What causes these changes? Can the economists’ model of labor markets explain them? After developing the model in the next section, we will endeavor to answer these questions.

### Review

- Workers’ pay includes the direct payments plus fringe benefits, which are about 30 percent of workers’ pay in the United States.
- When you talk about wages, you should be clear as to whether it is about wages including benefits or wages without benefits and whether it is about the real wage or the nominal wage.
- Real hourly wages have nearly tripled since World War II. They stagnated in the mid 1970s, then grew rapidly from 1996 to 2002 and have slowed down again since then.
- Discussions about the average real wage in the economy must be accompanied by an understanding of how wages are dispersed by skill, gender, industry, occupation, size of firm, part-time or full-time status, and geographic region.
- In recent times, the dispersion of wages between skilled and unskilled workers has increased, with college-educated workers gaining over those without a college education. The difference between the average wage of women and men is substantial, although it has narrowed in recent years.

### The Labor Market

The labor market consists of firms that have a demand for labor and people who supply the labor. In analyzing labor markets, economists stress their similarity to other markets; this enables economists to use the standard supply and demand model. To see the analogy, consider Figure 13-2, which illustrates a typical labor market. It shows a typical labor supply curve and a typical labor demand curve. On the vertical axis is the price of labor, or the wage. On the horizontal axis is the quantity of labor, either the number of workers or the number of hours worked. People work at many different types of jobs—physical therapists,
accountants, mechanics, teachers, Web developers, judges, and professional athletes—and each type has a labor market. The labor market diagram in Figure 13-2 could refer to any one of these particular types of labor.

The first thing to remember about the labor demand curve and the labor supply curve is that firms demand labor and people supply it. Firms demand labor—like other factors of production—because it can be used to produce goods and services; the labor demand curve tells us the quantity of labor demanded by firms at each wage. The labor supply curve tells us the quantity of labor supplied by workers at each wage.

Note that the labor demand curve slopes downward and the labor supply curve slopes upward, just like other demand and supply curves. Thus, a higher wage reduces the quantity of labor demanded by firms, and a higher wage increases the quantity of labor supplied by people. Note also that the curves intersect at a particular wage and a particular quantity of labor. As with any other market, this intersection predicts the quantity of something (in this case, labor) and its price (in this case, the wage). Having defined the basics of the labor supply and demand model, we will more closely study how these curves are derived.

**Labor Demand**

In this section, we look at labor demand, the relationship between the quantity of labor demanded by firms and the wage. In the next section, we look at labor supply, the relationship between the quantity of labor supplied by people and the wage. We start with a single firm’s demand for labor and then sum up all the firms that are in the labor market to get the market demand for labor.

In deriving a firm’s labor demand, economists assume that the firm’s decision about how many workers to employ, like its decision about how much of a good or service to produce, is based on profit maximization. The demand for labor is a derived demand; that is, it is derived from the firm’s decision about how many goods or services it can produce with the labor. The firm sells these goods and services to consumers in product markets, which are distinct from the labor market. Labor and other factors of production are not directly demanded by consumers; the firm’s demand for labor is derived from consumers’ demand for the firm’s goods and services.

**A Firm’s Employment Decision**

Recall how the idea of profit maximization was applied to a firm’s decision about the optimal quantity to produce: If producing another ton of steel will increase a steel firm’s profits—that is, if the marginal revenue from producing a ton is greater than the marginal cost of producing that ton—then the firm will produce that ton of output. However, if producing another ton of steel reduces the firm’s profits, then the firm will not produce that ton.
The idea of profit maximization is applied in a similar way to a firm’s decision about how many workers to employ: If employing another worker increases the firm’s profits, then the firm will employ that worker. If employing another worker reduces the firm’s profits, then the firm will not employ the worker.

We have already seen that a firm produces a quantity that equates marginal revenue to marginal cost ($MR = MC$). The firm satisfies an analogous condition in deciding how much labor to employ, as we discuss next.

**From Marginal Product to Marginal Revenue Product** To determine a firm’s demand curve for labor, we must examine how the firm uses labor to produce its output of goods and services. We start by assuming that the firm sells its output in a competitive market; that is, the firm is a price-taker. We also assume that the firm takes the wage as given in the labor market; in other words, the firm is hiring such a small proportion of the workers in the labor market that it cannot affect the market wage for those workers. Table 13-2 gives an example of such a competitive firm. It shows the weekly production and labor input of a firm called Getajob, which produces professional-looking job résumés in a college town. To produce a résumé, workers at Getajob talk to each of their clients (usually college seniors), give advice on what should go into the résumé, and then produce the résumé.

