Labor Demand

- Firm's hiring decision → rule of profit maximization

- Central question → how many workers are hired and what are they paid

- Begin with the study of labor demand by specifying the firm's production function → describing the technology that the firm uses to produce goods and services.

- The firm's output can be produced by a variety of capital–labor combinations.

$$Q = f(E, K)$$

where E is the number of employee hours of work and K is the aggregate stock of capital.

- Note that the number of employee−hours E is given by the product of the number of workers hired times the average number of hours worked per person → now ignores fact that workers are heterogeneous in terms of productivities.

- The most important concept associated with the firm's production function is "marginal product"

- The marginal product of labor is defined as the change in output resulting from hiring an additional worker, holding constant quantities of all other inputs (capital in our simplified model).

- The marginal product of labor eventually declines → "law of diminishing returns"

[Figure 1] The total product, the marginal product and the average product
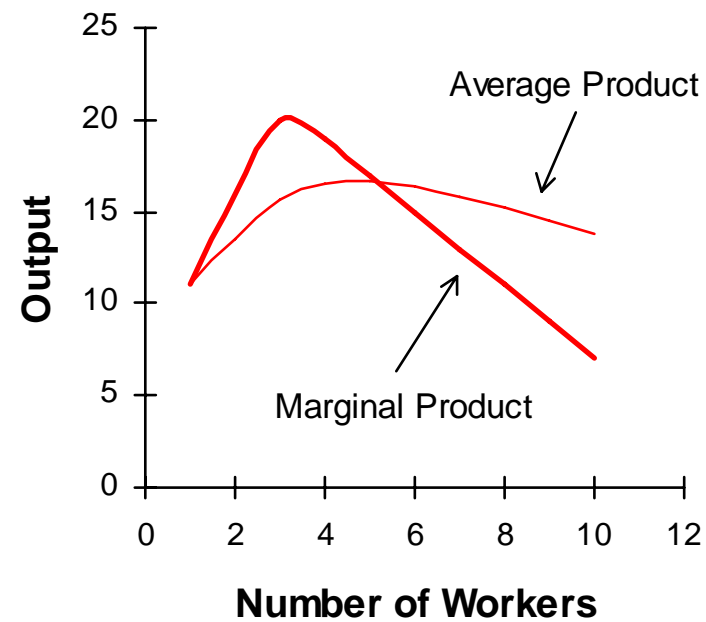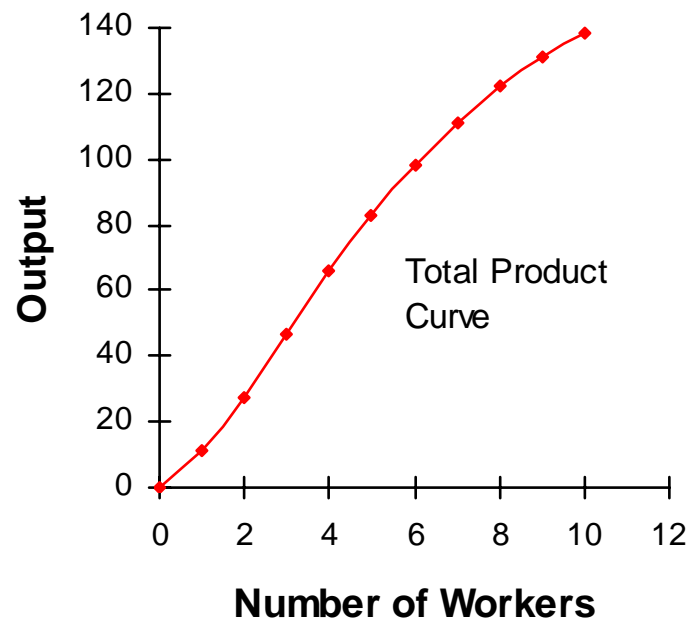
- The objective of the firm is to maximize profits.


