The Labor Market in Action

Outlook for Job Market Is Grim; When Jobs Do Return, Many Won't Pay Well

http://www.usatoday.com
January 8, 2010

… Foreign competition and automation will continue to kill manufacturing jobs: The government expects factories to cut 1.2 million manufacturing jobs by 2018. …

Still the government's Bureau of Labor Statistics expects the overall economy to generate 15.3 million new jobs (not counting replacements) from 2008 to 2018. … Where will the new jobs come from? …

Computer network and data analysts (median wage: $71,100) will see their ranks surge 53% from 2008 to 2018, the government predicts. And financial examiners, who ensure that companies are complying with financial laws and regulations, will grow in number by 41%. Their median earnings: $70,930. (The median wage figures—half earn more, half less—are from May 2008.) …

Measured by sheer numbers, the new jobs of the next decade don't look nearly as lucrative: The number of home health aides, for instance, is expected to expand by 461,000. But their median earnings come to just $20,460—well below the median U.S. wage of $32,390. …

The economy will also demand 400,000 new customer service representatives, an occupation with median earnings of $29,860 a year; and 394,000 workers who prepare and serve food, including fast food, earning $16,430. …

More than two thirds of new jobs won't require any education past high school. For several decades after World War II, high school graduates could find decent-paying manufacturing jobs. But factories are shedding workers or closing altogether. …

One bright spot: nursing. The country is expected to need 582,000 new registered nurses—a profession that pays a median $62,450 a year. …

ESSENCE OF THE STORY

- The Bureau of Labor Statistics forecasts that 1.2 million factory jobs will be lost and15.3 million new jobs will be created from 2008 to 2018.
- More than two thirds of the new jobs will require only a high school education and will be low paid.
- Among these will be 461,000 more home health aides (median earnings $20,460); 400,000 more customer service representatives (median earnings $29,860); and 394,000 more fast-food workers (median earnings $16,430).
- Job growth will be most rapid for computer network and data analysts (median earnings $71,100) and financial examiners (median earnings: $70,930), but the number of these jobs is small.
- There will be an additional 582,000 nurses (median earnings $62,450).

ECONOMIC ANALYSIS

- The labor markets are constantly in a state of change, reallocating the nation's labor resources to their highest-value employments.
- The value of marginal product (*VMP*) of workers in service industries is rising.
- The *VMP* of nurses is rising because an aging population is increasing the demand for health care and technological advances are making nurses more productive.
- With an increase in *VMP*, the demand for nurses increases.
- Anticipating good job prospects in nursing, more college students and other young workers train as nurses, which increases the supply of nurses.
- The combination of an increase in demand and an increase in supply increases employment and the increase is forecasted to be 582,000 nurses from 2008 to 2018.
- Nurses' wages might rise, fall, or remain unchanged, depending on whether supply or demand increases more.
- The figures illustrate the market for nurses in 2008 and 2018. The 2008 demand curve, D_{08}, and supply curve, S_{08}, determine the equilibrium number of nurses (2,760,000) and the equilibrium wage rate ($62,450 per year).
- By 2018, the demand for nurses will increase to D_{18}. With no change in supply in Fig. 1, the wage rate rises to $66,000 a year and employment increases to 2,900,000.
- But the anticipation of good job prospects increases supply to S_{18} in Fig. 2. Employment increases by 582,000 and the wage rate remains at its 2008 level (an assumption).
- As the *VMP* of nurses is rising, the *VMP* of workers in manufacturing industries is falling. Foreign competition is cutting the prices of manufactured goods and automation is making machines more productive than factory labor, decreasing their marginal product.
- With a decrease in *VMP*, the demand for factory workers decreases.
- Faced with the prospect of unemployment or working for a lower wage, young workers stop looking for factory jobs and undertake training for service jobs, which decreases the supply of factory workers.
- The combination of a decrease in demand and a decrease in supply decreases factory employment and the decrease is forecasted to be 1.2 million workers from 2008 to 2018.
- The wages of factory workers might rise, fall, or remain unchanged, depending on whether supply or demand decreases more.
- Similar events are occurring in the markets for all types of labor, some expanding like nurses and some contracting like factory workers.