The first two columns of Table 13-2 show how Getajob can increase its production of résumés each week by employing more workers. This is the production function for the firm; it assumes that the firm has a certain amount of capital—word-processing equipment, a small office near the campus, and so on. We assume that labor is the only variable input to production in the short run, so that the cost of increasing the production of résumés depends only on the additional cost of employing more workers. Observe that the marginal product (MP) of labor—which we defined in Chapter 6 as the change in the quantity produced when one additional unit of labor is employed,
holding other inputs fixed—declines as more workers are employed. In other words, there is a diminishing marginal product of labor, or diminishing return to labor: As more workers are hired with office space and equipment fixed, each additional worker adds less and less to production. For example, the first worker employed can produce 17 résumés a week, but if Getajob already employed eight workers, hiring a ninth worker will increase production by only one résumé.

Suppose that the market price for producing this type of résumé service is $100 per résumé, as shown in the fourth column of Table 13-2. Because Getajob is assumed to be a competitive firm, it cannot affect this price. Then, the total revenue of the firm for each amount of labor employed can be computed by multiplying the price \( P \) times the quantity produced \( Q \) with each amount of labor \( L \). This calculation is shown in the next-to-last column. For example, total revenue with \( L = 3 \) workers employed is \( P = $100 \) times \( Q = 42 \), or $4,200.

The last column of Table 13-2 shows the marginal revenue product (MRP) of labor. The marginal revenue product of labor is defined as the change in total revenue when one additional unit of labor is employed, holding all other inputs fixed. For example, the marginal revenue product of labor from hiring a third worker is the total revenue with three workers ($4,200) minus the total revenue with two workers ($3,100), or $4,200 − $3,100 = $1,100. The marginal revenue product of labor is used to find the demand curve for labor, as we will soon see.

What is the difference between the marginal product (MP) and the marginal revenue product (MRP)? The marginal product is the increase in the quantity produced when labor is increased by one unit, holding other inputs fixed. The marginal revenue product is the increase in total revenue when labor is increased by one unit, holding other inputs fixed. For a competitive firm taking the market price as given, the marginal revenue product (MRP) can be calculated by multiplying the marginal product (MP) by the price of output \( P \). For example, the marginal product when the third worker is hired is 11 résumés; thus, the additional revenue that the third worker will generate for the firm is $100 per résumé times 11, or $1,100.

Observe in Table 13-2 that the marginal revenue product of labor declines as more workers are employed. This result occurs because the marginal product of labor declines.

The Marginal Revenue Product of Labor Equals the Wage \( MRP = W \)

Now we are almost ready to derive the firm’s demand curve for labor. Suppose first that the wage for workers with the type of skills Getajob needs to produce résumés is $600 per week (for example, $15 per hour for 40 hours). Then, hiring one worker certainly makes sense because the marginal revenue product of labor is $1,700, or much greater than the $600 wage cost of hiring the worker. How about two workers? The marginal revenue product from employing a second worker is $1,400, still greater than $600, so it makes sense to hire a second worker. Continuing this way, we see that the firm will hire a total of five workers when the wage is $600 per week, because hiring a sixth worker would result in a marginal revenue product of only $500, less than the $600 per week wage.
Thus, if a firm maximizes profits, it will hire the largest number of workers for which
the marginal revenue product of labor is greater than the wage; if fractional units of labor
input (for example, hours rather than weeks of work) are possible, then the firm will
keep hiring workers until the marginal revenue product of labor exactly equals the wage.
Thus, we have derived a key rule of profit maximization: Firms will hire workers up to
the point at which the marginal revenue product of labor equals the wage. The rule that
the marginal revenue product of labor equals the wage can be written in symbols as
\[ MRP = W. \]

The Firm’s Derived Demand for Labor

Now, to find the demand curve for labor, we need to determine how many workers the
firm will hire at different wages. We know that Getajob will hire five workers if the wage
is $600 per week. What if the wage is $800 per week? Then the firm will hire only four
workers; the marginal revenue product of the fifth worker ($700) is now less than the
wage ($800), so the firm will not be maximizing its profits if it hires five workers. Thus,
we have shown that a higher wage reduces the quantity of labor demanded by the firm.
What if the wage is lower than $600? Suppose the wage is $250 a week, for example.
Then the firm will hire seven workers. Thus, a lower wage increases the quantity of labor
demanded by the firm.

