CHAPTER 1
INTRODUCTION

The employment relationship is one of the most fundamental relationships in our lives and this is why it attracts a good deal of legislative attention. Knowledge of the fundamentals of labor economics is essential to an understanding of a huge array of social problems and programs in the United States and elsewhere. Economists who are actively involved in analysis and evaluation of public policies believe that labor economics is useful in understanding the effects of these programs.

The Labor Market
Labor is unique in several ways:
- Labor services can only be rented because workers cannot be bought and sold.
- Labor services cannot be separated from workers, therefore, the conditions (nonpecuniary factors: environment, risk of injury, personalities of managers, perceptions of fair treatment, and flexibility of work hours) under which such services are rented are often as important as the price.

The circumstances under which employers and employees rent labor services clearly constitute a market, e.g. the labor market (placement of people in jobs). Institutions – want ads and employment agencies facilitate contact between buyers and sellers of services. Information about price and quality is exchanged in employment applications and interviews. Contract between both parties spells out: compensation for time, conditions of work, job security, and duration of the job.

Labor Economics: Some Basic Concepts
Labor economics is the study of the workings of the market for labor, which is primarily concerned with the behavior of employers and employees in response to the general incentives of wages, prices, profits, nonpecuniary aspects of the employment relationship. Labor economics will be conducted on two levels:
1. Positive economics — what is
2. Normative economics — what should be

Positive Economics
Positive economics is a theory of behavior in which people are typically assumed to respond favorably to benefits and negatively to costs, and underlying this theory of behavior are the basic assumptions of scarcity and rationality.
- Scarcity: The persuasive assumption underlying economic theory of resource scarcity – and choices must be made.
- Rationality: The basic assumption that people are rational – that means they have an objective, which they pursue in a reasonably consistent fashion.

For persons: the objective is utility maximization.
For firms: the objective is profit maximization.

The assumption of rationality implies a consistency of response to general economic incentives and an adaptability of behavior when those incentives change.

The Models and Predictions of Positive Economics
Behavioral predictions in economics flow more or less directly from the two fundamental assumptions of scarcity and rationality. Due to scarcity, workers continually make choices such as: look for other jobs, accept overtime, move to another area, or acquire more education. Employers also make choices: level of output, input mix in production. Economists assume that the choices and decisions made by employees and employers are guided by their desire to maximize utility or to maximize profit, respectively. There are skeptics about the assumptions used in economics, but economists argue that the theory underlying positive economics should be judged on the basis of its predictions, not its assumptions.

Any attempt to explain a complex set of behaviors and outcomes using a few fundamental influences leads to the creation of a model – created to strip away random and idiosyncratic factors. A Physical Model - Physicists can use simple calculations of velocity and gravitational pull to predict where a ball will fall if it is kicked with a certain force at a given angle to the ground – even though the prediction may not be accurate due to other forces ignored in the calculations, but it will give the average tendencies of outcomes

The Models and Predictions of Positive Economics
An Economic Model – To really grasp the assumptions and predictions of economic models with respect to scarcity and rationality, we consider the following examples:
- From the employee side of the market, we can assert that being subject to resource scarcity, workers will prefer high-paying jobs to low-paying ones if all other job characteristics are the same in each job – a highlight of the utility maximizing behavior of workers.
- From the employer side of the market, we can also assert that firms need to make profit to survive, and if they have high turnover, their costs will be higher than otherwise because of the need to hire and train replacements – a highlight of the profit maximizing behavior of firms.

We note several important things about the assertions of utility maximization and profit maximization: Employees and employers are both mindful of their scarce resources and are therefore on the lookout for chances to improve their wellbeing. There is a negative relationship between wages and voluntary turnover by holding other things equal – this relationship is supported by statistical studies or evidence. The assumptions of the theory concern individual behavior of employers and employees, but the predictions are about an aggregate relationship between wages and turnover, which can be tested using aggregate data.

Normative Economics
Normative economics is the study of what —should be[,] and the theories of social optimality are based in part on the underlying philosophical principle of —mutual benefits[,] which begins with the realization that there could be two kinds of economic transactions. One kind is entered into voluntarily because all parties to the transaction gain – as an illustrative example, assume that Sally is willing to make blueprints for $20 per hour. Ace Engineering is willing to pay someone $22 per hour to do the job. This labor market transaction is beneficial to both parties if the hourly wage agreed upon is between $20 and $22 – Pareto efficiency.

A second kind of transaction is one in which one or more parties lose – these transactions often involve the redistribution of income, from which some gain at the expense of others (explicit redistributiontransactions are not entered into voluntarily unless motivated by charity). Remember that markets facilitate voluntary transactions. Governments make certain transactions mandatory – basis for public programs/policies.

Markets and Values Policies or transactions from which all affected parties gain can be said to be Pareto-improving because they promote Pareto efficiency – unambiguously enhance social welfare and they can be unanimously supported because:
- All parties who are affected by the transaction gain.
- Some parties gain and no one loses.
- Some parties gain and some lose from the transaction, but the gainers fully compensate the losers.

Market Failure: Ignorance – People may be ignorant of some important facts and are thus led to make decisions that are not in their self-interest – for example, a smoker who takes a job at an asbestos plant may not know that inhaling asbestos dust and smoking substantially increased the risk of disease.

Market Failure: Transactions Barriers – There may be some barriers to the completion of mutually beneficial transactions: Laws may prohibit certain transactions – 3 or 4 decades ago, laws in some states prohibited employers from hiring women to work more than 40 hours a week. The expense of completing the transactions.

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Market Failure: Externalities – Market failure that arises when a buyer and a seller agree to a transaction that imposes costs (negative externality or spillover) or benefits (positive externality/spillover) on people who were not party to their decision. If all transaction costs and benefits fall on the decision makers, the transaction represents a step toward Pareto efficiency – this means that decision was voluntarily accepted by all who are affected by it. Externalities would also exist if workers have no mechanism to transfer their costs of being injured to their employers, who should be responsible for workplace safety.

Market Failure: Public Goods – Market failure that arises when a person is willing to consume a good or service but he/she is not willing to pay the cost of its provision/production — free rider problem. Free rider problem can lead to under-investment in the provision of such good or service unless the government can compel payments through its tax system.

Market Failure: Price Distortions – Market failure that arises when prices do not reflect the true preferences of the parties to the transaction. Special barriers to transactions could come in the form of taxes, subsidies, or other prices (price controls) that create — incorrect prices.

Normative Economics and Government Policy

Solutions to problems that prevent the completion of socially beneficial transactions frequently involve governmental intervention – repeal the law. For other type of transaction barriers, government intervention could either compel or actively promote transactions that are different from the ones that would be made by — the market.]

Examples:

Capital Market Imperfections – If workers find it difficult to obtain loans – to be used for various purposes – the government might intervene by making such loans available to consumers even if it faced the same risk of default

Externalities – Government can use policies to intervene in its decision on the mandatory school-leaving age by looking at the lifetime benefits of various schooling levels and comparing them to both the direct costs of education and the opportunity costs of lost production — internalize externalities

Efficiency versus Equity

The social goal of a more equitable distribution of income is often of paramount importance to political decision makers. The dispute is whether equity or economic efficiency should be the prime consideration in setting policy. The first source of dispute is that there is not a unique set of transactions that are Pareto efficient – a number of different sets of transactions can satisfy the definition of economic efficiency but questions arise as to which set is equitable. The second source of dispute over equity and efficiency is deeply rooted in the problem that to achieve more equity, steps away from Pareto efficiency must often be taken.

Statistical Testing of Labor Market Hypotheses

A Univariate Test

To test the relationship between wages and turnover or quit rates, we need to collect data. This type of analysis is called univariate because we are analyzing the effects of one variable (wage rate – predictor or explanatory variable shown on the X-axis) on just one other variable (quit rate – dependent variable on the Y-axis). Data collected for this type of test are called cross-sectional data because they provide observations across behavioral units – cross-sections – at a point in time. Observations that provide information on a single behavioral unit over a number of time periods are called time series data. Combination of cross-sectional and time-series data are called panel data.