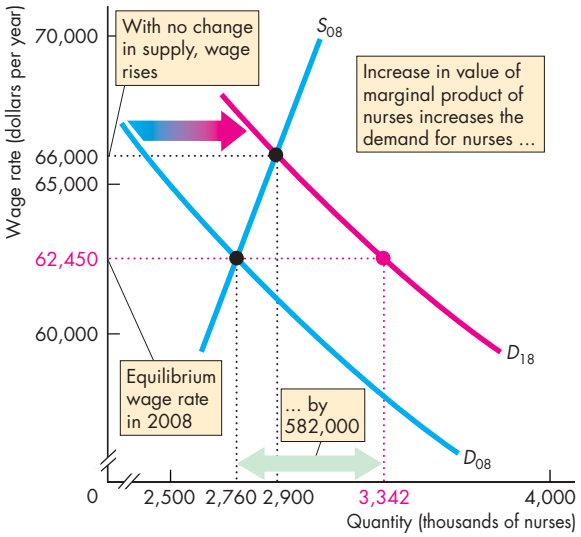

Figure 1 The market for nurses with no change in supply

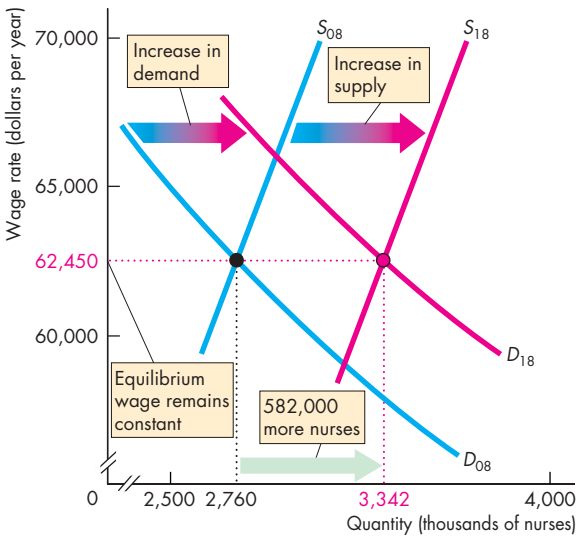

Figure 2 The market for nurses when supply increases

MATHEMATICAL NOTE

Present Value and Discounting

Rent-Versus-Buy Decision

To decide whether to rent an item of capital equipment or to buy the capital and implicitly rent it, a firm must compare the present expenditure on the capital with the future rental cost of the capital.

Comparing Current and Future Dollars

To compare a present expenditure with a future expenditure, we convert the future expenditure to its "present value."

The **present value** of a future amount of money is the amount that, if invested today, will grow to be as large as that future amount when the interest that it will earn is taken into account.

So the present value of a future amount of money is smaller than the future amount. The calculation that we use to convert a future amount of money to its present value is called **discounting**.

The easiest way to understand discounting and present value is to first consider its opposite: How a present value grows to a future amount of money because of *compound interest*.

Compound Interest

Compound interest is the interest on an initial investment plus the interest on the interest that the investment has previously earned. Because of compound interest, a present amount of money (a present value) grows into a larger future amount. The future amount is equal to the present amount (present value) plus the interest it will earn in the future. That is,

Future amount = Present value + Interest income.

The interest in the first year is equal to the present value multiplied by the interest rate, r, so

Amount after 1 year = Present value + ($r \times$ Present value).

or

Amount after 1 year = Present value $\times (1 + r)$.

If you invest \$100 today and the interest rate is 10 percent a year ($r = 0.1$), one year from today you will have \$110—the original \$100 plus \$10 interest.