Figure 13-3 shows how to determine the entire demand curve for labor. It shows
the wage on the vertical axis and the quantity of labor on the horizontal axis. The plotted
points are the marginal revenue products from Table 13-2. To find the demand
curve, we ask how much labor the firm would employ at each wage. Starting with a high
wage, we reduce the wage gradually, asking at each wage how much labor the firm

Figure 13-3
Determining a Firm’s Demand Curve for Labor
The black dots are exactly the same as the marginal revenue product of labor in Table 13-2.
The orange line indicates the quantity of labor demanded at each wage.
would employ. At a weekly wage of $2,000, the marginal revenue product is less than
the wage, so it does not make sense to hire any workers. Therefore, the quantity
demanded is zero at wages more than $2,000. At a weekly wage of $1,500, it makes
sense to hire one worker, and so on. As the wage is lowered gradually, the quantity of
labor demanded rises, as shown by the orange line in Figure 13-3. The step-like down-
ward-sloping curve is the labor demand curve. There would be more black dots and the
curve would be smooth if we measured work in fractions of a week rather than in whole
weeks.

Observe in Figure 13-3 that a firm’s demand curve for labor is completely deter-
mined by the firm’s marginal revenue product of labor. We have shown that the demand
curve for labor is downward sloping because the marginal revenue product of labor curve
is downward sloping. A higher wage will reduce the quantity of labor demanded, and a
lower wage will increase the quantity of labor demanded, because workers with a mar-
ginal revenue product that is lower than the wage will not be hired. Changes in the
quantity of labor demanded that result from changes in the wage are movements along
the downward-sloping labor demand curve.

We also can explain why a firm’s labor demand curve would shift. For example, if
the price \( P \) of the good \( \text{résumé}s \) rises—perhaps because the demand curve for
résumés shifts outward—then the marginal revenue product of labor \( MRP = P \times MP \)
will rise and the firm will be willing to employ more workers at any given wage level.
This result implies that the demand curve for labor will shift outward. Similarly, a rise in
the marginal product of labor \( MP \) also will lead the firm to increase the quantity
demanded of labor at each wage level, shifting the labor demand curve outward. On the
other hand, a decline in the price \( P \) or a decline in the marginal product \( MP \) will shift
the labor demand curve to the left.

**What If the Firm Has Market Power?** This approach to deriving the demand
curve for labor works equally well for the case of a firm that is not a price-taker but
instead is a monopoly or a monopolistic competitor. Table 13-3 shows an example of
such a firm. The key difference between the firm in Table 13-2 and this firm is in the col-
umn for the price. Rather than facing a constant price for its output and thus a horizon-
tal demand curve, this firm faces a downward-sloping demand curve: It can increase the
quantity of résumés demanded by lowering its price. For example, if Getajob’s résumés
are differentiated slightly from those of other résumé producers in town, then the
demand curve that Getajob faces when selling résumés may be downward sloping.

Once we observe that the price and output are inversely related, we can continue
just as we did with the competitive firm. Again, total revenue is equal to the price times
the quantity, and marginal revenue product is the change in total revenue as one more
worker is hired. Again, the marginal revenue product declines as more workers are hired,
as shown in the last column of Table 13-3. However, now the marginal revenue product
declines more sharply as more workers are employed, and it even turns negative. It turns
negative as more workers are hired and more output is produced and sold, because the
price of output must fall. This cuts into revenue because all units, not just the last unit,
are sold at the lower price. But the principle of labor demand is the same: Firms hire up
to the point at which the marginal revenue product of labor equals the wage. The mar-
ginal revenue product determines the labor demand curve.