Table 1A.1

<table>
<thead>
<tr>
<th>Firm</th>
<th>Average Hourly Wage ($)</th>
<th>Quit Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>E</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

Figure 1A.1: Estimated Relationship between Wages and Quit Rates Using Data from Table 1A.1

\[ Q_i = 45 - 2.5W_i, \quad R^2 = 0.67 \]

Any straight line can be represented by the general equation of the form:

\[ Y = a + bX \]

where Y is the dependent variable; X is the independent or explanatory variable; "a" and "b" are parameters or coefficients to be estimated — vertical intercept and slope. We could model the relationship between the data in Table 1A.1 and Figure 1A.1 as follows:

\[ Q_i = a_0 + a_1W_i + \varepsilon_i \]

where

\[ a_0 = 45, \quad a_1 = -2.5 \]

and \( W_i \) is firm i’s wage rate.

From equation (1A.3), we can predict that if a firm paid $4 per hour in 1993, its annual quit rate will be

\[ Q_i = 45 - 2.5(4) = 35 \%

This equation shows that the quit rate can vary from 0 to $81, but its quit rate will be: Qi = 45 – 2.5(18) = 0 percent. Note that the relationship between wages and quit rates cannot be assumed to be linear for low and very high values of wages. The estimated intercept (45) and the slope (−2.5) are only estimates of the true relationship, and there could be uncertainty associated with these estimates. The uncertainty about each coefficient is measured by its standard error (SE) or the estimated standard deviation (SD) of the coefficients.

\[ SE \text{ or SD for the intercept coefficient } (a_0) = 4.9 \]

\[ SE \text{ or SD for the slope coefficient } (a_1) = 0.625 \]

The larger the SE or SD the greater the uncertainty

Given the estimated coefficients and their SEs or SDs, we can test the hypothesis that the a1 coefficient is zero:

\[ H_0: a_1 = 0 \quad \rightarrow \quad \text{no relationship between W and Q}, \]

\[ H_A: a_1 \neq 0 \quad \rightarrow \quad \text{a relationship exists between both} \]

The t-statistics is used here to confirm or reject the null hypothesis of no relationship between W and Q.

\[ \text{computed t-value for } a_0 = 45/4.9 = 8.49 \]

\[ \text{computed t-value for } a_1 = -2.5/0.625 = -4.0 \]

The computed t-statistics for both coefficients (a0 and a1)are statistically significant at the either 1% or 5% level. Given the computed t-statistics for a1 to be 4.0, we can reject the null hypothesis of no relationship between W and Q in favor of the alternative/research hypothesis, which shows the true relationship is negative.

The univariate analysis in the previous section assumed that the only variable that can influence quit rate (other than \( a_1 \) is random factors) is a firm’s wage rate. Theoretically, there are many factors, other than the wage rate, that influence quit rates. Employee benefits, working conditions, firm size, age, and the level of education/training of worker. Economic theory will indicate which variables should be included in any statistical regression analysis and will suggest the direction of causation. If we assume that in addition to the wage rate (Wi), the other factor that can influence quit rate (Qj) is the average age of the workforce (AI), then we have:

\[ Q_i = 45 - 2.5W_i + 4.0A_i + \varepsilon_i \]

Multiple Regression Analysis

\( \text{AI} \) could be the age of firm i’s workers or the percentage of the firm’s workers older than some age level — that is, \( \text{AI} \) can be used as a dichotomous variable:

\[ \text{AI} = 0 \text{ if the average age of firm i’s workers is } \leq 40 \]
Ai = 1 if the average age of firm i's workers is > 40.

The parameters or coefficients – β0, β1, and β2 – of equation (1A.4) can be estimated using multiple regression analysis. Each RHS variable explains Qi, holding other independent variables constant.

Note that when:
Ai = 0, then Qi = β0 + β1Wi + εi → Qi = α0 + α1Wi + εi.
Ai = 1, then Qi = (β0 + β2) + β1Wi + εi.

The Problem of Omitted Variables
Running a univariate regression when the situation requires multiple regression or leaving out important explanatory variables in a multiple regression analysis will lead to omitted variables bias – an important pitfall in hypothesis testing, which highlights the need to use economic theory to guide empirical testing. For simple illustration, we assume that we know the true values of β0, β1, and β2 in equation (1A.4) and that there is no random error (each εi is zero). Then we have:

Qi = 50 – 2.5Wi − 10Ai (1A.5)

If Ai = 0 (average age ≤ 40), Qi = 50 – 2.5Wi → line Z0Z0
If Ai = 1 (average age > 40), Qi = 40 – 2.5Wi → line Z1Z1

This means that, given W, a firm’s quit rates will be 10% point lower if the average age of its workforce is over 40.

Figure 1A.2 True Relationships between Wages and Quit Rates (Equation 1A.5)

If the researcher ran the regression and omitted or ignored the fact that average age affects quit rate, then we have:

Qi = α0 + α1Wi + εi (1A.6)

With omitted variable bias, the question is whether the estimated value of α1 will correspond to the true slope of the Q/W relationship, which we have assumed to be –2.5. The answer depends heavily on how average wages and average age of employees vary across firm (Table 1A.2). Estimate of equation (1A.6) based on the data provided in Table 1A.2 yields:

Qi = 57 – 4Wi (1A.7)

(5.1) (0.612) R2 = 0.91

Computed t-statistics are: 11.18 and 6.54.

Table 1A.2

From Table 1A.2, we see that:
- Quit rates are lower in the three firms (k, l, and m) that pay high-wage, and they tend to employ older workers who are less likely to quit.
- Quit rates are higher in the three firms (p, q, and r) that pay low-wage, and they tend to employ younger workers who are more likely to quit.

If the true slope coefficient (β1) is –2.5, with omitted variable bias, the newly computed slope coefficient of –4 means that the estimated response overstates the sensitivity of the quit rate to wages. Equation (1A.7) ignores the effect that age has on quit rates. By omitting an important explanatory variable that affects quit rates and this is associated with wage levels, spurious regression results will be obtained.

Figure 1A.3 Estimated Relationships between Wages and Quit Rate

CHAPTER 2
OVERVIEW OF THE LABOR MARKET

The Labor Market: Definitions, Facts, and Trends
The market that allocates workers to jobs and coordinates employment decision is the labor market, which could be: national labor market, regional, local, external, internal labor market, primary, secondary

The Labor Force and Unemployment
The Adult Working Population (AWP) consists of those who are over 16 years of age and are in the labor force (LF) and not in labor force (NLF).

AWP = LF + NLF

The labor force consists of those (>16 years of age) who are employed(E) and those who are unemployed(U) but are actively seeking work or waiting to be recalled from layoff.

LF = E + U

People who are not employed and are neither looking for work or waiting to be recalled from layoff.

 Movements/Flows between LF and NLF:
- Those who leave the labor force by retiring or by dropping out.
- Those who have never worked who are entering the LF, while those who have dropped out are reentering the LF.

 Movements/Flows between E and U:
- Employed workers become unemployed by quitting voluntarily or by being involuntarily separated from firm either temporarily or permanently.
- Unemployed workers obtain employment by being newlyhired or by being recalled to a job from layoff.

Figure 2.1 Labor Force Status of the U.S. Adult Civilian Population, April 2013 (seasonally adjusted)
Unemployment rate is the ratio of those unemployed (U) to those in the labor force (LF):
- Varies from year to year, by region, by state, by gender, and by race
- Tends to be low when the labor market is tight and high when the labor market is loose, which happened in 2009.

