

Ch. 17: Demand and Supply in Factor Markets

Objectives

- The firm's choice of the quantities of labor and capital to employ.
- People's choices of the quantities of labor and capital to supply.
- Explain how wages and interest rates are determined in competitive resource markets
- Explain the concept of economic rent and distinguish between economic rent and opportunity cost

Factor Prices and Incomes

Factors of production are the resources used to produce goods and services.

The factors of production are

- Labor
- Capital
- Land
- Entrepreneurship

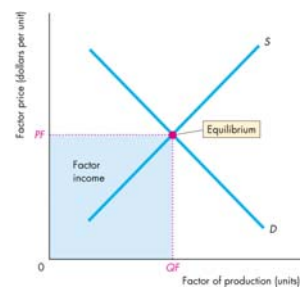
Factor Prices and Incomes

Factor prices determine incomes:

- Labor earns wages.
- Capital earns interest.
- Land earns rent.
- Entrepreneurship earns normal profit.
- Economic profit (loss) is paid to (borne by) the owner of the firm.

Factor Prices and Incomes

The income earned by the owner of a factor of production equals the equilibrium price multiplied by the equilibrium quantity.



Factor Prices and Incomes

Effect of increases in factor demand:

- Factor price rises
- Income rises

Effect of increases in factor supply:

- Factor price falls
- Income could rise or fall depending on demand elasticity

Labor Markets

Labor markets

- allocate labor and the price of labor is the real wage rate (the wage rate adjusted for the price level).
- In 2002, labor earned 72 percent of total income in the United States.
- The average hourly wage rate was close to \$25
 - \$21 in wage or salary and \$4 in benefits.

Labor Markets



The Demand for Labor

A firm's demand for labor is a **derived demand**

- derived from the demand for the goods or services produce by the factor.
- In deciding how much labor to hire, the firm compares the marginal revenue from hiring one more worker with the marginal cost of hiring that worker.

The **marginal revenue product** of labor (MRP_L)

- change in total revenue that results from employing one more unit of labor.

$$MRP_L = MP_L \times MR$$

$$= MP_L \times P \quad \text{if perfect competition}$$

Labor Markets

L (no. of workers)	TP	MP	TR if $P=MR=4$	MRP if $P=MR=4$
0	0			
1	5			
2	9			
3	12			
4	14			
5	15			

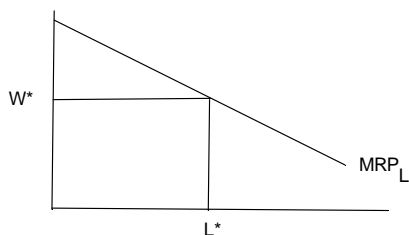
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- MRP falls as L increases because of law of diminishing marginal returns.
- Firm should hire more labor if as $MRP_L > W$ and stop when $MRP_L = W$
- How many workers should firm hire if
 - Wage = \$8
 - Wage = \$12

Labor Markets

The Labor Demand Curve

The marginal revenue product curve for labor is the demand curve for labor.



Labor Markets

Equivalence of Two Conditions for Profit Maximization

$MRP_L = W$ (profit-maximizing level of employment)

→ $MR \times MP = W$.

→ $MR = W/MP$.

But $W/MP = MC$ →

$MR = MC$ (profit maximizing level of output)

Labor Markets

Changes in the Firm's Demand for Labor

The demand for labor (MRP_L) rises and the demand for labor curve shifts if:

- The price of the firm's output changes (MR rises)
- Worker productivity rises (MP rises)
- The prices of other factors of production change
 - Substitution effects
 - Scale effects
- Technology changes

Labor Markets

Market Demand

The market demand for labor is obtained by summing the quantities of labor demanded by all firms at each wage rate.

Because each firm's demand for labor curve slopes downward, so does the market demand curve.

Labor Markets

Elasticity of Demand for Labor

The elasticity of demand for labor measures the responsiveness of the quantity of labor demanded in the market to a change in the wage rate.

The elasticity of demand for labor depends on:

- The labor intensity of the production process
- The elasticity of demand for the product
- The substitutability of capital for labor

Labor Markets

Importance of elasticity of labor demand

- Minimum wage effects
- Power of unions
- Effects of immigration on wages

Labor Markets

The Supply of Labor

As wage rate rises, offsetting effects on quantity of labor supplied

Substitution effect

- The opportunity cost of leisure increases with the wage, people buy less leisure and work more.

Income effect

- As wage rate rises, person is richer, buys more leisure, and works less.

Labor Markets

Net Effect of Wage Increase:

Work more if $SE > IE$

Work less if $SE < IE$

If work many hours already, IE is larger and more likely that IE dominates.

If work few hours, IE is small and more likely that SE effect dominates.

Labor Markets

Backward-bending supply of labor curve

At low wage rates, $SE > IE$ and Q_S rises as wage rises.

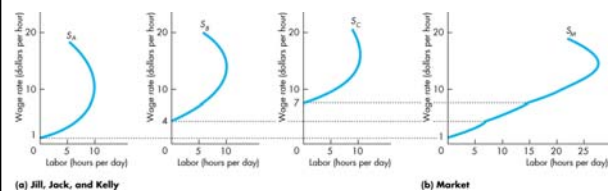
At high wage rates, $IE > SE$ and Q_S falls as wage rises.

The **individual labor supply curve** slopes upward at low wage rates but eventually bends backward at high wage rates.

The **market labor supply curve** is obtained by summing each individual's supply curve of labor.

Labor Markets

The backward bending supply curve for individuals, and the eventually backward bending market supply curve.