- Profit function = $p*q - w*E - r*K$

  where p is the price of product, w is the wage rate, and r is the price of capital

- Perfectly competitive firms cannot influence prices of output or inputs.

Short-run Hiring Decision

- In the short run, the firm cannot increase or decrease the size of its plant, or purchase or sell physical equipment → the amount of capital is fixed.

- Value of Marginal Product (VMP) is the marginal product of labor times the dollar value of the output → VMP =p*MPe.

- VMP indicates the dollar benefit derived from hiring an additional worker, holding capital constant.

- Value of Average Product is the dollar value of output per worker.

[Figure 2] The Firm's Hiring Decision in the Short Run
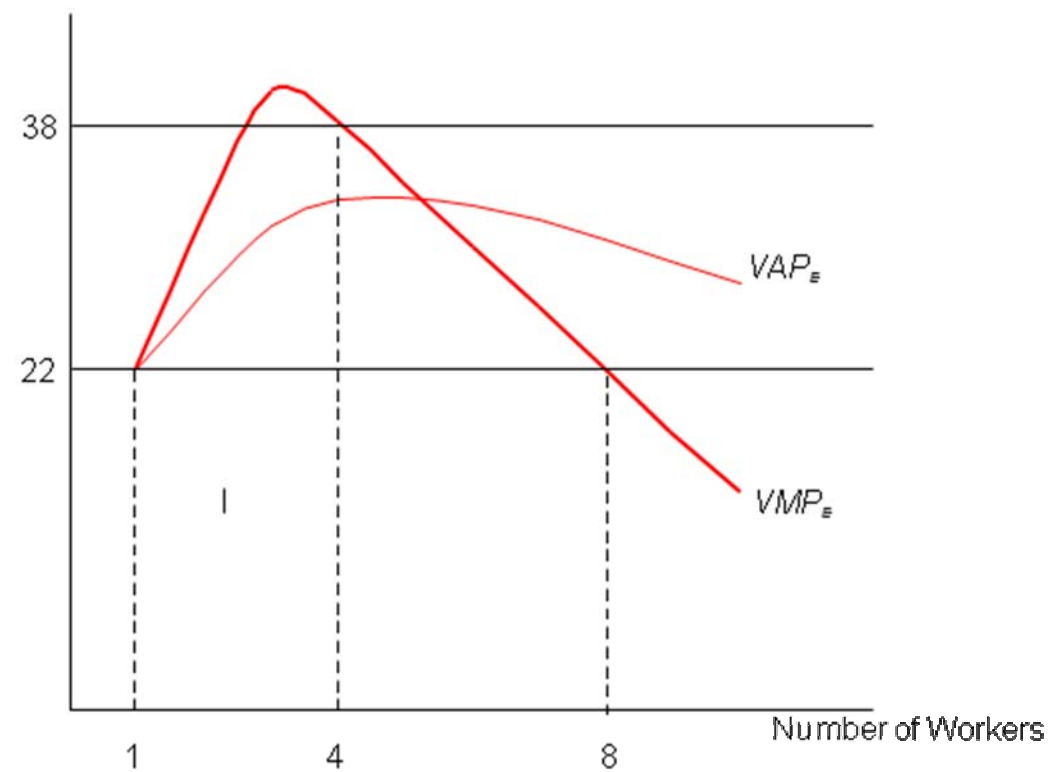
- A profit-maximizing firm hires workers up to the point where the wage rate equals the value of marginal product of labor.

- VMPe equals to the wage rate of $22, hiring eight workers.

- The demand curve for labor indicates how many workers the firm hires for each possible wage, holding capital constant.

