

**chapter Outline**

**Input Markets: Basic Concepts**

Define the basic concepts of input markets.

**Labor Markets**

Discuss the conditions that affect supply and demand in labor markets.

**Land Markets**

Describe the relationship between supply and demand in land markets.

**Input Demand Curves**

Identify factors that trigger shifts in factor demand curves.

**The Firm’s Profit-Maximizing Condition in Input Markets**

Understand how the prices of the different inputs relate to their relative productivity.

detailed chapter Outline

I. Introduction

A. How do firms decide the quantities of various inputs to hire? This chapter looks at the first two major input markets, those for labor and land. Perfect competition is assumed in both the output and input markets throughout the chapter.

B. Every firm must make three decisions.

1. How much to produce and supply in output markets.

2. What technology to use to produce the output.

3. What input quantities should be used.

C. The three main inputs are labor, land, and capital.

II. Input Markets: Basic Concepts

A. Demand for Inputs: A *Derived* Demand

1. The demand for inputs is a derived demand; it is derived from the demand for the output. *Derived demand* means the demand for resources (inputs) is dependent on the demand for the outputs those resources can be used to produce.

2. The *productivity of an input* is the amount of output produced per unit of that input.

3. Inputs are demanded by a firm if and only if households demand the product that firm produces.

B. Marginal Revenue Product

1. The *marginal product of labor* (*MPL*) is the additional output produced by one additional unit of labor.

2. *Marginal Revenue Product (MRP)* or *the value of marginal product* (*VMP*) is the additional revenue a firm earns by employing 1 additional unit of input, *ceteris paribus*.

3. As long as the firm is selling into a perfectly competitive output market *MRPL*= *MPL* × *PX* where *PX* is the price of output.

4. Chapter 7 calculated the marginal product of labor for a sandwich shop.

5. Here we add a column for the value added per unit of output ($0.50). We can then calculate *MRPL*.

6. If the wage rate is $4 per hour, the sandwich shop will hire three workers because the *MRP* of the fourth worker is $2.50 which is less than *w*.

C. Labor Supply

1. The *market labor supply curve* is the horizontal aggregation of the individual labor supply curves for workers in an area.

2. As long as individual labor supply curves are upward-sloping the market labor supply curve will also have a positive slope.

3. A change in the wage rate causes a movement along the labor supply curve.

4. A change in any other factor affecting labor supply causes the labor supply curve to shift. For example:

a. Greater wealth may induce some people to supply less labor.

b. Cultural changes can increase or reduce the labor force participation rate. Government regulations and restrictions can increase or decrease the labor force participation rate.

III. Labor Markets

A. The Firm’s Labor Market Decision

1. Supply and Demand in Labor Markets

a. The demand for labor is determined by the marginal revenue product of labor curves for the firms in the industry. Market demand is the aggregation of individual firm demand curves.

b. Labor supply is determined by household decisions.

c. The price of labor (the wage rate) brings the market to equilibrium. That also determines equilibrium employment (hours of labor supplied and demanded).

d. The firm takes the wage rate as given and uses its *MRPL* curve to determine how much labor it will hire.

2. Comparing Marginal Revenue and Marginal Cost to Maximize Profits

a. A competitive firm’s supply curve is its *MC* curve above the *AVC* curve. When the firm sets *MC* = *MR* (= *P*) the supply curve traces out the *MC* curve. Both *MR* and *MC* were measured with respect to one more unit of output.

b. In this chapter the marginal cost and marginal revenue produced by hiring one more unit of an input is being measured. In Chapter 8 we compared marginal revenue with marginal cost. In both cases, the decision process is the same.

B. Many Labor Markets

1. In the real world there are a great many labor markets. Each has a set of skills demanded and supplied.

2. However, the basic point does not change. If markets are competitive, the wage rate in each labor market is determined by supply and demand. Firms will hire more labor in each market in which they participate until the marginal revenue product of that labor is equal to its wage rate.

IV. Land Markets

A. Unlike other resources land is strictly fixed in supply. Thus, its price is demand determined.

1. A *demand-determined price* describes the price of a good that is in fixed supply; it is determined exclusively by what households and firms are willing to pay for the good.

2. The return to any factor of production that is in fixed supply is called *pure rent*. Although the supply of land is perfectly inelastic, the supply of land in any given use may not be.

B. Rent and the Value of Output Produced on Land

1. Rent depends on what the potential users of the land are willing to pay for it. A firm will increase land use as long as the *MRP* of the next acre of land exceeds its price.