Labor Markets

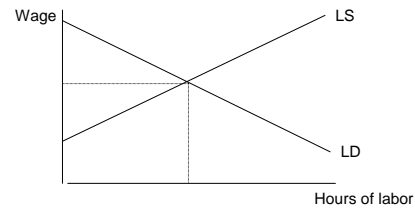
Changes in the supply of labor

The supply of labor changes and the supply curve shifts if

- The adult population changes
- Home technology.
- Taxes
 - The Laffer curve

Labor Markets

Labor Market Equilibrium



Labor Markets

Consider effect of following on equilibrium wage and employment:

- Increase in demand for autos on auto workers.
- Increased tax rate on employees.
- Reduced cost of capital (or technological innovations) that can substitute for labor.
- Increased immigration.
 - Substitutes for immigrants versus complements.
- More generous welfare or Social Security programs.

Labor Markets

Theory of Compensating Differences.

- Equally skilled workers will receive differential pay if jobs differ in terms of “non-pecuniary aspects”.
- Example: Suppose all workers are equally skilled and get a safe job that pays \$10 per hour.
 - If some employers have risky jobs, how much must they pay to attract workers?
 - What does labor supply curve look like for risky jobs?
 - Graphic representation of compensating difference.

Labor Markets

- Other examples of compensating difference
 - "night shift"
 - dirty jobs
 - jobs with high unemployment risk
 - jobs that require higher level of education
- Other labor market applications.
 - Why did the education premium grow?
 - Would a higher minimum wage reduce poverty?

Capital Markets

Capital markets are the channels through which firms obtain financial resources to buy physical factors of production that economists call capital.

The available financial resources come from savings.

The real interest rate is the return on capital and is the "price" determined in the capital market.

The real interest rate equals the nominal interest rate minus the inflation rate.

Capital Markets

The Demand for Capital

A firm's demand for financial capital (borrowed funds) stems from its demand for physical capital.

The firm employs the quantity of physical capital that makes the marginal revenue product of capital equal to the price of the capital.

The returns to capital come in the future, but capital must be paid for in the present.

So the firm must convert the future marginal revenue product of capital to a present value.

Capital Markets

Discounting and Present Value

Discounting is converting a future amount of money into a **present value**.

The PV of a future amount of money is the amount that, if invested today at the interest rate r will grow to be as large as that future amount.

Capital Markets

If the interest rate for one period is r , then the amount of money a person has one year in the future is:

$$FV = PV + (r \times PV) = PV \times (1 + r)$$

$$\rightarrow PV = FV / (1 + r)$$

$$FV \text{ in } T\text{-years} = PV \times (1 + r)^T$$

$$\rightarrow PV = FV \text{ in } T\text{-years} / (1 + r)^T$$

Example: What is PV of \$100 that will be paid in 5 years if the interest rate is 5%?

Capital Markets

- Assuming 5% interest, what is PV of \$100 per year over the next 3 years if first payment is one year from today?
- As interest rate rises, what happens to PV of future stream of income?

Capital Markets

The net present value of an investment subtracts the cost of the capital good from the present value of its income stream.

If the net present value is positive, buying the capital is profitable for the firm, and the firm buys the capital.

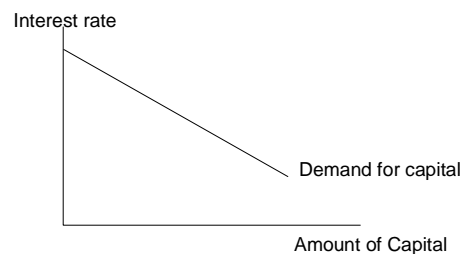
Example: Buy a machine today for \$5000. It will generate revenue of \$3000 in one year and another \$3000 in two years and has a scrap value of \$500 at the end of the two years.

What is the NPV if the interest rate is:

0% 5% 20%

Capital Markets

- A rise in the interest rate lowers the net present value of capital.
- As the interest rate rises, fewer projects have positive NPV and the quantity of capital demanded decreases.



Capital Markets

Factors shifting the demand for capital

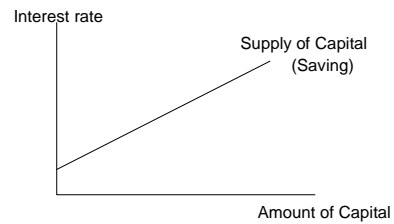
- New technology
- Expectations of future profits from capital
- Taxes
- Depreciation schedules
- Population (capital/labor ratio)
- NOT interest rates (moves along curve)

Capital Markets

The Supply of Capital

The quantity of capital supplied results from people's savings decisions.

As interest rates rise, people are encourage to save more.



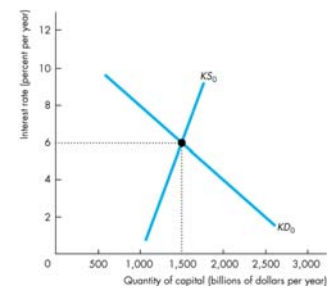
Capital Markets

The main influences on the supply of capital are:

- The size and age distribution of the population
- Taxes on saving versus consumption.
- Expectations of future income relative to current income.

Capital Markets

Equilibrium occurs at the interest rate that makes the quantity of capital demanded equal the quantity of capital supplied.



Capital Markets



What is the effect of each of the following on interest rates, saving, and capital accumulation?

- Tax incentives for saving.
- Technological innovation that creates highly profitable new machinery.
- Baby boomers move into retirement.
- Expectation of large decrease in incomes in next year.
- More generous safety net.