- The labor demand curve is downward sloping → reflects the fact that additional workers are costly due to the "law of diminishing returns"

[Figure 3] The Short-Run Demand Curve for Labor
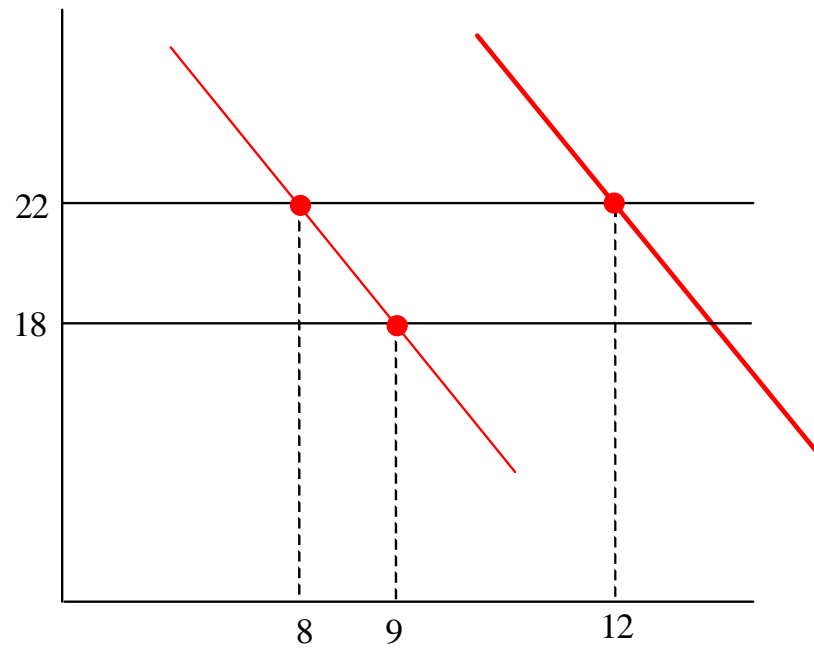
- Because marginal product eventually declines, the short-run demand curve for labor is downward sloping.

- A drop in the wage from $22 to $18 increases the firm's employment.

- An increase in the price of the output shifts the value of marginal product curve upward (to the right), and increases employment → "shift in the labor demand"