Industries and Occupations: Adapting to Change
The labor-market changes occurring in a dynamic economy are sizable:
- Employment in goods-producing industries (largely manufacturing) has fallen as a share of total nonfarm employment since the 1950s.
- Private-sector services have experienced dramatic growth (expansion in wholesale and retail trade).

Workers and employers have adapted to these changes through the acquisition of new skills and technology.

The Earnings of Labor
The price of labor that equilibrate the labor market is the wage rate.

Nominal and Real Wages
The wage rate is the price of labor per working hour, which could measured in nominal and/or real terms:
- Nominal wage – what workers get paid per hour in current dollars.
- Real wages or the real purchasing power of a worker’s earnings – nominal wages divided by some measure of prices (usually the consumer price index –CPI).

The CPI
Some of the problems with the use CPI as measure of changes in the purchasing power of workers are:
- Consumer change the bundle of goods and services they buy over time in response to changes in prices but not reflected in the bundle with which the CPI is computed.
- The quality of goods and services change over time but the CPI does not account for changes in quality.

Given these and other problems, some economists believe that the CPI has overstated the inflation by as much as 1% point per year.

Using the CPI to convert present values into past values and vice versa – see row 4 for 1980, 1990, and 2012:

Wages, Earnings, Compensation, and Income
Wages refer to the payment for a unit of time/hour worked. Earnings refer to wages multiplied by the number of time units/hours worked. Employee Benefits can be either payments in kind or deferred. Examples of payments in kind are employer-provided health care, health insurance, and paid vacation time. Examples of deferred payments are employer-financed retirement benefits – Social Security taxes – set aside money that enables employees to receive pensions later. Total compensation consists of earnings plus employee benefits. Income received by a family includes earnings, benefits, and unearned income, which included dividends or interest received on investment and government transfer payments.

How the Labor Market Works
Firms must successfully operate in the labor market, the capital market, and the product market if they are to survive. Firms purchase inputs – labor (L) and capital (K) used in the production of goods and services – from the labor market and the capital market, respectively. The study of the labor market begins and ends with an analysis of the demand for and the supply of labor:
- Employers/Firms demand for labor from different labor markets.
- Employees/Workers supply their labor services.
Remember that the major labor market outcomes are related to: (a) the terms of employment (wages, compensation levels, working conditions) and (b) the levels of employment.

**How the Labor Market Works**

**The Demand for Labor**

Firms combine $L$ and $K$ to produce goods and services that are sold in the product market. Firms’ total output ($Q$) and their mix of inputs ($L$ and $K$) depend on three forces:

- Output or product demand ($Q_D$).
- The amount of $L$ and $K$ acquired at given prices: wages ($W$) for $L$ and rental cost ($r_K$) or price ($p_K$) for $K$.
- Choice of technology ($T$) available to firms.

Demand for labor: $LD = f (W, Q_D, T)$

where $LD$ = labor demand or the desired level of employment by the firm, $W$ = wage rate, $Q_D$ = output or product demand, and $T$ = technology.

If $Q_D$ and $T$ are held constant, then $LD = g(W)$, see Table 2.3.

### Wage Changes

An increase in wage will lead to:

- A scale or output effect – the reduction in the scale of production or output due to the reduction in employment.
- A substitution effect – capital is substituted for labor in the production process.

**Figure 2.6 Labor Demand Curve (based on data in Table 2.3)**

### Changes in Other Forces Affecting Demand

If the demand for the product ($Q_D$) increases, holding other factors ($L$, $W$, $K$, $r_K$ or $p_K$, and $T$) constant, this will lead to scale or output effect as firms try to maximize profits; thus leading to an increase in labor demand. The labor demand curve shifts to the right at every possible wage level indicated in Table 2.3 — see Figure 2.7. If the supply of capital changed and $r_K$ or $p_K$ fell by 50%, but other factors remained unchanged, more $K$ would be used in production process — generates two opposite effects for LD:

- If the scale effect dominates, more workers will be required as well, thus $LD$ will shift to the right — see Figure 2.8 (a).
- If the substitution effect dominates as firm adopt more capital-intensive technologies in response to cheaper capital, $LD$ will shift to the left — see Figure 2.8 (b).

**Figure 2.7 Shift in Demand for Labor Due to Increase in Product Demand**

**Figure 2.8 Possible Shifts in Demand for Labor Due to Fall in Capital Prices**

### Market, Industry, and Firm Demand

The demand for labor can be analyzed on three levels

1. **Firm level** — to analyze the demand for labor by a particular firm, we see how an increase in the wage rate of machinists affects their level of employment by a particular aircraft manufacturer.
2. **Industry level** — to analyze the effect of this wage increase on the employment of machinists in the entire aircraft industry, we utilize an industry demand curve.
3. **Market** — to see how the wage increase affects the entire labor market for machinists in all industries in which they are used, we use a market demand curve.

### Long Run versus Short run

In the short run, employers find it difficult to substitute capital for labor (and vice versa); and this is also true for product demand. It takes time to fully adjust consumption and production behavior.

### The Supply of Labor

The simplifying assumption here is that workers have already decided to work, but they must choose their:

- Occupation
- Employer

### Market Supply

If the market wage for legal assistants (or “paralegals”) increases and the salaries and wages in other occupations are held constant, more workers would want to become paralegals:

- Labor supply of paralegals will be upward-sloping — see Figure 2.9
- The quantity of labor supply will be positively related to the wage rate, holding other wages constant.

Other factors such as changes in the wage rate of insurance agents, but the wage rate ($W$) of paralegals is unchanged, the $LS$ curve of paralegals will shift to the left — see Figure 2.10.
Supply to Firms
We assume that the labor market for paralegals is perfectly competitive, and that no firm will offer a wage that is above or below what the market wage indicates – firms are wage takers: Labor supply curves of paralegals to a firm are horizontal – see Figure 2.11. At the on-going wage of W₀, employers can hire all the paralegals they need and each employer faces S₀ supply curve. If the paralegal wage falls from W₀ to W₁, employers can still hire as much as they want at the lower wage, and each firm’s or employer’s labor supply curve becomes S₁ with the same slope as the supply curve S₀. Note that a fall in the wage rate of paralegal does not mean withdrawals from the paralegal profession into the insurance agent market because they are not perfect substitutes.

The Determination of the Wage
The wage rate that prevails in the labor market depends on LD and LS, regardless of whether labor unions and/or nonmarket factors are involved – see Figure 2.12.

The Market-Clearing Wage
The wage rate (Wₑ) at which LD equals LS is the market-clearing wage – that is, no labor surplus and/or no labor shortage.
- For any wage (W₁) lower than Wₑ: LD > LS → EDL, and with adjustments from employers/demanders, wage rises to Wₑ.
- For any wage (W₂) higher than Wₑ: LD < LS → ESL, and with adjustments from workers/suppliers, wage falls to Wₑ.
- We becomes the going wage that individual employers and employees face – see Figures 2.12 and 2.13.

Disturbing the Equilibrium
Changes in labor demand or changes in labor supply or the simultaneous changes in labor demand and supply will change the equilibrium wage (Wₑ) and employment (L): – If LD shifts to the right, We rises to Wₑ* – see Figure 2.14.
- If LS shifts to the left, We rises to Wₑ” – see Figure 2.15.
If the LS curve shifts to the right – see Figure 2.16 – or the LD curve shifts to the left, market wage will fall from We to Wₑ’. If LS shifts to the left and this is accompanied by a rightward shift in LD, market wage will rise dramatically with net employment increase – see question # 1 under Review Questions.

Who Is Underpaid and Who Is Overpaid?
The concepts of underpayment and overpayment have to do with the social issue of producing goods and services in the least-costly way, hence the comparison of overpayment and underpayment with market-clearing wage.
Above-Market Wages
Workers whose wages are higher than the market-clearing wage are considered to be overpaid—two implications: Employers are paying more than necessary to produce their output: (WH > We). More workers want jobs than they can find: Y > V → ESL—see Figure 2.17. Wage reduction close to the level dictated by the market would be Pareto improving.