In the case of a firm with market power, the simple relationship \( MRP = P \times MP \) no
longer holds, however, because the firm does not take the market price as given. Instead,
we replace the price \( P \) by the more general marginal revenue \( MR \) in that relationship.
Marginal revenue product is now equal to the marginal revenue \( MR \) times the marginal
product \( MP \). The relationship \( MRP = MR \times MP \) holds for all firms, whether they have
market power or not. Only for a competitive firm is \( MR = P \).
Market Demand for Labor  To get the demand for labor in the market as a whole, we must add up the labor demand curves for all the firms demanding workers in the labor market. At each wage, we sum the total quantity of labor demanded by all firms in the market; this is illustrated in Figure 13-4 for the case of two firms producing résumés. The two curves on the left are the labor demand curves for two résumé-producing firms, Getajob and Careerpro. (The curves are smoothed out compared with that in Figure 13-3 so that they are easier to see.) The process of summing individual firms’ demands for labor to get the market demand is analogous to summing individual demand curves for goods to get the market demand curve for goods. At each wage, we sum the labor demand at all the firms to get the market demand.

A Comparison of \( MRP = W \) with \( MC = P \)

A firm’s decision to employ workers is closely tied to its decision about how much to produce. We have emphasized the former decision in this chapter and the latter decision in earlier chapters. To draw attention to this connection, Table 13-4 shows the marginal cost when the wage is $600. Marginal cost is equal to the change in variable costs divided by the change in quantity produced. Variable costs are the wage times the amount of labor employed.

Now, consider the quantity of output the firm would produce if it compared price and marginal cost as discussed in earlier chapters. If the price of output is $100, the firm will produce 58 résumés, the highest level of output for which price is greater than marginal cost. This is exactly what we found using the \( MRP = W \) rule, because 58 units of output require five workers. Recall that employing five workers is the profit-maximizing labor choice when the wage is $600.
**Summing Firms’ Demands to Get the Labor Market Demand Curve**

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

**Figure 13-4**

![Graph showing labor demand curves for different firms and the overall market demand.]

**Table 13-4**

<table>
<thead>
<tr>
<th>Workers Employed Each Week (L)</th>
<th>Quantity Produced (Q)</th>
<th>Variable Costs (dollars) (VC)</th>
<th>Marginal Cost (dollars) (MC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>17</td>
<td>600</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>31</td>
<td>1,200</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>42</td>
<td>1,800</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td>51</td>
<td>2,400</td>
<td>67</td>
</tr>
<tr>
<td>5</td>
<td>58</td>
<td>3,000</td>
<td>86</td>
</tr>
<tr>
<td>6</td>
<td>63</td>
<td>3,600</td>
<td>120</td>
</tr>
<tr>
<td>7</td>
<td>66</td>
<td>4,200</td>
<td>200</td>
</tr>
<tr>
<td>8</td>
<td>68</td>
<td>4,800</td>
<td>300</td>
</tr>
<tr>
<td>9</td>
<td>69</td>
<td>5,400</td>
<td>600</td>
</tr>
</tbody>
</table>
If the profit-maximizing firm could produce fractional units, then it would set marginal cost exactly equal to price \( MC = P \). The resulting production decision would be exactly the same as that implied by the rule that the marginal revenue product of labor equals the wage.

### REVIEW

- The demand for labor is a relationship between the quantity of labor a firm will employ and the wage, which is the price of labor.
- The demand for labor is a derived demand because it is derived from the goods and services produced by labor.
- If the marginal revenue product of an additional worker exceeds the wage, the firm should employ that worker. If the marginal revenue product of an additional worker is less than the wage, the firm should not employ that worker.
- Accordingly, a profit-maximizing firm will hire workers until the marginal revenue product of labor equals the wage.
- When the wage rises, the quantity of labor demanded by firms declines. When the wage falls, the quantity of labor demanded increases. These are movements along the labor demand curve.
- When the marginal revenue product of labor rises, the demand curve for that type of labor shifts outward. The marginal revenue product of labor can increase if either the marginal product of labor rises or the price of the good produced using labor rises.
- The market demand for labor is obtained by adding up the labor demand curves of all firms looking for workers in the labor market.

### Labor Supply

We now focus on labor supply. An individual’s labor supply curve is derived from that person’s decision about whether to work and how much to work, at different wage rates. The market labor supply curve is the sum of many people’s individual labor supply curves. The decision about whether to work and how much to work depends very much on individual circumstances, so we begin by examining the individual’s decision.