- Other issues associated with the labor demand → short-run labor demand for industry and long-run labor demand
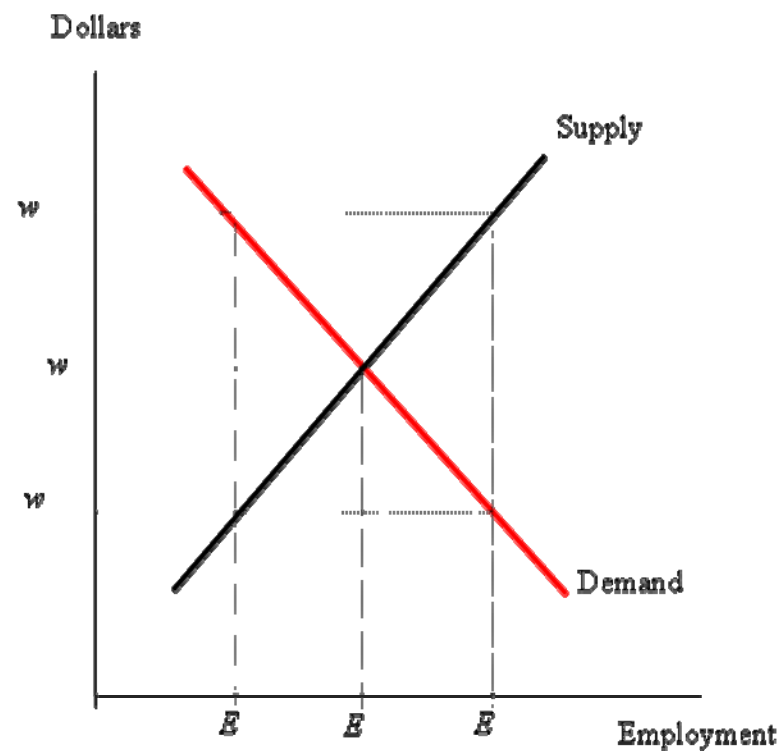
[Figure 4] The Employment Decision in the Long Run
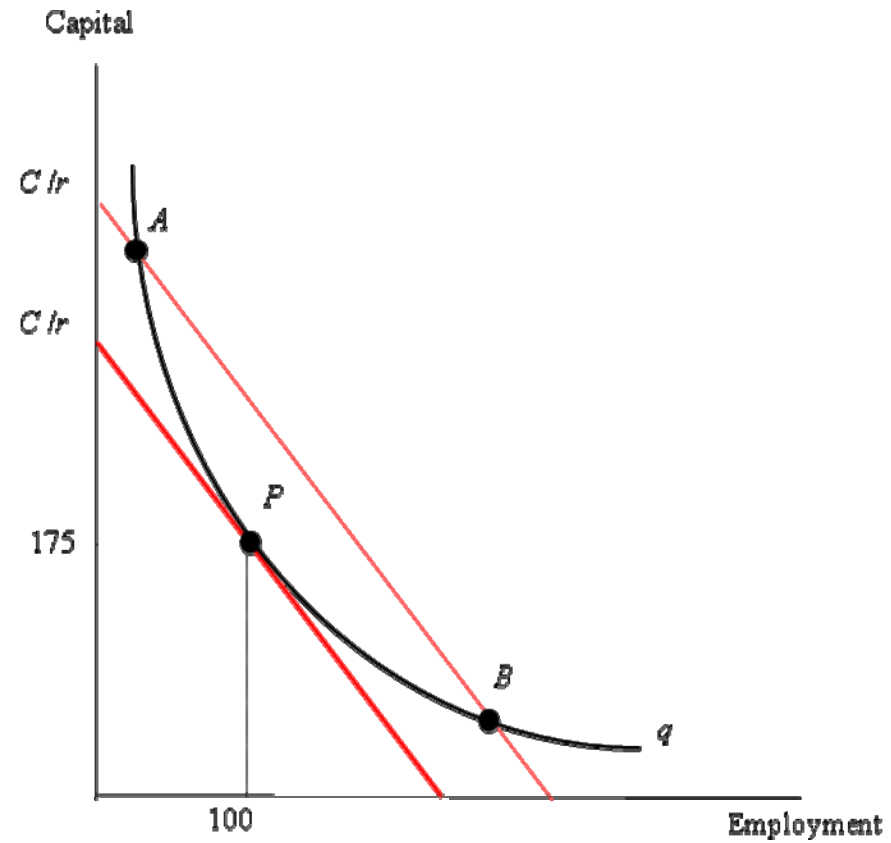
- A firm minimizes the cost of producing q_0 units of output by using the capital-labor combination at point P, where the isoquant is tangent to the isocost → slope of isoquant is equal to slope of isocost.

- All other capital-labor combinations (such as those given by points A and B) lie on a higher isocost curve → not minimizing the cost.

- Minimizing cost → profit-maximizing

- When wage rate decreases, two effects happen in the long-run labor demand.

- Scale effect → the firm takes advantage of the lower price of labor by expanding production.

- Substitution effect → the firm takes advantage of the wage change by rearranging its mix of inputs even if holding output constant.

- The wage cut encourages the firm to adopt a different method of production, one that is more labor intensive to take advantage of the now-cheaper labor.