Check that the above formula delivers that answer:

$$\$100 \times 1.1 = \$110.$$

If you leave this \$110 invested to earn 10 percent during a second year, at the end of that year you will have

Amount after 2 years = Present value $\times (1 + r)^2$.

With the numbers of the previous example, you invest \$100 today at an interest rate of 10 percent a year ($r = 0.1$). After one year you will have \$110—the original \$100 plus \$10 interest. And after the second year, you will have \$121. In the second year, you earned \$10 on your initial \$100 plus \$1 on the \$10 interest that you earned in the first year.

Check that the above formula delivers that answer:

$$\$100 \times (1.1)^2 = \$100 \times 1.21 = \$121.$$

If you leave your \$100 invested for n years, it will grow to

Amount after n years = Present value $\times (1 + r)^n$.

With an interest rate of 10 percent a year, your \$100 will grow to \$195 after 7 years ($n = 7$)—almost double the present value of \$100.

Discounting a Future Amount

We have just calculated future amounts one year, two years, and n years in the future, knowing the present value and the interest rate. To calculate the present value of these future amounts, we just work backward.

To find the present value of an amount one year in the future, we divide the future amount by $(1 + r)$.

That is,

$$\text{Present value} = \frac{\text{Amount of money one year in future}}{(1 + r)}.$$

Let's check that we can use the present value formula by calculating the present value of \$110 one year from now when the interest rate is 10 percent a

year. You'll be able to guess that the answer is $100 because we just calculated that $100 invested today at 10 percent a year becomes $110 in one year. So the present value of $110 one year from today is $100. But let's use the formula. Putting the numbers into the above formula, we have

$$\text{Present value} = \frac{\$110}{(1 + 0.1)}$$
$$= \frac{\$110}{1.1} = \$100.$$

To calculate the present value of an amount of money two years in the future, we use the formula:

$$\text{Present value} = \frac{\text{Amount of money two years in future}}{(1 + r)^2}.$$

Use this formula to calculate the present value of $121 two years from now at an interest rate of 10 percent a year. With these numbers, the formula gives

$$\text{Present value} = \frac{\$121}{(1 + 0.1)^2}$$
$$= \frac{\$121}{(1.1)^2}$$
$$= \frac{\$121}{1.21}$$
$$= \$100.$$

We can calculate the present value of an amount of money n years in the future by using the general formula

$$\text{Present value} = \frac{\text{Amount of money } n \text{ years in future}}{(1 + r)^n}.$$

For example, if the interest rate is 10 percent a year, $100 to be received 10 years from now has a present value of $38.55. That is, if $38.55 is invested today at 10 percent a year it will accumulate to $100 in 10 years.

Present Value of a Sequence of Future Amounts

You've seen how to calculate the present value of an amount of money one year, two years, and n years in the future. Most practical applications of present value calculate the present value of a sequence of future amounts of money that are spread over several years. An airline's payment of rent for the lease of airplanes is an example.

To calculate the present value of a sequence of amounts over several years, we use the formula you have learned and apply it to each year. We then sum the present values for all the years to find the present value of the sequence of amounts.

For example, suppose that a firm expects to pay $100 a year for each of the next five years and the interest rate is 10 percent a year ($r = 0.1$). The present value (PV) of these five payments of $100 each is calculated by using the following formula:

$$PV = \frac{\$100}{1.1} + \frac{\$100}{1.1^2} + \frac{\$100}{1.1^3} + \frac{\$100}{1.1^4} + \frac{\$100}{1.1^5},$$

which equals

$$PV = \$90.91 + \$82.64 + \$75.13 + \$68.30 + \$62.09$$
$$= \$379.07.$$

You can see that the firm pays $500 over five years. But because the money is paid in the future, it is not worth $500 today. Its present value is only $379.07. And the farther in the future the money is paid, the smaller is its present value. The $100 paid one year in the future is worth $90.91 today, but the $100 paid five years in the future is worth only $62.09 today.

