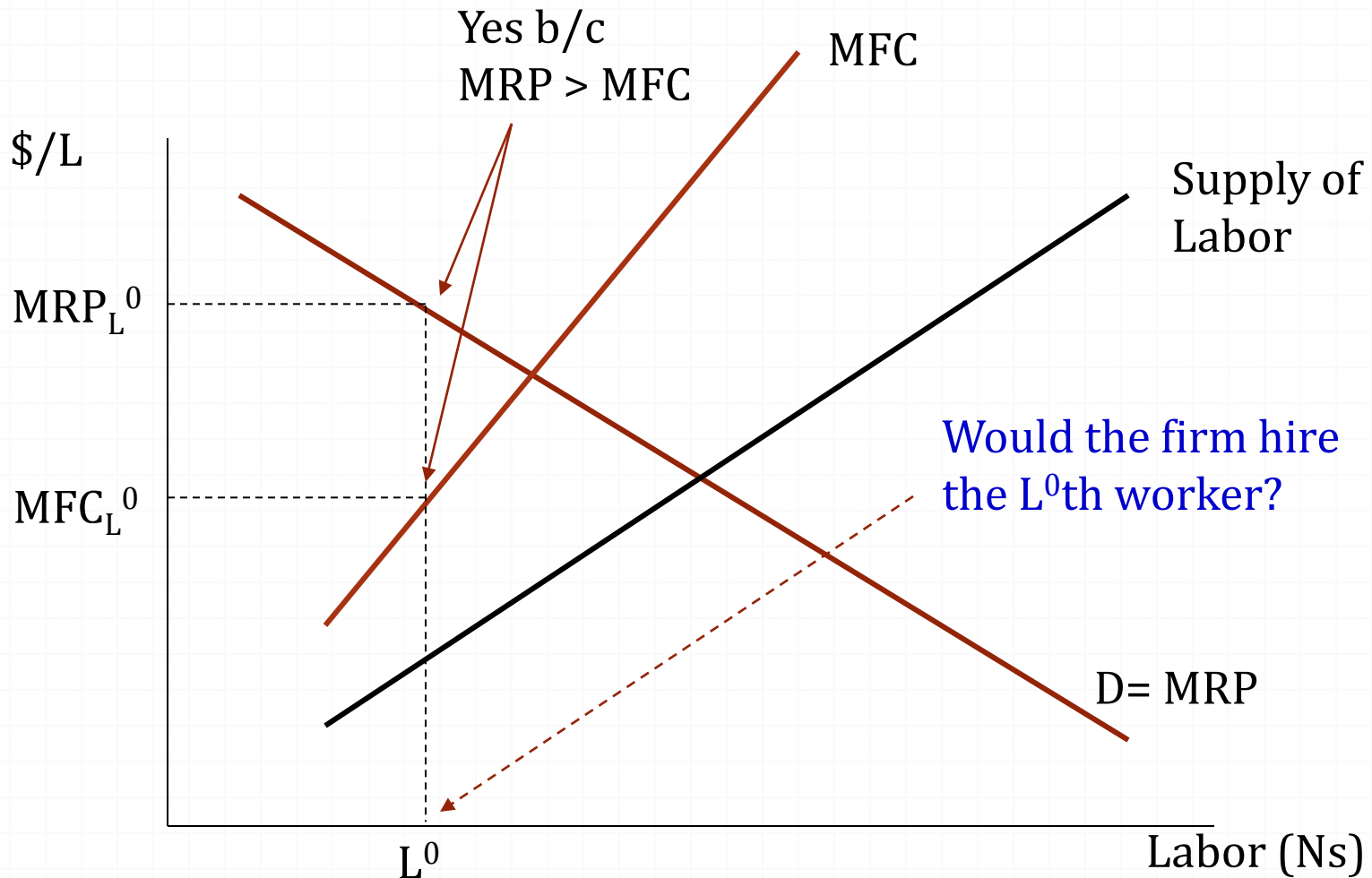
Monopsonist

- A monopsony exists if there is a single purchaser of an input in the market.
- The market then has a **single MRP curve** that represents the **demand for a factor or input**.
- The **monopsonist faces the entire supply of labor**.
 - Just like the monopolist faces the entire demand for its output
- Because the monopsonist faces the entire supply curve, it recognizes that **if it wants to hire another worker, it must pay that worker a higher wage rate and also a higher wage rate to all those who would have worked for less**.