Below-Market Wages
Employees whose wages are below market-clearing levels are considered to be underpaid: At below-market wages, employers face labor shortages due to Wl < We—see Figure 2.18.

- If workers are made to work at WL wage, it will be difficult for employers to find and keep workers, and those who remain will be dissatisfied and resentful; therefore, production of goods and services will be affected—see Example 2.2.
- If wages were to increase close the market-clearing level (We), more workers will be attracted to the market and output would rise as employment would increase from V to X.

Economic Rents
With respect to the labor market, economic rents can be defined as the difference between the wage workers are actually paid on a job and the workers’ reservation wages. Economic rents sum the area between the market-clearing wage and the labor supply curve—see Figure 2.19. The labor supply curve of any occupation or industry is a schedule of reservation wages that indicates the labor forthcoming at each wage level—each worker potentially has a different reservation wage, hence rents will differ for each. The reservation wage of a worker is the wage below which the worker would refuse (or quit) the job in question. It is the opportunity cost to the individual worker for giving up hours of leisure for market work.

Unemployment and Responses to Technological Change Across Countries
The strength of nonmarket forces: government programs, laws, customs or institutions (labor unions) varies across countries. Theoretically, if wages are held above the market-clearing levels, there will be excess supply of labor (ESL or unemployment), and this ESL or unemployment would worsen if the labor demand curve shifts to the left. Nonmarket forces, which can prolong the duration of unemployment, are probably much stronger in most of Europe than in North America. Unemployment rates are much higher in most European countries because of their generous unemployment compensation programs and laws (severance pay).

CHAPTER 3
THE DEMAND FOR LABOR

Profit Maximization
For products price-taking and inputs price-taking firm, profit maximizing decisions by a firm mainly involve the question of whether, and how, to increase or decrease output. The search for profit improving possibilities means that small (―marginal‖) changes must be made almost daily:

- Major decisions to open a new plant or introduce a new product line are relatively rare, once made. Must approach profit maximization incrementally through the trial-and-error process of small changes. Incrementally decide on its optimal level of output by:
  - Q ↑ when MR > MC
  - Q ↓ when MR < MC, and that
  - Q is profit maximizing or loss minimizing when MR = MC.

A firm can expand or contract output only by altering its use of inputs (capital and labor).

- Use more of an input if its MRP (additional income) > MEI (additional expense).
- Reduce the employment of an input if its MRP < MEI.
- No further changes in an input are desirable if its MRP = MEI.

Marginal Income from an Additional Unit of Input
We assume that labor (L) and capital (K) are needed to produce a given level of output (Q). That is:

\[ Q = f(L, K) \]

Marginal Product
Marginal product of labor: MPL = \( \frac{\Delta Q}{\Delta L} \) | constant (3.1)
Marginal product of capital: MPK = \( \frac{\Delta Q}{\Delta K} \) | constant (3.2)

Marginal Revenue
Recall that:

- In perfectly or purely competitive product market: MR = AR = P
- In imperfectly or impurely competitive product market: MR < AR = P

Marginal Revenue Product
Marginal revenue product of L: MRPL = MPL . MR (3.3a)
Marginal revenue product of K: MRPK = MPK . MR (3.3b)

Marginal Expense of an Added Input
\( \Delta L \) and/or \( \Delta K \) will add to or subtract from the firm’s total costs. Marginal expense of labor (MEI) is the change in total labor cost for each additional unit of labor hired. If the labor market is competitive, each worker hired is paid the same wage (W) as all other workers, hence: MEI = W → horizontal supply curve. If the capital market is competitive, each additional unit of capital will have the same rental cost (C), hence: MEK = C.

The Short-Run Demand for Labor When Both Product and Labor Markets Are Competitive
In the short-run, the firm cannot vary its stock of capital, therefore, the production function takes the form:

\[ Q = f(L, K) \]

This means the firm needs only to decide whether to alter its output level; how to increase or decrease output is not an issue, because only the employment of labor (L) can be adjusted—see Table 3.1
When both product and labor markets are competitive, it is assumed that:
- All producers or sellers are price takers in the product market.
- All employers of labor are wage takers in the labor market.

Analysis of a firm’s production and employment is in the short run where the firm cannot vary its capital stock. With short production, only the employment of labor can be adjusted.

A Critical Assumption: Declining MPL
Since K is constant in the short-run, adding extra unit of L increases output in each case – MPL is positive to some point. Eventually, adding more L will produce progressively smaller increments of output – law of diminishing marginal returns. This means that as employment expands, each additional worker has a progressively smaller share of the capital stock to work with.

From Profit Maximization to Labor Demand
Profits are maximized only when employment is such that any further one-unit change in labor would have a marginal revenue product equal to marginal expense:

\[ MRPL = MEL \]  
\[ MPL \cdot P = W \]  
\[ MPL = W/P \]

Labor Demand in Terms of Real Wages
Labor demand can be analyzed in terms of either real or money wages. The negative slope of the labor demand curve indicates that each additional unit of labor employed produces a progressively smaller increment in output. At any real wage determined by the market, the firm should employ labor up to the point at which MPL equals the real wage (W/P) – the firm’s demand for labor in the short-run is equivalent to the downward-sloping segment of its MPL schedule:

- At E0 employment level: MPL = W/P → profit maximizing level of employment.
- At E1 employment level: MPL > W/P → employment level E1 is less than E0; firm could increase profit by adding L.
- At E2 employment level: MPL < W/P → employment level E2 is greater than E0; firm could increase profit by decreasing L.

Figure 3.1 Demand for Labor in the Short Run (Real Wage)

Labor Demand in Terms of Money Wages
In some circumstances, labor demand curves are more readily conceptualized as downward-sloping functions of money wages. MRPL does not decline because added workers are inconstant, it declines because capital stock is fixed, hence added workers have less capital or equipment to work with. The fundamental point is: the labor demand curve in the short-run slopes downward because it is the MRPL curve, which slopes downward because of labor’s diminishing marginal product. Since MRPL = W for a profit maximizer who takes wages as given, the MRPL curve and labor demand curve (MPL) must be the same. The marginal product of an individual is not a function solely of his or her personal characteristics:
- It depends on the number of similar employees hired by the firm and the firm’s capital stock.

\[ P = W/MPL \]  
\[ P = C/MPK \]  
\[ W/MPL = C/MPK \]

Money Demand Curves
A market demand curve (or schedule) is the summation of the labor demanded by all firms in a particular labor market at each level of the real wage. When real wage changes (falls or increases), the number of workers that existing firms want to employ changes (increases or falls) Objections to the Marginal Productivity Theory of Demand Employers do not go around verbalizing MRPL – it is a theoretical concept, which assumes a degree of sophistication that most employers do not have. With fixed capital stock, it seems that adding labor would not add to output at all – but workers take their turns in using the fixed capital stock such that labor will generally have a marginal product greater than zero

The Demand for Labor in Competitive Markets When Other Inputs Can be Varied

Labor Demand in the Long Run
In long-run, the firm’s ability to adjust other inputs such as capital will affect the demand for labor. To maximize profits in the long-run, the firm must adjust L and K such that each input’s MRP is equal to its ME

\[ MPL \cdot P = W \] (a restatement of equation 3.5) \[ MPK \cdot P = C \] (the profit maximizing condition for K)

Rearranging equations (3.7a) and (3.7b) yields:

\[ P = W/MPL \]  
\[ P = C/MPK \]  
\[ W/MPL = C/MPK \]

\[ W \]
\[ MP_L^* \]  
\[ MP_K^* \]

\[ MP_L^* \] is the added cost or marginal cost of producing an added unit of output when using labor to generate the increase in output

\[ C \]
\[ MP_L^* \]

\[ C \]
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Muhammad Firman (University of Indonesia - Accounting)

Muhammad Firman

Payroll taxes are used to finance government programs such as:
- Unemployment insurance
- Social Security retirement
- Disability
- Medicare/Medicaid

More Than Two Inputs
Capital and labor are not the only inputs used in the production process. Labor can be subdivided into many categories—by age, educational level, and occupation. Other inputs in the production process include materials and energy. For all other inputs, the equality of MC in using these inputs to produce an added unit of output as given by equation (3.8c) applies.