[Figure 5] Overview of Labor Market Equilibrium

[Figure 6] The impact of the Minimum Wage on Employment
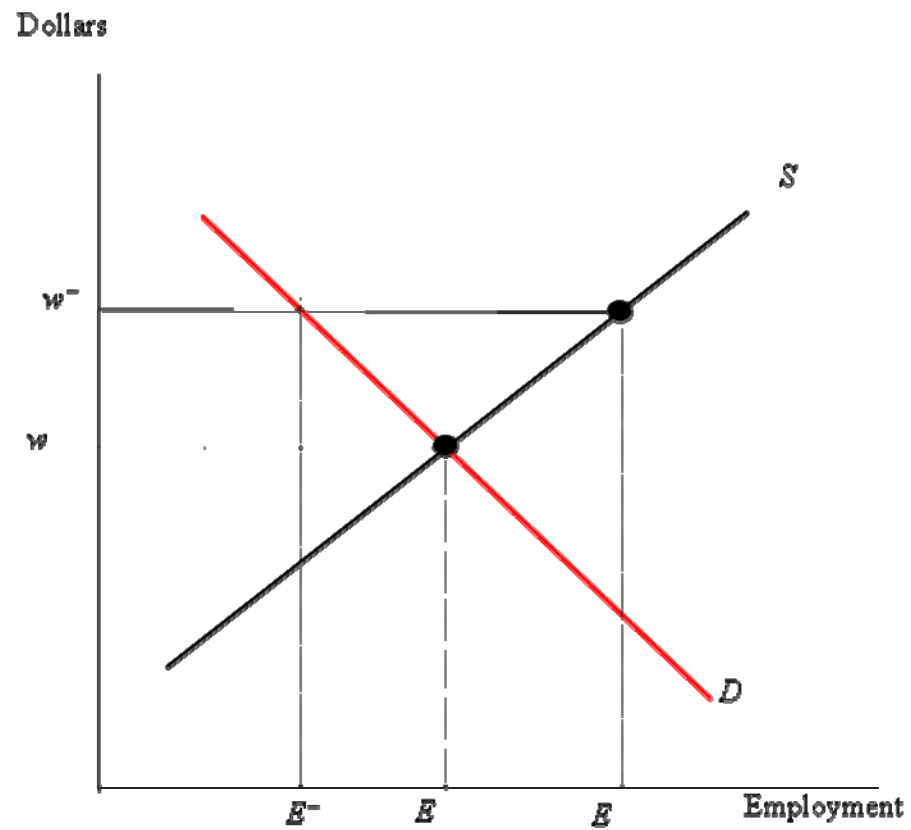
- A minimum wage set at $\bar{w}$ results in employers cutting employment from $E*$ to E^-.

- The higher wage also encourages $E_S - E*$ workers to enter the market.

- Therefore, under a minimum wage, $E_S - E^-$ workers are unemployed.

- The simplest model of the minimum wage predicts that as long as the demand curve for labor is downward sloping, an increase in the minimum wage should decrease the employment of the affected groups.

- Most of the empirical studies focus on the impact of minimum wage on teenagers, a group that is clearly affected by the legislation.

- A comprehensive survey of minimum wage studies concludes that the elasticity of teenage employment with respect to the minimum wage is between -0.1 and -0.3.

- These studies mostly look at the time-series relation between the employment of teenagers and the minimum wage.

- The estimated elasticities, however, are extremely sensitive to the time period over which the correlation is estimated.

- A number of recent studies have introduced a different methodology for estimating the employment effects of minimum wages by carrying out "case studies"

The employment effect of Minimum Wages in New Jersey and
Pennsylvania (Card and Kreuger, AER 1984)

- On April 1, 1992, New Jersey increased its minimum wage to $5.05 per hour, the highest minimum wage in the US.

- The neighboring state of Pennsylvania kept the minimum wage at $4.24, the federally mandated minimum.

- The New Jersey−Pennsylvania provides a "natural experiment" that can be used to assess the employment impacts of minimum wage legislation.

[Table 1] The employment effect of Minimum Wages in New Jersey and Pennsylvania

	Employment in typical Fast-Food Restaurant (in Full-Time Equivalents)	
	NJ	Pennsylvania
Before New Jersey minimum wage increase	20.4	23.3
After New Jersey minimum wage increase	21.0	21.2
Difference	0.6	−2.1
Difference-in-differences	2.7	