2. The value of any land parcel depends on the uses to which adjoining parcels are put.

V. Input Demand Curves

A. Shifts in Factor Demand Curves: Input demand curves are derived from production functions and output price. Shifts in factor demand curves are caused by changes in:

1. The Demand for Outputs: Changes in the demand for a product cause factor demand curves to shift and the prices of those inputs to change. This is a direct result of the equilibrium condition *MRPL* = *MPL* × *PX*.

2. The Quantity of Complementary and Substitutable Inputs

a. The productivity of, and thus the demand for, any one factor of production depends on the quality and quantity of the other factors with which it works.

b. A great example of complementarity is the long-term impact of capital accumulation on labor productivity.

3. The Prices of Other Inputs: the firm’s choice of a production technology depends, in part, on relative input prices.

4. *Technological Change* is the introduction of new methods of production or new products intended to increase the productivity of existing inputs or to raise marginal products. Changing productivity, in turn, affects the demand for all factors of production.

VI. Profit-Maximizing Condition in Input Markets

Learning Objectives: Understand how the prices of the different inputs relate to their relative productivity.

A. Every firm has an incentive to use variable inputs as long as the revenue generated by those inputs covers the costs of those inputs at the margin. More formally, firms will employ each input up to the point that its price equals its marginal revenue product. The optimal combination of inputs is where the marginal product for the last dollar spent on each input are all equal.

B. Consider the simple mathematics of profit maximization (*PX* is the price of output):



Then it is clear that each of the following must equal PX:



Since each of these is equal to PX the result in the text is obvious:



Extended Applications



Application 1: Minimum Wage Laws

On July 24, 2009, the U.S. minimum wage was increased to $7.25 per hour. (The Department of Labor Website has an excellent history of the minimum wage. See <http://www.dol.gov/whd/minwage/coverage.htm>.) Although most of the general public seems to believe that “the higher the minimum wage, the better,” economists are somewhat skeptical about the minimum wage. To explore why, make the following simplifying assumptions: (1) there are two types of labor—high-paid skilled labor and low-paid unskilled labor; (2) the minimum wage is set above the equilibrium wage in the unskilled labor market; and (3) in the short run, labor (both types) is a variable input whereas capital is fixed.

The diagram following shows the impact of the minimum wage on the unskilled labor market. In the absence of the minimum, we assume a market wage rate of *W1*, below the minimum. The firm hires labor until *MRP* = *W1*, for total employment of *F1* (Point *A*). Now, we impose a minimum wage of *Wmin*. In the short run, it no longer pays for the firm to hire *F1* workers, as for all workers beyond *Fs*, *MRP*<*Wmin*. Instead, the firm will hire *F2* workers, which is where *MRP*=*Wmin*. The short-run impact of the minimum wage on the unskilled, low-wage sector is a decrease in employment and an increase in wages for those lucky enough to keep their jobs. (Indeed, a long-standing controversy among economists is the relative size of the two groups: the job-losers and the job-keepers. This is a demand elasticity issue.)

In the unskilled labor market as a whole, the minimum wage causes employment to decrease from *M1* to *M2*. It also causes an increase in the number of unskilled workers looking for work—from *M1* to *MS*. The net result is an increase in unemployment among unskilled workers, from zero to the distance between *M2* and *MS*. You may wish to point out that some of the newly unemployed were not willing to work at the original wage. (The number of “newly unemployed” created by the minimum wage is *MS*–*M1*.)



In the long run, the increase in the cost of unskilled labor will lead firms to adopt more capital-intensive technology. In many cases, the capital acquired—even if complementary with labor—will not be complementary with unskilled labor. That is, the change in technology will likely lead to a decrease in the marginal product of unskilled labor and a leftward shift in the *MRP* curve for this input. As the next figure shows, this leads to a further shrinkage of low-skilled jobs—to Point *C*, where *F3* workers are hired in the typical firm and *M3* workers are hired in the industry.



What about skilled workers? Are they affected by minimum wage legislation? Yes, in two ways. First, capital-intensive technologies usually require skilled rather than unskilled labor to work with the new capital. For example, when office buildings replaced manually operated elevators with automatic ones, elevator operators (unskilled labor) were no longer needed, whereas elevator repair technicians (skilled labor) were in high demand. Second, the production of capital tends to employ skilled rather than unskilled labor. For example, automatic elevators are designed and produced by skilled labor (engineers, metal workers, software consultants), whereas the elevator operators they replaced were mostly unskilled. Thus, an indirect impact of minimum wage legislation is to increase the *MRP* of skilled labor in the long run, as firms shift to more capital-intensive technologies. The net effect is greater employment and higher wages for skilled workers in the long run, as shown in the diagram following.