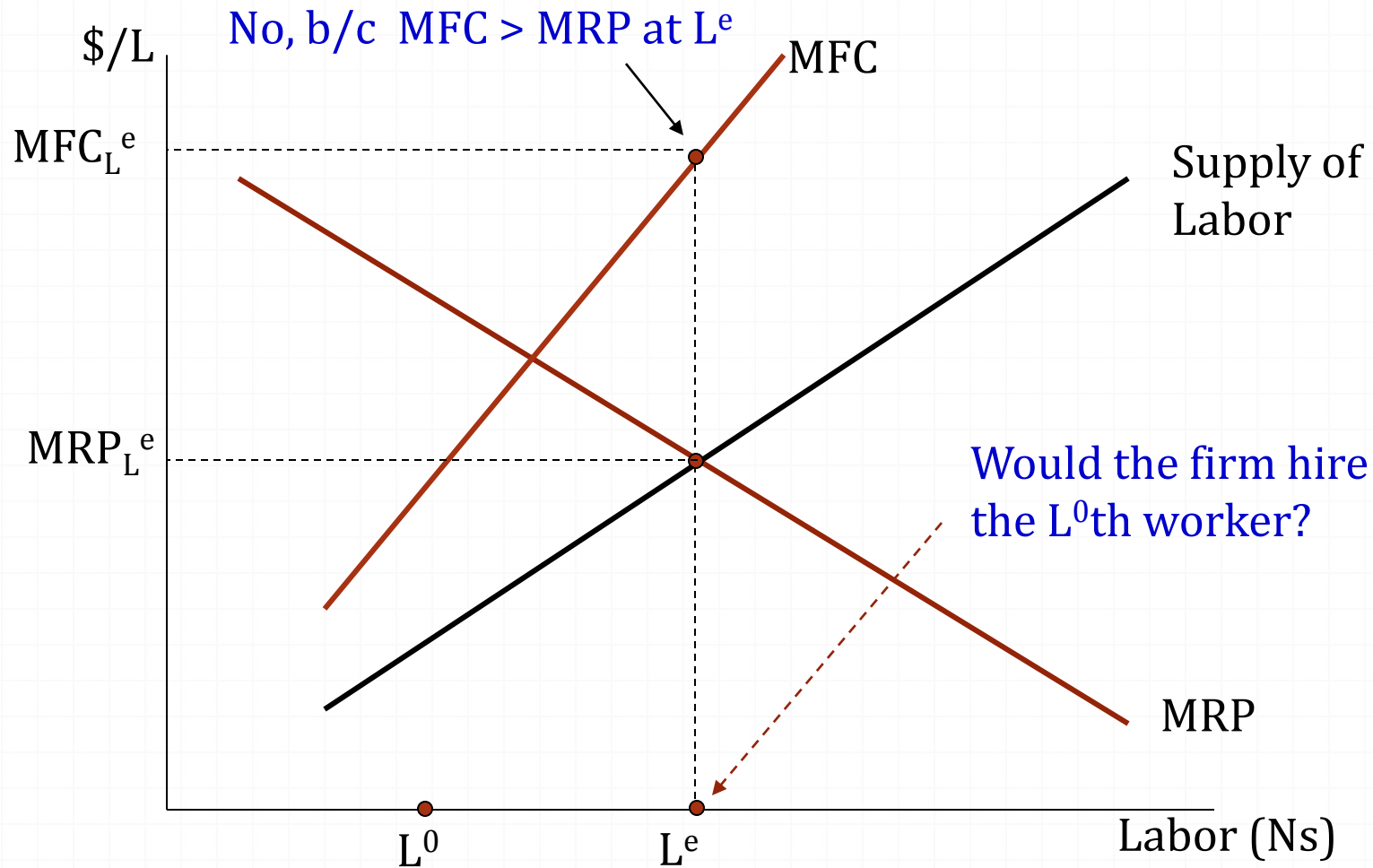
Monopsony Model



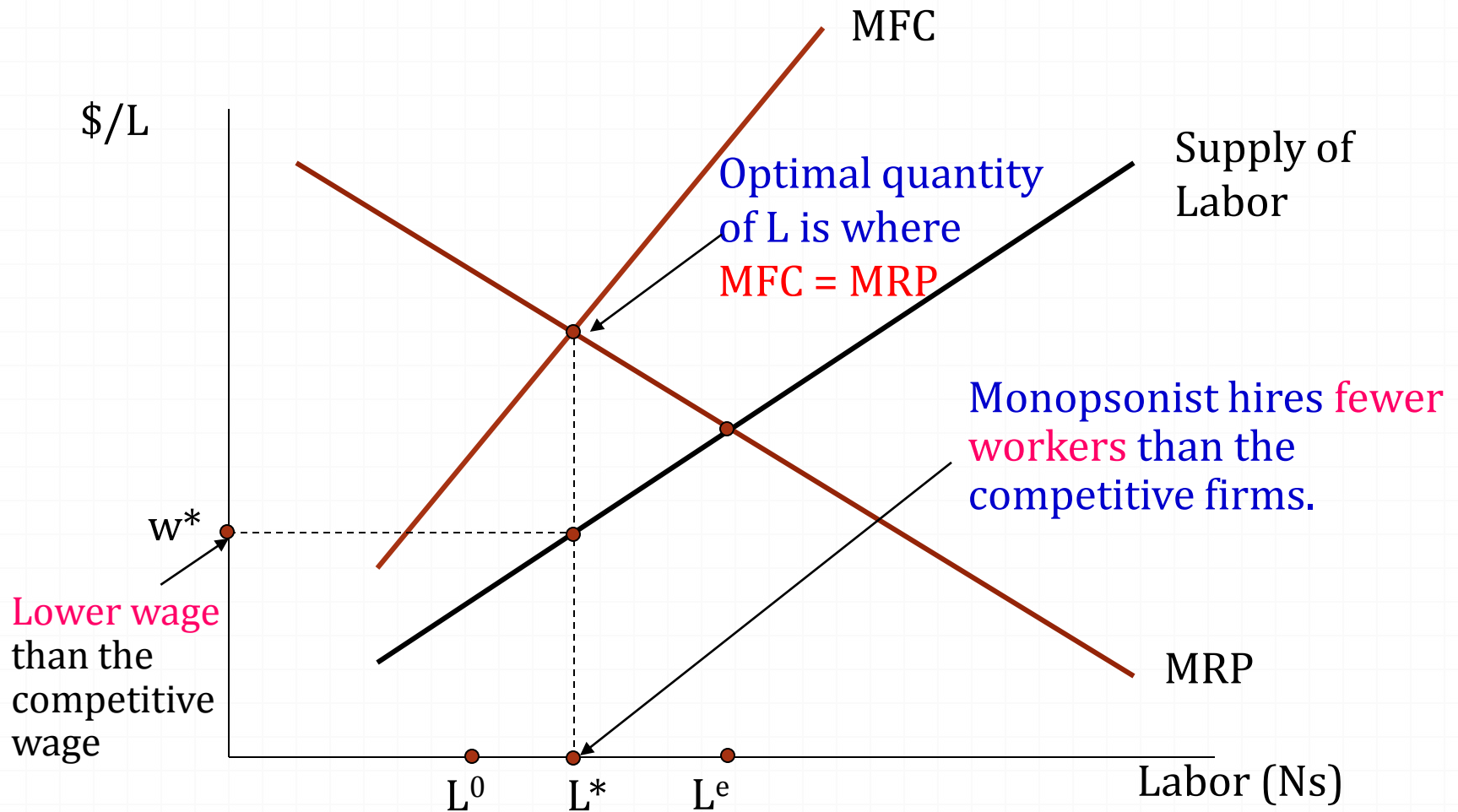
Monopsony Model



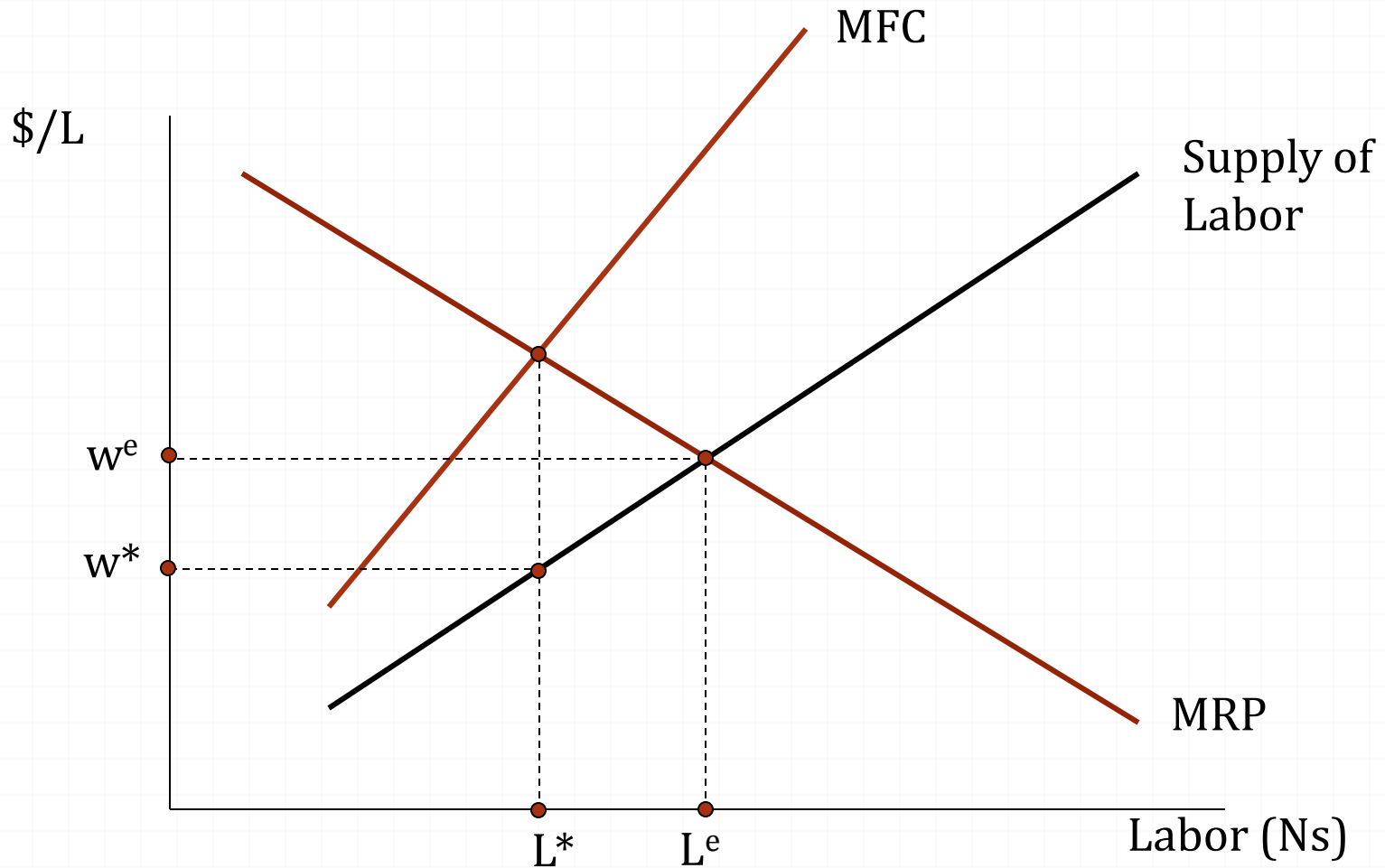
Monopsony Model



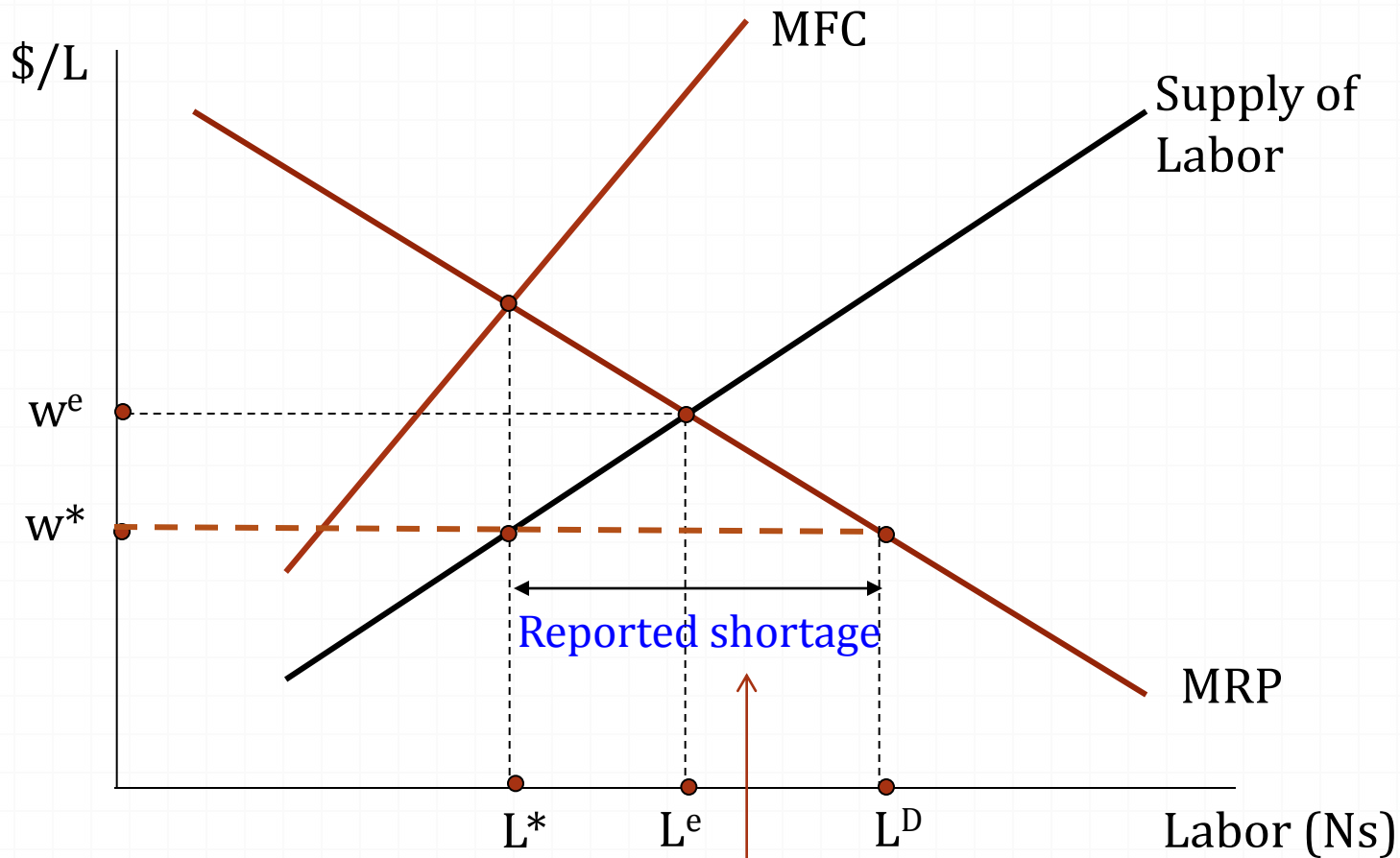
Monopsony Model



Monopsony Model



Monopsony Model: Reported Shortages



There is not enough nurses willing to at the low wage rate that monopsonist hospitals are willing to pay.

Licensure and Monopoly Rent

- Controversies on the role of health professional licensure:
 - **Self-interest** theory: Organized medicine has used control of licensure for self-interest by **limiting entry**.
 - **Public-interest** theory: Regulatory measures, such as licensure, are demanded as a result of the **limited information patients have about quality** and the relatively high costs of obtaining information.
- Some economists argue that licensure and professional control over medical education creates “**economic rents**” for physicians.
 - Payment to factors over and above those necessary to induce them to provide their services.