The Decision

If this firm could lease a machine for five years at $100 a year or buy the machine for $500, it would jump at leasing. Only if the firm could buy the machine for less than $379.07 would it want to buy.

Many personal and business decisions turn on calculations like the one you've just made. A decision to buy or rent an apartment, to lease or rent a car, to pay off a student loan or let the loan run another year can all be made using the above calculation.

SUMMARY

Key Points

The Anatomy of Factor Markets (p. 418)

- The factor markets are: job markets for labor; rental markets (often implicit rental markets) for capital and land; and global commodity markets for nonrenewable natural resources.
- The services of entrepreneurs are not traded on a factor market.

Working Problem 1 will give you a better understanding of the anatomy of factor markets.

The Demand for a Factor of Production (pp. 419–421)

- The value of marginal product determines the demand for a factor of production.
- The value of marginal product decreases as the quantity of the factor employed increases.
- The firm employs the quantity of each factor of production that makes the value of marginal product equal to the factor price.

Working Problems 2 to 8 will give you a better understanding of the demand for a factor of production.

Labor Markets (pp. 422–427)

- The value of marginal product of labor determines the demand for labor. A rise in the wage rate brings a decrease in the quantity demanded.
- The quantity of labor supplied depends on the wage rate. At low wage rates, a rise in the wage rate increases the quantity supplied. Beyond a high enough wage rate, a rise in the wage rate decreases the quantity supplied—the supply curve eventually bends backward.
- Demand and supply determine the wage rate in a competitive labor market.
- A labor union can raise the wage rate by restricting the supply or increasing the demand for labor.
- A monopsony can lower the wage rate below the competitive level.
- A union or a minimum wage in a monopsony labor market can raise the wage rate without a fall in employment.

Working Problems 9 to 11 will give you a better understanding of labor markets.

Capital and Natural Resource Markets (pp. 428–431)

- The value of marginal product of capital (and land) determines the demand for capital (and land).
- Firms make a rent-versus-buy decision by choosing the option that minimizes cost.
- The supply of land is inelastic and the demand for land determines the rental rate.
- The demand for a nonrenewable natural resource depends on the value of marginal product and on the expected future price.
- The supply of a nonrenewable natural resource depends on the known reserves, the cost of extraction, and the expected future price.
- The price of nonrenewable natural resources can differ from the market fundamentals price because of speculation based on expectations about the future price.
- The price of a nonrenewable natural resource is expected to rise at a rate equal to the interest rate.

Working Problems 12 to 17 will give you a better understanding of capital and natural resource markets.

Key Terms

Bilateral monopoly, 425
Compound interest, 434
Derived demand, 419
Discounting, 434
Hotelling Principle, 430
Job, 418
Labor union, 424
Monopsony, 425
Nonrenewable natural resources, 418
Present value, 434
Value of marginal product, 419

STUDY PLAN PROBLEMS AND APPLICATIONS

myeconlab You can work Problems 1 to 18 in Chapter 18 Study Plan and get instant feedback.

The Anatomy of Factor Markets (Study Plan18.1)

1. Tim is opening a new online store. He plans to hire two people to key in the data at $10 an hour. Tim is also considering buying or leasing some new computers. The purchase price of a computer is $900 and after three years it is worthless. The annual cost of leasing a computer is $450.
   a. In which factor markets does Tim operate?
   b. What is the price of the capital equipment and the rental rate of capital?

The Demand for a Factor of Production (Study Plan18.2)

Use the following data to work Problems 2 to 7.

Wanda owns a fish store. She employs students to sort and pack the fish. Students can pack the following amounts of fish:

Number of students	Quantity of fish (pounds)
1	20
2	50
3	90
4	120
5	145
6	165
7	180
8	190

The fish market is competitive and the price of fish is 50¢ a pound. The market for packers is competitive and their market wage rate is $7.50 an hour.