If Inputs Are Substitute in Production
If two inputs are substitutes in production, and if an increase in the price of one input shifts the demand for another input to the left as in panel (a) of Figure 3.3, then the scale effect dominates the substitution effect—inputs are gross complements. If the increase in the price of one input shifts the demand for the other input to the right as indicated in panel (b) of Figure 3.3, then the substitution effect dominates—inputs are gross substitutes.

If Inputs Are Complements in Production
When two inputs must be used together in some proportion, they are considered to be perfect complements or complements in production—that is, no substitution effect, only scale effect.

Monopoly producers are price-makers in the product market but wage-takers in the labor market. They use MRPL = MEL to determine the profit-maximizing level of employment.

Maximizing Monopoly Profits
To maximize monopoly profits, a monopolist will hire until:

\[ \text{MRPL} = \text{MR} \cdot \text{MPL} = W \]  

(3.9)

Dividing both sides by P (recall that P > MR) yields:

\[ \frac{\text{MR}}{P} \cdot \frac{\text{MPL}}{P} = \frac{W}{P} \]  

(3.10)

Do Monopolies Pay Higher Wages?
Economists suspect that product-market monopolies pay wages that are higher than what a competitive firms would pay and pass the costs along to consumers in the form of higher prices. The ability to pass higher wages makes it possible for managers to hire people who might be more attractive or personable or have other characteristics managers find desirable.

Policy Application: The Labor Market Effects of Employer Payroll Taxes and Wage Subsidies
Governments finance certain social programs through taxes—payroll taxes—that require employers to remit payments based on their total payroll costs.

Who Bears the Burden of a Payroll Tax?
Payroll taxes are used to finance government programs such as:
- Unemployment insurance
- Social Security retirement
- Disability
- Medicare/Medicaid

Shifting the Demand Curve
Payroll taxes will shift the labor demand curve to the left. Employers will decrease their employment of workers if their wage costs (wage bill) increase by the tax amount of X (that is, W + X) due to payroll tax. Employers will retain the same amount of workers as before the payroll tax was imposed if the entire tax burden is passed onto the workers, that is, workers’ wages fall by the tax amount of X (hence, W – X). Employees bear a burden in the form of lower wage rates and lower employment levels when the government chooses to generate revenues through a payroll tax on employers.

Effects of Labor Supply Curves
If the labor supply curve were vertical—meaning that lower or higher wages have no effect on labor supply—the entire amount of the tax will be shifted to workers in the form of a decrease in their wages by the amount of X (hence W – X). The incidence of tax burden on employers and employees depends on the responsiveness (elasticities) of labor demand and labor supply to changes in wages. If wages do not fall due to an employer payroll-tax increase, employment levels will, and employer labor costs will increase, thus reducing the quantity of labor demanded.
Q = f (L, K)

The Slope of the Isoquant
Along any isoquant, K can be decreased for much larger increase in L, but Q will remain unchanged. That is, labor could be substituted for capital to maintain a given level of production (ΔQ = 0):

\[
\frac{\Delta K}{MP_K} + \frac{\Delta L}{MP_L} = 0 = -\frac{\Delta K}{L} \frac{\Delta Q}{\Delta K} + \frac{\Delta L}{L} \frac{\Delta Q}{\Delta L}
\]

\[
\Delta K \frac{MP_K}{MP_L} = \Delta L \frac{MP_L}{MP_K}
\]

Demand for Labor in the Short Run
Earlier in the Chapter, we assumed that capital is fixed in the short-run hence and that labor is hired until labor’s MPL = W/P

Q = f (L,K)

Holding constant capital at Ka, the firm can produce: Q = 100 by employing La workers

Q = 150 by employing La’ workers

Q = 200 by employing La” workers

The extra labor (La” – La’) required to produce 50 units of added output is greater than the extra labor (La’ – La) that produced the first 50-unit increment – see Figure 3A.2. The assumptions that MPL declines as employment is increased and that firmshire until MPL = W/P are the bases for the assertion that a firm’s short-run demandcurve for labor slopes downward.

The Substitution Effect
Isoexpenditure line BB’ shows the cost minimizing point in producing Q* where the wage rate is $10 and the rental cost of capital is $20, which remained constant when the wage rate increased to $20 (doubled). ↑W to $20 rotates the isoexpenditure line BB’ inward to BB” and it is no longer tangent to isoquant Q*, that is, Q* can no longer be produced for $1,500. It is assumed that the least-cost expenditure to produce Q* increases to $2,250 and EE’ is the new isoexpenditure line. The increased labor cost will induce the firm to substitute capital for labor – see point Z’ in Figure 3A.4. The reduction in employment from LZ to LZ” is the substitution effect generated by the wage increase.

The Scale Effect
Suppose that the profit-maximizing level of output falls from Q* to Q** and that all isoexpenditure lines have a new slope of 1 when W = $20 and C = $20 – see Figure 3A.5. The cost-minimizing way to produce Q** is at Z’ where the isoexpenditure line FF’ is tangent to the Q** isoquant. The overall response in employment of labor due to the increase in the wage rate is the fall in labor usage from LZ to LZ”. Recall that the decline from LZ to LZ” is known as the substitution effect due to a wage change. The scale effect is the reduction in employment from LZ” to LZ” – reduction in the usage of both K (at KZ”– not shown) and L (at LZ”) because of the reduced scale of production.
The Own-Wage Elasticity of Demand

The own-wage elasticity of demand for a category of labor is defined as the percentage change in its employment (E) induced by a 1 percent increase in its wage rate (W):

1. \( \eta_{i} \) is relatively elastic labor demand if the % \( \Delta E_i > \% \Delta W_i \)
2. \( \eta_{i} \) is relatively inelastic labor demand if the % \( \Delta E_i < \% \Delta W_i \)
3. \( \eta_{i} \) is unitary elastic labor demand if the % \( \Delta E_i = \% \Delta W_i \)
4. \( \eta_{i} \) is perfectly elastic labor demand if the % \( \Delta E_i \) is infinite for no % \( \Delta W_i \)
5. \( \eta_{i} \) is perfectly inelastic labor demand if the % \( \Delta E_i \) is zero for positive or negative changes in the wage rate (no \% \( \Delta W_i \))

Figure 4.1 Relative Demand Elasticities

![Graph showing different elasticities along a demand curve]

The Hicks-Marshall Laws of Derived Demand

These laws assert that, other things equal, the own-wage elasticity of demand for a category of labor is generally higher under the following conditions:

1. When price elasticity of demand for the product being produced is higher.
2. When other factors of production can be more easily substituted for the category of labor.
3. When the supply of other factors of production is more highly elastic.
4. When the cost of employing the category of labor is a larger share of the total costs of production.

Demand for the Final Product

The greater the price elasticity of demand for the final product, the larger the percentage decline in output (and the greater percentage loss in employment) associated with a given price increase - the greater the elasticity of demand for the product, the greater the elasticity of demand for labor. The implication is that wage elasticities will be higher in the long run than in the short run.

Substitutability of Other Factors

When substitution possibilities exist, a reduction in employment will accompany whatever reductions are caused by the scale effect – the easier it is to substitute other factors of production, the greater the wage elasticity of labor demand.

