24g. Create a graph where all of the data in Table 1-3 are plotted with unemployment on the horizontal axis and wage inflation on the vertical axis. Use one symbol to denote data from the period 1960–69 and a different one to denote data from the period 1970–79.

24h. Since the data from the 1970s generally seem to follow a different pattern than the 1960s data, suppose we define a variable $D_{70}$ such that $D_{70} = 1$ if the data come from the period 1970–79, otherwise it takes on a value of zero. Adding this variable to the basic linear model yielded the following least squares estimates:

$$\%\Delta W_t = 5.4 - 0.28\, UR_t + 3.7\, D_{70}. $$

(1.17)  (0.24)  (0.61)

Plot the estimated line implied by this equation for the 1960s data on the graph from 24g. Do the same for the 1970s data.

24i. If a researcher assumed that the tradeoff between unemployment and wage inflation was the same during the 1960s and 1970s, then the variable $D_{70}$ would be omitted and linear least squares regression yields the equation

$$\%\Delta W_t = 2.9 + 0.53\, UR_t. $$

(1.86)  (0.34)

Add a plot of this line to the graph from 24h. Why does the omission of the $D_{70}$ variable make such a difference in the estimated line? Does omitting an independent variable from a regression equation always make such a difference?

*24j. The equation estimated in Question 24h assumed that the position of the entire curve shifted during the 1970s but that the slope remained the same. Write the equation that would be estimated if both the position and slope of the curve were allowed to change.

### Applications

**Alternatives to the Norm of Pareto Efficiency**

25. On May 15, 1891, Pope Leo XIII, leader of the Roman Catholic Church, circulated a letter to church members in which he wrote

> When there is question of defending the rights of individuals, the defenseless and the poor have a claim to special consideration. The richer class has many ways of shielding itself, and stands less in need of help from the state; whereas the mass of the poor have no resources of their own to fall back on, and must chiefly depend on the assistance of the state. It is for this reason that wage-earners, since they mostly belong to the latter class, should be especially cared for and protected by the government.


This teaching has been reaffirmed by Pope John Paul II and has generally come to be known as exercising a “preferential option for the poor.”
25a. How does the notion of a “preferential option for the poor” compare with the norm of Pareto efficiency?

25b. How does the role of government envisioned by Pope Leo XIII compare with the role government would play in a society where the norm was strictly Pareto efficiency?

26. In May 1990 a telephone survey of Moscow and New York City residents was conducted to gauge popular attitudes toward free markets. One of the questions was

Suppose the government wants to undertake a reform to improve the productivity of the economy. As a result, everyone will be better off, but the improvement in life will not affect people equally. A million people (people who respond energetically to the incentives in the plan and people with certain skills) will see their incomes triple while everyone else will see only a tiny income increase, about 1%. Would you support this plan?

The responses are presented in Table 1-4.

<table>
<thead>
<tr>
<th>Response</th>
<th>U.S.S.R.</th>
<th>U.S.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>55%</td>
<td>38%</td>
</tr>
<tr>
<td>No</td>
<td>45%</td>
<td>64%</td>
</tr>
</tbody>
</table>


26a. If individuals cared only about their personal levels of income, the expected response to the above question would be “yes,” and yet a significant portion of the respondents in both countries answered “no.” What do the survey responses suggest that people care about?

26b. Are the answers to the survey question consistent with the norm of Pareto efficiency?

26c. How do you think the premise of the question would have had to be different to gain a more favorable reaction?

**Estimating the Relationship between Wages and Productivity (Appendix 1A)**

27. An important relationship in labor economics is the one between employee earnings ($E$) and the revenue ($R$) an employee generates for the firm. One problem in estimating this relationship, however, is that in many instances (e.g., when employees work in groups or teams) it is difficult to know or measure precisely what an employee contributes to the firm. In occupations like automobile or real estate sales, however, the amount of revenue a particular worker generates for the firm is very clear. The question then becomes, to what extent do differences in employee productivity translate into differences in pay? And to what extent do other factors, like concern about economic status and fairness, play a role? This problem explores the methodology involved in answering these questions.

Consider the equation

$$E_i = \alpha_0 + \alpha_1 R_i + e_i,$$

where $e_i$ is a random error term, and the subscript $i$ refers to one individual. The parameters to be estimated are $\alpha_0$, the vertical intercept of the line, and $\alpha_1$, the slope of the line.
27a. Briefly outline how one would go about estimating the parameters \( \alpha_0 \) and \( \alpha_1 \).

27b. How can you tell the degree to which these estimated values approach the true underlying values of the parameters? How could you test the hypothesis that the parameter \( \alpha_1 \) was different from zero?

27c. The standard theory of the demand for labor (to be studied in Chapter 3) says that the parameter \( \alpha_1 \) should equal 1. That is, differences in productivity should be reflected in differences in pay on a one-to-one basis. How could you test this hypothesis?

27d. In practice, pay schemes seem to put much less emphasis on productivity than the standard theory predicts. Most firms determine pay by looking at variables such as experience, education, and years at the firm, rather than an employee’s output. In his book *Choosing the Right Pond: Human Behavior and the Quest for Status* (New York: Oxford University Press, 1985), economist Robert H. Frank argues that pay is relatively insensitive to productivity differences because people care about their relative position in the wage hierarchy of the firm. Frank’s hypothesis is that high productivity workers earn less than the standard theory predicts because they must pay a price for occupying the top ranked positions in the firm. On the other hand, low productivity workers command a premium for occupying the low status positions of the firm. (See Example 8.1 in Chapter 8 of the text.) If relative standing is something workers care about, fairness dictates that pay reflect all of a worker’s contributions to a firm, including any effects his position in the wage hierarchy has on the well-being of coworkers.

What does Frank’s hypothesis imply about the values of the parameters \( \alpha_0 \) and \( \alpha_1 \) relative to the standard model?

27e. Frank goes on to argue that the more closely workers interact in their day-to-day routines, the greater the price paid by the top ranked workers, and the larger the premium received by low ranked workers. Suppose we define the dichotomous variable \( D \) to represent the level of interaction in the workplace between coworkers. \( D \) would take on the value of 1 if employees interacted extensively, 0 if they did not. What equation would you use to test this additional hypothesis?

27f. Discuss the consequences for the estimates of the parameters \( \alpha_0 \) and \( \alpha_1 \) of omitting the variable \( D \) from the analysis.