2. Calculate the marginal product of the students and draw the marginal product curve.
3. Calculate the value of marginal product of labor and draw the value of marginal product curve.
4. a. Find Wanda's demand for labor curve.
   b. How many students does Wanda employ?

Use the following additional information to work Problems 5 and 6.

The market price of fish falls to 33.33¢ a pound, but the packers' wage rate remains at $7.50 an hour.

5. a. How does the students' marginal product change?
   b. How does the value of marginal product of labor change?
6. a. How does Wanda's demand for labor change?
   b. What happens to the number of students that Wanda employs?
7. At Wanda's fish store packers' wages increase to $10 an hour, but the price of fish remains at 50¢ a pound.
   a. What happens to the value of marginal product of labor?
   b. What happens to Wanda's demand for labor curve?
   c. How many students does Wanda employ?
8. **British Construction Activity Falls**

   Construction activity in Britain declined in June at the fastest rate in 11 years. A major home builder was unable to raise more capital—both signs of worsening conditions in the battered housing industry. Employment of construction labor declined in June after 23 months of growth. Average house prices fell 0.9 percent in June, the eighth consecutive month of declines, leaving the average 6.3 percent below June 2007.

   Source: *Forbes*, July 2, 2008

   a. Explain how a fall in house prices influences the market for construction labor.
   b. On a graph illustrate the effect of falling house prices in the market for construction labor.

Labor Markets (Study Plan18.3)

Use the following news clip to work Problems 9 to 11.

In Modern Rarity, Workers Form Union at Small Chain

In New York's low-income neighborhoods, labor unions have virtually no presence. But after a year-long struggle, 95 workers at a chain of 10 sneaker stores have formed a union. After months of negotiations, the two sides signed a three-year contract that sets the wage rate at $7.25 an hour.

Source: *The New York Times*, February 5, 2006

9. Why are labor unions scarce in New York's low-income neighborhoods?
10. Who wins from this union contract? Who loses?
11. How can this union try to change the demand for labor?

Capital and Natural Resource Markets

(Study Plan18.4)

12. Classify the following items as a nonrenewable natural resource, a renewable natural resource, or not a natural resource. Explain your answers.
    a. Trump Tower
    b. Lake Michigan
    c. Coal in a West Virginia coal mine
    d. The Internet
    e. Yosemite National Park
    f. Power generated by wind turbines
13. **Trump Group Selling Parcel For $1.8 Billion**
    A consortium of Hong Kong investors and Donald J. Trump are selling a stretch of river-front land and three buildings on the Upper West Side for about $1.8 billion in the largest residential sale in city history. Mr. Trump acquired the land for less than $100 million a decade ago during a real estate recession.
    Source: *The New York Times*, June 1, 2005
    a. Why has the price of land on New York City's Upper West Side increased over the last decade? In your answer include a discussion of the demand for and supply of land.
    b. Use a graph to show why the price of land on the Upper West Side increased over the last decade.
    c. Is the supply of land on the Upper West Side perfectly inelastic?
14. In the news clip in Problem 8,
    a. Explain how a fall in house prices influences the market for construction equipment leases.
    b. Draw a graph to illustrate the effect of a fall in house prices in the market for construction equipment leases.

Use the following news clip to work Problems 15 and 16.

Fixing Farming

Solutions to the global food crisis will come from genetically engineered crops and large-scale farms. Demand for farm products will keep growing as the population grows. But the supply of farmland is limited and farms already use 55 percent of the habitable land. The solution is for farmers to become more productive—generating more output from fewer inputs.