The Supply of Other Factors

If an increase in the wages of unskilled workers caused employers to attempt to substitute skilled employees for unskilled employees, the wages of the skilled workers (fixed number) would be bid up by employers. If the price of other inputs did not increase when employers attempted to increase their use, the substitution effect – the wage elasticity of labor demand – would be larger.

The Share of Labor in Total Costs

The share of labor cost (TCL = wL) in total costs of production \( TC(Q) = rK + wL \) or \( cK + wL \) is expressed as:

\[
\frac{rK + wL}{W}
\]

thus, the greater the category’s share in total costs, the greater the wage elasticity of demand.

Estimates of Own-Wage Labor Demand Elasticities

Employers’ labor demand responses to a wage change can be broken down into two components which can be expressed in elasticities:

- Scale effect
- Substitution effect

The short-run scale effect (elasticity) is defined as:

\[
\eta_e = \frac{\% \Delta E_i}{\% \Delta W_i} \text{ holding production technology constant}
\]

The substitution effect (elasticity) is defined as:

\[
\eta_s = \frac{\% \Delta E_i}{\% \Delta W_i} \text{ holding output constant}
\]

Table 4.1 Components of the Own-Wage Elasticity of Demand for Labor: Empirical Estimates Using Plant-Level Data

<table>
<thead>
<tr>
<th></th>
<th>Estimated Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-Run Scale</td>
<td>-0.5</td>
</tr>
<tr>
<td>Substitution</td>
<td>-0.45</td>
</tr>
</tbody>
</table>

Applying the Laws of Derived Demand: Inferential Analysis

Labor demand elasticities and wage gains are related, that is, the more elastic the demand for labor, the smaller the wage gain a union will succeed in winning for its members.

1. Unions would win larger wage gains for their members in markets with inelastic labor demand curves.
2. Unions would strive to take actions that reduce the wage elasticity of demand for their members’ services.
3. Unions might first seek to organize workers in markets in which labor demand curves are inelastic (because the gains from unionization are higher in these markets).

The Cross-Wage Elasticity of Demand

Can the Laws of Derived Demand Be Applied to Cross-Elasticities?
The Hicks-Marshall laws of derived demand that applied to $n_{ji}$ cannot be applied directly to $n_{ijk}$ because the substitution effect and the scale effect work in opposite direction.

The Scale Effect – The size of the scale effect will depend on $TCL/TCL(Q)$. The greater the price elasticity of product demand, the greater the scale effect (and thus the greater the likelihood of gross complementarity).

Estimates Relating to Cross-Elasticities

Knowing the sign of cross-wage labor demand elasticities is useful for answering many public-policy questions, that is, it is crucial to know whether two inputs are gross complements or gross substitutes in production.

The Substitution Effect – Are teenagers and adults substitutes or complements in production? If they are complements, the use of more teenagers will reinforce the scale effect and serve to unambiguously increase adult employment. If they are substitutes, more teenagers will be used, and the question becomes whether this substitution effect is large or small relative to the scale effect.

Empirical studies that paired together factors of production offer at least a few generalizations:

1. Labor and energy (materials) are clearly (probably) substituting in production, although their degree of substitutability is small.
2. Skilled and unskilled labor are substitutes in production.
3. Though uncertain whether skilled or unskilled L is substitute for or a complement with K, but it appears that skilled L is more likely to be complementary with K than is unskilled L.
4. Skilled L is more likely to be a gross complement with K.
5. If wages of both skilled and unskilled L were to rise by the same percentage, employment loss will be greater for unskilled.

Policy Application: Effects of Minimum Wage Laws

History and Description

The Fair Labor Standard Act (FLSA) of October, 1938 was the first major piece of protective legislation adopted at the national level in the United States. Provisions of the FLSA included:

- Minimum wage (Wmin), which initially was set at $0.25 per hour covered roughly 43% of all nonsupervisory wage and salary workers. By July, 2009, the Wmin was set at $7.25 per hour and it covered 90% of all nonsupervisory workers.
- Overtime-pay premium for workers who worked long workweeks.
- Restrictions on the use of child labor.

Figure 4.3 Federal Minimum Wage Relative to Wages in Manufacturing, 1938–2012

Employment Effects: Theoretical Analysis

The main concern about minimum wage (Wmin) legislation has been that it will reduce the employment of the targeted groups. Economic theory suggests that Wmin can be expected to reduce employment opportunities for the least skilled or least experienced workers, more so, if the labor demand curve for this group is relatively elastic, that is:

\[
\% \Delta E_i > \% \Delta w_i \]

aggregate earnings of low-wage workers could be made smaller by an increase in Wmin.

Nominal versus Real Wages

Wmin levels are set in nominal terms and adjusted by the US Congress only sporadically. Higher price levels tend to lower the real Wmin. Regional differences in prices or wages affect the real Wmin. For example, real Wmin|Mississippi > real Wmin|Alaska where wages and prices are very high, therefore, we expect its impact will be most adverse in regions with the lowest costs of living. Many states have their own Wmin laws with many having minimums that exceed the federal minimum wage.

Holding Other Things Constant

Predictions of job loss associated with higher Wmin are made holding other things constant. If there are no changes in labor demand and Wmin, and that W0 and P0 changed by the same magnitude from year 0 to year 1, then:

- \( W_0/P_0 = W_1/P_1 \)
- No change in employment in both periods.

Assume that in year 1, two things happened:

(a) Wmin is raised to W2 such that W2/P1 > W1/P1 = W0/P0.
(b) economic expansion led to an increase in demand for low-skilled labor/workers, which shifts labor demand to the right with an increase in employment.

The increase in employment due to economic expansion led some investigators to conclude that Wmin increases had no adverse employment effects. In a growing economy, the expected effect of a one-time increase in the minimum wage is to reduce the rate of growth of employment – see Figure 4.4.4.

Figure 4.4 Minimum Wage Effects: Growing Demand Obscures Job Loss

If Wmin had not been raised, the level of employment that would have prevailed due to economic expansion would have been at E1H – greater than E1. Loss in employment due to Wmin is: E1H – E1.

Effects of Uncovered Sectors

The minimum wage has covered many sectors over the years but the laws still do not apply to some nonsupervisory workers: Those in small firms in the retail trade and service industries are exempted. With million of employers and limited resources for governmental enforcement, noncompliance with the law may be widespread, creating another kind of noncoverage. The existence of uncovered sectors significantly affects how the overall employment of low-wage workers will respond to an increase in the Wmin – see Figure 4.5.

Figure 4.5 Minimum Wage Effects: Incomplete Coverage Causes Employment Shifts

Intersectoral Shifts in Product Demand

To examine or highlight the effects of an increase in Wmin, we compare the convenient stores (CSs) who sell items that supermarkets (SMs) also carry. Assume that:

(a) there is an increase in Wmin in both stores,
(b) both carry and sell same items, and
(c) due to Wmin paid to low-skilled workers in both stores (CSs and SMs), we observe:
Employment Effects: Empirical Estimates
The initial effects of Wmin were observed when it was newly established in late 1938, but the effects of more recent increases in Wmin are not easily observable. Studies of the targeted group – teenagers – have not arrived at any general consensus about the negative impact of Wmin.

Does the Minimum Wage Fight Poverty?
Studies found that many who live in poverty are not affected by Wmin, either because they are not employed (that is, they cannot find jobs at the Wmin) or because their W > Wmin. Studies found that many of those most affected by Wmin are teenagers, who may not reside in poor families.

"Living Wage" Laws
Roughly 100 cities, counties, and school districts have adopted — living wage] laws or ordinances, which impose a wage floor higher than the federal or state Wmin on employers who do business or receive benefits from the city and/or local government. Living wage levels are set relative to the federal poverty guidelines:

- $17,170 for a family of three.
- $20,650 for a family of four.
- $8.00 to $12.00 per hour.