### Work versus Two Alternatives: Home Work and Leisure

Consider a person deciding how much to work—either how many hours a week or how many weeks a year. As with any economic decision, we need to consider the alternative to work. Economists traditionally have called the alternative leisure, although many of the activities that make up the alternative to work are not normally thought of as leisure. These activities include “home work,” like painting the house or caring for children at home, as well as pure leisure time, such as simply talking to friends on the telephone, going bowling, or hiking in the country. The price of leisure is the opportunity cost of not working, that is, the wage. If a person’s marginal benefit from more leisure is greater than the wage, then the person will choose more leisure. The decision to consume more leisure is thus like the decision to consume more of any other good. This analogy may seem strange, but it works quite well in practice.

### Effects of Wage Changes: Income and Substitution Effects

Like the decision to consume a commodity, the decision to work can be analyzed with the concepts of the substitution effect and the income effect.

Recall that the substitution effect says that a higher price for a good will make that good less attractive to purchase relative to alternatives. In the case of the labor market,
because the wage is the price of leisure (or home work), the higher the wage, the less attractive leisure (or home work) will seem relative to work. In other words, a higher wage makes work more rewarding compared with the alternatives. So even if you really enjoy your nonwork activities, including sleeping, watching movies, playing video games, or even studying, if the wage paid for part-time student employment triples from $10 an hour to $30 an hour, you would be more likely to sacrifice these nonwork activities and work an extra hour each day. The sacrifice—less time to study, sleep, watch television, and so on—will be worth the higher wage. Therefore, the quantity of labor supplied tends to increase when the wage rises because of the substitution effect.

Recall also that the income effect reflects the fact that changes in the price of a good either reduce (if a price increase) or expand (if a price decrease) your ability to buy all goods, even ones whose prices have not changed, by changing your real income. In the case of the labor market, a higher wage will increase the real income of an individual and enable that individual to buy more of all goods, including leisure. For example, if you were working 10 hours a week at a wage of $10 an hour, you might decide that at a wage of $30 an hour, you would be happier working five hours a week and enjoying five more hours of leisure. In this case, even after working fewer hours, you have more money to buy other goods. The income effect works in the opposite direction from the substitution effect: The quantity of labor supplied tends to decrease, rather than increase, when the wage rises because of the income effect.

The Shape of Supply Curves

Because the substitution effect and the income effect work in opposite directions, the labor supply curve can slope either upward or downward. The supply curve slopes upward if the substitution effect dominates—that is, as the wage rises, individuals work more because the price of leisure (the opportunity cost of not working) rises. The labor supply curve slopes downward if the income effect dominates—as the wage rises, individuals choose to work less because they can earn as much if not more money by working fewer hours. Several possibilities for the shape of a labor supply curve are illustrated in Figure 13-5.

Moreover, the same supply curve may slope upward for some range of wages and downward for another range. For example, at high wage levels—when people earn enough to take long vacations—the income effect may dominate. At lower wages, the substitution effect may be dominant, which then would result in a backward-bending labor supply curve, as shown in Figure 13-6.

This derivation of the labor supply curve may seem unrealistic. After all, the workweek is forty hours for many jobs; you may not have much choice about the number of hours you work per week. In fact, the sensitivity of the quantity of labor supplied to the wage is probably small for many workers. But economists have shown that the effect is large for some workers, and therefore it is useful to distinguish one worker’s supply curve from another’s.

In a family with two adults and children, for example, one of the adults already may have a job and the other may be choosing between working at home and working outside the home. This decision may be sensitive to the wage and perhaps the cost of child care or of consuming more prepared meals. In fact, the increased number of women working outside the home may be the result of increased opportunities and wages for women. The increase in the wage induces workers to work more in the labor market. Economists have observed a fairly strong wage effect on the amount women work, as illustrated in the Economics in Action box on page 343.

One also needs to distinguish between the effects of a temporary change in the wage and those of a more permanent change. Empirical studies show that the quantity of labor supplied rises more in response to a temporary increase in the wage than to a permanent increase. What’s the explanation? Consider an example. If you have a special one-time opportunity tomorrow to earn $100 an hour rather than your usual $6 an hour, you are
Three Labor Supply Curves
The three curves differ in the relative strength of the income and substitution effects. The labor supply curve on the left slopes upward because the substitution effect is stronger than the income effect. For the curve on the right, the income effect is stronger than the substitution effect. For the vertical curve in the middle, the two effects are the same.