Source: *Fortune*, May 22, 2008

15. a. Is farmland a renewable or nonrenewable resource?
    b. Explain how the growing demand for farm products will affect the market for land and draw a graph to illustrate your answer.
16. How might farmers meet the growing demand for farm products without having to use a greater quantity of farmland?
17. **Copter Crisis**
    Helicopters are in short supply these days. You could blame a rise in military spending, a jump in disaster relief, even crowded airports pushing executives into private travel. But the fastest growth is coming from the offshore oil-and-gas industry, where helicopters are the only way to ferry crews to and from rigs and platforms. Hundred-dollar oil has pushed producers to work existing fields harder and to open new deep-sea wells in Brazil, India, and Alaska. The number of rigs and platforms has grown by 13% over the past decade. Oil companies are facing a two-year backlog in orders for the Sikorsky S92, a favorite of the oil industry, and a 40% rise in prices for used models.
    Source: *Fortune*, May 12, 2008
    a. Explain how high oil prices influence the market for helicopter leases and services (such as the Sikorsky S92).
    b. What happens to the value of marginal product of a helicopter as a firm leases or buys additional helicopters?

Mathematical Note (Study Plan 18.MN)

18. Keshia is opening a new bookkeeping service. She is considering buying or leasing some new laptop computers. The purchase price of a laptop is $1,500 and after three years it is worthless. The annual lease rate is $550 per laptop. The value of marginal product of one laptop is $700 a year. The value of marginal product of a second laptop is $625 a year. The value of marginal product of a third laptop is $575 a year. And the value of marginal product of a fourth laptop is $500 a year.
    a. How many laptops will Keshia lease or buy?
    b. If the interest rate is 4 percent a year, will Keshia lease or buy her laptops?
    c. If the interest rate is 6 percent a year, will Keshia lease or buy her laptops?

ADDITIONAL PROBLEMS AND APPLICATIONS

myeconlab You can work these problems in MyEconLab if assigned by your instructor.

The Anatomy of Factor Markets

19. Venus is opening a tennis school. She plans to hire a marketing graduate to promote the school and an administrator at $20 an hour. Venus is also considering buying or leasing a new tennis ball machine. The purchase price of the machine is $1,000 and after three years it is worthless. The annual cost of leasing the machine is $500.
    a. In which factor markets does Venus operate?
    b. What is the price of the capital equipment and the rental rate of capital?

The Demand for a Factor of Production

Use the following data to work Problems 20 to 23. Kaiser's Ice Cream Parlor hires workers to produce smoothies. The market for smoothies is perfectly competitive, and the price of a smoothie is $4. The labor market is competitive, and the wage rate is $40 a day. The table shows the workers' total product schedule.

Number of workers	Quantity produced (smoothies per day)
1	7
2	21
3	33
4	43
5	51
6	55

20. Calculate the marginal product of hiring the fourth worker and the fourth worker's value of marginal product.
21. How many workers will Kaiser's hire to maximize its profit and how many smoothies a day will Kaiser's produce?
22. If the price rises to $5 a smoothie, how many workers will Kaiser's hire?
23. Kaiser's installs a new soda fountain that increases the productivity of workers by 50 percent. If the price of a smoothie remains at $4 and the wage rises to $48 a day, how many workers does Kaiser's hire?
24. **Detroit Oil Refinery Expansion Approved**
    Marathon Oil Saturday started work on a $1.9 billion expansion of its gasoline refinery in Detroit. Marathon will employ 800 construction workers and add 135 permanent jobs to the existing 480 workers at the refinery.
    Source: *United Press International*, June 21, 2008
    a. Explain how rising gasoline prices influence the market for refinery labor.
    b. Draw a graph to illustrate the effects of rising gasoline prices on the market for refinery labor.

Labor Markets

25. **You May be Paid More (or Less) than You Think**
    It's hard to put a price on happiness, but if you've ever had to choose between a job you like and a better-paying one that you like less, you'd like to know what job satisfaction is worth.
    John Helliwell and Haifang Huang (economists at the University of British Columbia) have estimated four key factors influencing job satisfaction: Trust in management is like a 36 percent pay raise; a job with lots of variety is like a 21 percent pay raise; a job that requires a high level of skill is like a 19 percent pay raise; and a job with enough time to finish your work is like an 11 percent pay raise.
    Source: CNN, March 29, 2006
    a. How might the job characteristics described here affect the supply of labor for different types of jobs?
    b. How might this influence on supply result in different wage rates that reflect the attractiveness of a job's characteristics?