Sometimes it is said that large labor unions have no selfish interest at stake in their support for minimum wage hikes, as virtually all of their membership earns substantially more than the minimum anyway. But this analysis shows that labor unions do indeed have much to gain from these minimum wage hikes, and virtually nothing to lose. Skilled labor can expect an increase in jobs and an increase in pay. Some unskilled workers can expect higher pay as well. The major losers are those unskilled workers laid off because profit-maximizing firms no longer have an incentive to hire them.

Compounding the problem, some states have decided the federal minimum wage does not go far enough. Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Illinois, Maine, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, Ohio, Oregon, Rhode Island, South Dakota, Vermont, Washington, Washington, D.C., West Virginia, and Wisconsin all have statewide minimum wage rates exceeding the federal standard. (See <http://www.dol.gov/whd/minwage/america.htm> for an interactive map. A better presentation, including upcoming minimum wage increases and each city with a different minimum is at the Economic Policy Institute <https://www.epi.org/minimum-wage-tracker/>.) For example, the California minimum wage is $10.50 or $11.00 per hour. Firms with 25 or fewer employees pay the lower minimum wage. Meaning, of course, the marginal cost of worker #26 is relatively large. California is also one of the few states that requires overtime pay for working more than 8 hours in any day. (The usual standard is exceeding 40 hours in a week.)

The most recent trend is the push for a $15 per hour minimum wage in various cities. Los Angeles (city and county), San Francisco, and Seattle are examples. Most cities have adopted a “phase-in” approach that will gradually raise the minimum wage between now and 2020. And both Seattle and Los Angeles passed their minimum wage laws in April and July, 2015. Economists are eagerly awaiting data from these experiments.

But one effect is already clear. McDonald’s has announced that they will gradually phase out workers who take orders, replacing them with kiosks. (This Fortune article is one of many: <http://fortune.com/2016/11/18/mcdonalds-kiosks-table-service/>.) As always, the true minimum wage is zero, approximately what the former order-takers will be earning.

Application 2: The U.S. Labor Force Participation Rate[[1]](#footnote-1)

(If you got here by clicking the link in the teaching tip, [click here](#TT_LFPR) to go back.)

This chapter mentions the increase in the labor force participation rate (LFPR) caused by the influx of women in the 1970s. More recent changes have been in the opposite direction. Since 2000 the rate has fallen. Since 2008 it has fallen sharply. Until 2014 the LFPR was at the lowest levels seen since 1978. After looking at the data we’ll discuss some hypotheses about the recent uptick. (If you’re teaching macroeconomics, bookmark this application for your discussion of the unemployment rate.)

It’s tempting to think the decline is being caused by baby boomers retiring. Sadly, that is not the case. According to the best estimates,[[2]](#footnote-2) about half the decline is caused by people in the demographic bulge retiring. The other half remains unexplained. Here’s the big picture:



In the following graphs the vertical axes are not identical. Be careful to point this out if you show this to the class. Focus on the trends, but be sure to mention the percentages as well. One group economists focus on is the “prime working age” segment, 25–54 years old.



If we break this down by age groups the problem becomes clear:

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(In a departure from previous editions, each of the charts above is separate from the others, making copying and pasting considerably easier.)

The LFPR has been declining for every age group except adults aged 55 and older. Granted, the magnitude of the declines is very small for the 35–44 and 45–54 groups, about 3% points each. What is really disturbing is the 4% point decline in the 25–34 group. These young adults are not getting jobs. And the data is clear: lifetime earnings prospects get smaller for every year starting a first job is postponed. For those of us counting on Social Security to supplement our retirements, this is not good news.

You might ask your students a question: what are these people doing if they’re not looking for work? The mythology is 30-year-olds living in their parents’ basement. While there are certainly a few households that fit that description, it seems unlikely that this explanation can account for the entire decline. To stimulate discussion, suggest two hypotheses. First, some are undoubtedly going through a series of internships, hoping one leads to employment. Second, perhaps they are not truly unemployed, but are instead working in the informal sector (also called the underground economy). Additional research is needed on this subject.

Now about the upturn. Here’s quarterly data since 2014.



The year 2016 was a presidential election year. It sure looks like those who had dropped out of the labor force were looking forward to a new administration after 8 years of the Obama presidency.

1. There is a separate Excel workbook to go with this application. The file name is CaseFair13e\_IM\_Ch10\_LFPR.xlsx. [↑](#footnote-ref-1)
2. Aaronson, Stephanie, Tomaz Cajner, Bruce Fallick, Felix Galbis-Reig, Christopher L. Smith, and William Wascher, “Labor Force Participation: Recent Developments and Future Prospects.” 2014–64. Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C. [↑](#footnote-ref-2)