Benefits are reduced in cases where companies affected by the ordinance may have to relocate to other cities with no such laws/ordinances.

Applying Concepts of Labor Demand Elasticity to the Issue of Technological Change
There are two aspects of technological change – product innovation and process innovation – that can affect both the product demand and labor demand curves.

Product Demand Shifts
Technological change by way of product innovation entails the introduction of new product – e.g. USB is now a substitute for CD-ROM.

Technological change (product innovation) will necessitate some painful changes in established industries, as workers, unions, and employers must all adjust to a new environment.

Capital-Labor Substitution
Technological change (process innovation) – is often associated with automation – can be viewed as reducing the cost of capital and hence a decrease in its price as well as in the use of labor. Note that if ηjk > 0, inputs j and k are gross substitutes, and that technological change via automation will reduce the demand for unskilled labor. If ηjk < 0, inputs j and k are gross complements, therefore, technological change via automation will increase the demand for skilled labor.

Overall Effects of Technological Change
Technological innovations – process and product – affect the demand for labor through both scale and substitution effects. Technological change imposes cost on some workers – those who face decreased demand for their services and must bear the costs (wage loss, temporary unemployment, or the need in investing in learning new skills) of changing jobs. Technological change increases society’s production and consumption possibilities – see Figure 4.6.

Figure 4.6 The Production Possibilities for a Hypothetical Society

Line XY shows society’s PPC with production and consumption at point A in the absence of any technological change. If the new technological invention favors the production of clothing, the PPC shifts from XY to ZY.

With the new technological change, production and consumption could be at point B or at point C or society many choose any point between B and C.

Empirical Study Estimating the Labor Demand Curve: Time Series Data and Coping with —Simultaneity
Estimating the elasticity of demand for labor is actually very difficult.
1. If we have data on wages and employment of workers who are homogeneous in many characteristics, this homogeneity often requires analyzing groups so narrow that data are difficult to obtain.

2. Wand E are determined simultaneously by the interaction of supply and demand curves.

Estimating the Labor Demand Curve: Time Series Data and Coping with —Simultaneity

CHAPTER 5
FRICCTIONS IN THE LABOR MARKET

Frictions on the Employee Side of the Market
The Law of One Price (LOP)
Workers who are of equal skills within occupations will receive the same wage – there will be no wage differentials.

Assumptions underlying the LOP:

- Every employee has information about available jobs – information is costless.
- Mobility or job search across employers is costless.
- Labor supply curve is horizontal.

Mobility or job search across employers is NOT costless. Job search takes time and effort. Costs of job search include:

(a) application – printing resumes and postage
(b) interview – buying expensive clothes for interview
(c) travel – hiring movers if employed
(d) psychological costs – missing friends and family members.

Costs of job search/mobility make the supply curve to be upward sloping and not horizontal as assumed earlier.

Figure 5.1 The Supply of Labor to Firm A: Worker-Mobility Costs Increase the Slope of the Labor Supply Curve Facing Individual Employers
Monopsonistic Labor Markets: A Definition
A labor market monopsonist is the only buyer/employer of labor in its labor market. The employer faces an upward labor supply curve but its MEL (or MCL) is much higher than the wage rate.

Profit Maximization under Monopsonistic Conditions
Recall that:
- profit-maximizing firms will hire as long as MRPL > MEL
- hiring stops when MRPL = MEL
- when firms face upward sloping supply curves, the MEL exceeds the wage.

Why the Marginal Expense of Labor Exceeds the Wage Rate
The marginal expense of labor (MEL) exceeds the wage rate because potential employees find it costly to change jobs, so the firm must be willing to pay higher wages to attract workers from other employers, the MEL includes to the wages paid to the extra worker plus the additional cost of raising the wage for all other workers.

Table 5.1

<table>
<thead>
<tr>
<th>Offered Wage ($)</th>
<th>Supply of Labor</th>
<th>Total Hourly Cost ($)</th>
<th>Marginal Expense of Labor ($)</th>
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<td>13</td>
<td>143</td>
<td>23</td>
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</tbody>
</table>

Figure 5.2 A Graph of the Firm-Level Data in Table 5.1

The Firm’s Choice of Wage and Employment Levels
The monopsonist hires workers up to the point where:

\[ \text{MRPL} = \text{MEL} \]  

The labor market effects caused by MEL > W: A labor market monopsonist hires less workers in comparison to the competitive employer(s). A labor market monopsonist pays a wage that is less than the competitive wage – exploits workers.

Monopsonistic Conditions and Firms’ Wage Policies
The employers in monopsonistic labor markets must decide on the wage to pay unlike in the perfectly competitive labor markets where firms are wage takers. Firms must make labor market decisions that allow them to remain competitive in their product markets. Product and labor market constraints may cause firms in monopsonistic labor markets to offer different wages to equivalent workers. Due to the unlikelihood that SL and MRPL curves would be exactly the same for different firms in the same labor market, it should be no surprise if exactly comparable workers have different marginal productivities and receive different wages at different firms.

How Do Monopsonistic Firms Respond to Shifts in the Supply Curve?
The labor market monopsonistic firm does not really have a labor demand curve – it has MRPL curve. The monopsonistic firm is not a wage taker and its MRPL curve shows various levels of employment of which there is only one profit-maximizing level of employment and only one associated wage rate.

Shifts in Labor Supply Curve That Increase MEL
If fewer workers are willing to work and the labor supply shifts to the left, the short-run effects are:
- employment level (E) will fall to E’ and the market wage (W) will increase to W’
- MEL will also shift to a higher level (ME’L).

Figure 5.4 The Monopsonistic Firm’s Short-Run Response to a Leftward Shift in Labor Supply: Employment Falls and Wage Increases

In the long run, the monopsonistic firm’s cost minimizing mix of capital (K) and labor (L) would require:

\[ \frac{MP_L}{MP_K} = \frac{C}{\text{ME}_L} \]  

Effects of a Mandated Wage
A mandated wage (Wm) prevents a firm from paying a wage less than Wm – this creates a perfectly elastic labor supply curve facing the firm, thus
altering its MEL curve. A profit-maximizing firm will hire labor where the MRPL inserts the perfectly elastic labor supply curve (MEL curve) created by Wm – see employment at Em in Figure 5.5. For a monopsonistic firm, Wm can simultaneously increase the average cost of labor and reduce MEL – the decrease in marginal expense will induce the firm to expand output and employment in the short run.

Figure 5.5 Minimum-Wage Effects under Monopsonistic Conditions: Both Wages and Employment Can Increase in the Short Run

Monopsonistic Conditions and the Employment Response to Minimum Wage Legislation
- Legislated increases in Wmin raise wages.
- Modest increase in Wmin can reduce MEL.
- Fall in MEL may cause some firms/employers to experience increases in employment.
- Higher total labor costs due to Wmin may force some firms/employers to close.

Job Search Costs and Other Labor Market Outcomes
Despite the job search costs, some workers' high wage levels may be due to luck – they are lucky to be employed by a high-paying/high-productivity employer. Job mobility/search costs for workers may explain why:
- Wages increase or improve over time with workers' labor market experience or activity.
- Wages increase with workers' length of time (tenure) with their particular employers.

Wage Levels, Luck, and Search
Employee mobility costs can create, other things equal, monopsonistic conditions that result in pay differences among workers who have equal productive capabilities. The implication is that to some extent, a worker’s wage depends on luck – some workers will be lucky to obtain a job offer from high-paying employer. Workers who see their jobs as a poor match (due to low pay) have more incentive to search for other offers than the lucky ones who have good matches with high wages.

Labor-market studies have observed that workers' wages tend to increase both with
(1) overall labor market experience, and
(2) holding labor market experience constant, the length of time with one's employer (“job tenure”).