![Figure 13-5](image)

Backward-Bending Labor Supply Curve
A person may have a labor supply curve that is positively sloped for a low wage, is steeper for a higher wage, and then bends backward for a still higher wage.

![Figure 13-6](image)
Incentives to Work

Does It Pay to Stay Home?
BY MARK SCHWANHAUSSER

For Yolanda Achanzar, going to work was like listening to an old-fashioned cash register ring. She’d drop off her two toddlers with a sitter (ka-ching: $29 a day). She’d commute in her Mercury Villager (ka-ching: $8). She’d dig into her purse for breakfast and lunch (ka-ching: $10). And she’d dress up for work (ka-ching: $5 a day, $8.50 if she snagged her hose, $12.50 if you include the dry-cleaning bills). “If you add all that up,” she said, “it’s just not worth it, vs. the time you could have spent with your children, loving them, rearing them, nurturing them.”

And so, although she loved her job and co-workers, and her $25,000 paycheck accounted for nearly 40 percent of her family’s income, she chucked her job Friday to stay home with 27-month-old Marissa and 14-month-old Jordan. She felt she simply couldn’t afford her job any longer.

Achanzar and her husband, Gil, are among the millions of American parents who agonize trying to discover the proper mix for a family’s financial welfare, the children’s care and the parents’ careers. For them, money is an issue—and something has to give.

For many parents, the decision starts with a bottom-line analysis of dollars in and dollars out. But next comes the long-term equation that consists of nothing but variables. How much is it worth to stay home with the kids? What lifestyle will we have?

<table>
<thead>
<tr>
<th>Income</th>
<th>Both spouses work</th>
<th>One stays home</th>
<th>Both spouses work</th>
<th>One stays home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spouse A</td>
<td>$ 35,600</td>
<td>$ 35,600</td>
<td>$ 67,000</td>
<td>$ 67,000</td>
</tr>
<tr>
<td>Spouse B</td>
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<td>35,000</td>
<td>0</td>
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<tr>
<td><strong>Total income</strong></td>
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<td><strong>35,600</strong></td>
<td><strong>102,000</strong></td>
<td><strong>67,000</strong></td>
</tr>
<tr>
<td>Taxes¹</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Taxable income</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>7,949</td>
<td>2,929</td>
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<td>4,413</td>
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<td><strong>32,857</strong></td>
<td><strong>17,068</strong></td>
</tr>
<tr>
<td>Work expenses²</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child care</td>
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<td>0</td>
<td>10,000</td>
<td>0</td>
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<tr>
<td>Transportation</td>
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<td>0</td>
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<td>Meals</td>
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<td>0</td>
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<tr>
<td>Wardrobe</td>
<td>900</td>
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<td>Dry cleaning</td>
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<td>0</td>
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<td><strong>Total expenses</strong></td>
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<td><strong>15,950</strong></td>
<td><strong>0</strong></td>
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<td>Total income</td>
<td>59,600</td>
<td>35,600</td>
<td>102,000</td>
<td>67,000</td>
</tr>
<tr>
<td>Total taxes</td>
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<td>6,035</td>
<td>32,857</td>
<td>17,068</td>
</tr>
<tr>
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<td>0</td>
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<td>0</td>
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<tr>
<td><strong>Left to spend</strong></td>
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<td><strong>$29,565</strong></td>
<td><strong>$53,193</strong></td>
<td><strong>$49,932</strong></td>
</tr>
<tr>
<td>Decreases in spendable cash</td>
<td><strong>$ 6,579</strong></td>
<td></td>
<td><strong>$ 3,261</strong></td>
<td></td>
</tr>
<tr>
<td>Percentage change</td>
<td>18%</td>
<td></td>
<td>6%</td>
<td></td>
</tr>
</tbody>
</table>


¹Includes $480 federal child-care credit and variable state credit.

²Work expenses are for the lower-paid spouse only. Although that spouse’s work expenses would be erased by staying home, bills at home would rise and should be included in a full-cost analysis.
likely to put off some leisure for one day; the substitution effect dominates. But if you are lucky enough to land a lifetime job at $100 an hour rather than $6 an hour, you may decide to work fewer hours and have more leisure time; the income effect dominates.