Use the following news clip to work Problems 26 to 29.

The New War over Wal-Mart

Today, Wal-Mart employs more people—1.7 million—than any other private employer in the world. With size comes power: Wal-Mart's prices are lower and United Food and Commercial Workers International Union argues that Wal-Mart's wages are also lowers than its competitors. Last year, the workers at a Canadian outlet joined the union and Wal-Mart immediately closed the outlet. But does Wal-Mart behave

any worse than its competitors? When it comes to payroll, Wal-Mart's median hourly wage tracks the national median wage for general merchandise retail jobs.

Source: *The Atlantic*, June 2006

26. a. Assuming that Wal-Mart has market power in a labor market, explain how the firm could use that market power in setting wages.
    b. Draw a graph to illustrate how Wal-Mart might use labor market power to set wages.
27. a. Explain how a union of Wal-Mart's employees would attempt to counteract Wal-Mart's wage offers (a bilateral monopoly).
    b. Explain the response by the Canadian Wal-Mart to the unionization of employees.
28. Based upon evidence presented in this article, does Wal-Mart function as a monopsony in labor markets, or is the market for retail labor more competitive? Explain.
29. If the market for retail labor is competitive, explain the potential effect of a union on the wage rates. Draw a graph to illustrate your answer.

Capital and Natural Resource Markets

Use the following news clip to work Problems 30 and 31.

Gas Prices Create Land Rush

There is a land rush going on across Pennsylvania, but buyers aren't interested in the land itself. Buyers are interested in what lies beneath the earth's surface—mineral rights to natural gas deposits. Record high natural gas prices have already pushed up drilling activity across the state, but drilling companies have discovered a new technology that will enable deep gas-bearing shale to be exploited. Development companies, drilling companies and speculators have been crisscrossing the state, trying to lease mineral rights from landowners. The new drilling techniques might recover about 10 percent of those reserves, and that would ring up at a value of $1 trillion.

Source: *Erie Times-News*, June 15, 2008

30. a. Is natural gas a renewable or nonrenewable resource? Explain.
    b. Explain why the demand for land in Pennsylvania has increased.
31. a. If companies are responding to the higher prices for natural gas by drilling right now wherever they can, what does that imply about their assumptions about the future price of natural gas in relation to current interest rates?
    b. What could cause the price of natural gas to fall in the future?
32. New technology has allowed oil to be pumped from much deeper offshore oil fields than before. For example, 28 deep ocean rigs operate in the deep waters of the Gulf of Mexico.
    a. What effect do you think deep ocean sources have had on the world oil price?
    b. Who will benefit from drilling for oil in the Gulf of Mexico? Explain your answer.
33. Water is a natural resource that is plentiful in Canada but not plentiful in Arizona and southern California.
    a. If Canadians start to export bulk water to Arizona and southern California, what do you predict will be the effect on the price of bulk water?
    b. Will Canada eventually run out of water?
    c. Do you think the Hotelling Principle applies to Canada's water? Explain why or why not.

Economics in the News

34. After you have studied *Reading Between the Lines* on pp. 432–433 answer the following questions.
    a. Name some jobs for which future employment will expand and some for which it will shrink.
    b. What are the influences on the demand for labor that bring an increase in demand and what are the influences that bring a decrease in demand?
    c. Why is an increase in the demand for nurses likely to bring a similar increase in the supply of nurses?
    d. Draw a graph of the market for factory workers in 2008 and 2018. Show the effects of a decrease in the demand for factory workers with no change in the supply on the employment and wage rate of factory workers.
    e. If the outcome you've shown in part (d) occurred, explain how the incentives faced by young workers just entering the labor force would be affected.
    f. On your graph of the labor market in part (d), show how you would expect the supply of factory workers to change by 2018 and show your predicted level of employment and wage rate of factory workers in 2018.