This difference between temporary and permanent changes helps explain the dramatic decline in the average hours worked per week in the as wages have risen over the last century. These are more permanent changes, for which the income effect dominates.

**Work vs. Another Alternative: Getting Human Capital**

The skills of a worker depend in part on how much schooling and training the worker has had. The decision to obtain these skills—to finish high school and attend a community college or obtain a four-year college degree—is much like the choice between work and leisure. In fact, an important decision for many young people is whether to go to work or to finish high school; if they have finished high school, the choice is whether to go to work or to go to college.

Economists view the education and training that raise skills and productivity as a form of *investment*, a decision to spend funds or time on something now because it pays off in the future. Continuing the analogy, an investment in a college education raises the amount of *human capital*—a person’s knowledge and skills—in the same way that the investment in a factory or machine by a business firm raises physical capital. Figure 13-7 demonstrates the kind of difference this investment can make.

The decision to invest in human capital can be approached like any other economic choice. Suppose the decision is whether Angela should go to college or get a job. If she does not go to college, she saves on tuition and can begin earning an income right away. If she goes to college, she pays tuition and forgoes the opportunity to earn income at a full-time job. However, if Angela is like most people, college will improve her skills and land her a better job at higher pay. The returns on college education are the extra pay. Angela ought to go to college—invest in human capital—if the returns are greater than the cost.

People can increase their skills at work as well as in school. In fact, **on-the-job training** is one of the most important ways in which workers’ productivity increases. On-the-job training can be either *firm specific*, in which case the skills are useful only at one firm, or *general purpose*, in which case the skills are transferable to other jobs.

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**Figure 13-7**

**Higher Education and Economic Success**

According to this chart, education pays off in terms of earnings, with doctorate degree holders earning the most, followed by workers with professional and master’s degrees.
Explaining Wage Trends and Differences

Labor Productivity

When we combine the labor demand and labor supply curves derived in the previous two sections, we get the model of the labor market summarized in Figure 13-2. The model predicts that the wage in the labor market will be at the intersection of the supply and demand curves. The point of intersection, where the quantity of labor supplied equals the quantity of labor demanded, is the labor market equilibrium.

The model also predicts that the equilibrium wage equals the marginal revenue product. If the marginal product of labor employed at a firm increases, then the model predicts that the firm’s labor demand curve will shift to the right, as the firm will be willing to hire more workers at any given wage. Suppose the marginal product of labor rises for the economy as a whole; then the labor demand curve for the economy should shift to the right and both the equilibrium quantity of labor and the equilibrium wage should also rise. Is this what occurs in reality?

The Relationship between Real Wages and Labor Productivity

In Figure 13-8, the line graph shows the percentage by which real wages have increased each year since 1992. Real wages rose rapidly in the five years starting in 1996. After the 2001 recession, the growth rate of real wages slowed down; it remains to be seen what the impact of the current recession will be. The bars in Figure 13-8 show output per hour of work in the same period. Output per hour of work is called labor productivity and is a good indication of trends in the marginal product of labor on average in the United States. Labor productivity growth in the United States was robust in the decade

**REVIEW**

- An individual’s labor supply curve can be viewed as the outcome of the choice between work and some other activity, whether home work or leisure.
- Wages can be thought of as the price of that alternative activity, whether home work or leisure. This is because the opportunity cost of allocating an hour to that activity is the forgone wage that could have been earned from work.
- Changes in wages have both a substitution effect and an income effect on the labor supply. The substitution effect is that as wages rise, the cost of not working rises—the attractiveness of work increases relative to its alternatives. The income effect is that a rise in the wage increases the real income of an individual and enables that individual to enjoy more of all goods, including leisure.
- The income effect will tend to lower the incentive to work as the wage rises, while the substitution effect will increase the incentive to work. In some situations, the substitution effect dominates, leading to an increase in the quantity of labor supplied as the wage rises—an upward-sloping labor curve. In other situations, the income effect dominates, leading to a decrease in the quantity of labor supplied as the wage rises—a downward-sloping labor curve.
- Individuals also have to make decisions between working and acquiring human capital through education and training. Then the cost of acquiring human capital is the forgone wages, whereas the benefit of human capital is the extra wages one can earn using the knowledge and skills accumulated from going to school or receiving on-the-job training. If the returns are greater than the costs, then individuals should continue with their education.