Wage and Labor Market Experience
Workers who have spent more time in the labor market have had more chances to acquire better offers and thus improve upon their initial job matches – that is, workers' wages improve the longer they are active in the labor market.

Wages and Job Tenure
With costly job searches, workers who are fortunate enough to find jobs with highpaying employers will have little incentive to continue searching. Those who have longer job tenure with their employers also tend to have higher wages.

Job Search Costs and Unemployment
Job search costs can help to explain the existence (and level) of unemployment – the longer it takes for a worker to receive an acceptable offer, the longer the unemployed worker will remain unemployed.

The competitive model may offer predictions that are at least partially contradicted by evidence but it does not mean that it is irrelevant, especially in the long run. The major difference between the competitive and monopsonistic models is the assumption about employee mobility costs.

Frictions on the Employer Side of the Market
Categories of Quasi-Fixed Costs
The frictions on the employer side of the market cause firms to bear “quasi-fixed costs” that are difficult to cut in the short run. Quasi-fixed costs fall into two categories: investments in their workforce and certain employee benefits.

Labor Investments
(1) Costs of hiring replacements such as advertising the position, screening, interviewing, “wine and dine”, and terminating – severance pay,

(2) Costs of formal or informal training – firms incur explicit and implicit costs of training employees.

Table 5.2 The Marginal Product of Labor in a Hypothetical Car Dealership (Capital Held Constant)

Employee Benefits
Workers also receive other fringe benefits in addition to their wage and salary earnings. These other benefits fall under the following categories:
(1) legally required payments such as social security, workers' compensation, and unemployment insurance
(2) retirement – defined benefit plans depend on years of service years, and defined contribution plans
(3) insurance – medical and life
(4) Paid vacations, holidays, and sick leave
(5) Others

See Table 5.3, p.149 for these categories.

Table 5.3

The Employment/Hours Trade-Off
The fact that certain labor costs (quasi-fixed costs) are not hours-related, while others are, will lead employers to think of "workers" and "hours-per-worker" as two substitutable inputs in the production process, therefore, L is divided into:
(a) Number of "workers" hired – denoted as M
(b) "Hours-per-worker" on the average – denoted as H.

Then, let:

\[ \text{MPH} = \Delta Q / \Delta H | K \text{ constant} \rightarrow \text{added output associated with each added worker.} \]

MPH = \Delta Q / \Delta H | K \text{ and M constant} \rightarrow \text{added output generated by increasing average hours per worker.}

Determining the Mix of Workers and Hours
Using the profit-maximizing level of employment:

\[ \frac{\Delta Q}{\Delta M} = \frac{\Delta M}{\Delta L} | K \text{ and M constant} \rightarrow \text{added output associated with each added worker.} \]

MPH = \Delta Q / \Delta H | K \text{ and M constant} \rightarrow \text{added output generated by increasing average hours per worker.}

Figure 5.6 The Predicted Relationship between MEM /MEH and Overtime Hours

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Policy Analysis: The Overtime Pay Premium

The Fair Labor Standards Act requires that employees covered by the act (hourly paid, nonsupervisory workers) receive an overtime pay premium of at least 50 percent of their regular hourly wages for each hour worked in excess of 40 hours per week. Employers who regularly schedule overtime do so because it is cheaper than incurring the quasi-fixed costs of employing more workers. In fall 2004, the U.S. Department of Labor introduced several controversial revisions to federal overtime regulations that redefined which jobs are exempt from coverage.

Overtime and Spreading the Work

The time-and-one-half requirement for overtime protects workers by “spreading the work” (creating more job openings) through reduced usage of overtime. If firms eliminate overtime and hire more workers at the same base wage rate, their labor costs will clearly rise, thus reducing the scale of output and increasing firms’ incentive to substitute K for L. Even if base wages are not changed, it is unlikely that all the reduced overtime hours will be replaced by hiring more workers.

Overtime and Total Pay

Many overtime hours are regularly scheduled with the possible mutual agreement between the employees and employers on a “package” of weekly hours and total compensation. Employers could respond to a legislated increase in coverage by reducing the straighttime salary such that with the new overtime payments considered, total compensation per worker remained unchanged. A study of the effects of overtime premiums in the U.S. found evidence that base wages adjust to mandated changes and that the legislated expansions in overtime coverage have had no measurable effect on overtime hours worked.

Training Investments

Recall that employer-provided training is part of the quasi-fixed costs of hiring workers.

The Training Decision by Employers

Employers incur explicit and implicit training costs if the decision is to train a worker after hiring. During training, Cost-training > MRPL, therefore, training will be undertaken if the employer believes it can collect returns after training:

1. increased worker productivity (MRPL more than W),
2. reduced turn-over – employee stays longer with the firm.

The Types of Training

At the extreme, there are two types of training that employers can provide: general training and specific training.

General Training – Teaches workers skills that can be used to enhance their productivity with many employers – skills are easily transferable – thus paying for general training can be a risky investment for an employer.

Specific Training – Teaches workers skills that increase their productivity only with the employer providing the training – skills are firm-specific and not transferable – thus employers have stronger incentives to invest in specific training.

Training and Post-Training Wage Increases

The best way to provide incentives for on-the-job (OJT) is for employees and employers to share the costs and returns of the investment in training. If employees bear part of the training costs, post-training wage can be increased more than if employers bear all the training costs. Employers can recoup training costs by not raising the post-training wage too much – a point confirmed by empirical evidence. Increased post-training wage may protect employers’ investment by reducing the chances that the trained workers will quit.

Employer Training Investments and Recessional Layoffs

Employers will invest in OJT of its workers as long as:

MRPL [after training] > W [after training].

If due to a recession, MRPL [after training] is barely greater than W [after training], the employer will not layoff its trained employees, particularly, those workers with specific training and the longest job tenure. Employers cannot recoup training costs from laid-off workers/employees who obtained specific training. If MRPL [after training] < W [after training] and a recession is prolonged, employers may have no choice but to layoff workers because it is profitable to do so.

Hiring Investments

Firms bear the hiring and training costs of workers, thus, it is in their interests to reduce costs through effective evaluations when making hiring-placement-promotion decisions.

The Use of Credentials

Firms rely on credentials or signals to determine workers’ train ability (fast learners vs. slow learners) and potential MPL.

(a) Are college graduates (CG) more productive than high school graduates (HSG)?

(b) If yes, there is no need to waste valuable resources in interviewing and testing all candidates (CG and HSG) to find out their respective MPLs.

Firms use educational standard to screen applicants and such use of credentials to judge group characteristics can lead to statistical discrimination – with obvious costs.

Internal Labor Markets

Internal labor markets (ILM) exist or firms create them because they cannot ascertain workers’ personal attributes (dependability, motivation, honesty, and flexibility) based on interviews, employment tests, or even recommendations of former employers. Firms fill job vacancies with employees from within (ILM) because they know more about their current employees than those from outside – firms can make better decisions. Hiring within the ILM may not be economically efficient and cost effective, but it fosters workers’ attachment to the firms. Firms that invest heavily in specific training use ILM.

How Can the Employer Recoup Its Hiring Investments?

Firms/Employers can recoup their hiring investments by hiring only those employees whose productivity would be higher than the average productivity. Firms can recoup their hiring investments by paying a wage that is higher than the average wage but still less than the workers’ marginal productivity:


Paying W > Waverage, high mobility costs, and the fact information obtained about a worker by a particular employer may not be relevant across employers, the employee is more likely to remain longer with its employer.

Figure 5.7 Productivity and Wage Growth, First Two Years on Job, by Occupation and Initial Hours of Employer Training
Trends in Labor Force Participation and Hours of Work

Recall from Chapter 2 that:

\[ LFPR = \left( \frac{LF}{WAP} \right) \times 100 \]

Labor Force Participation Rates

Over the past ten decades, LFPRW has more than doubled while the LFPRM has decreased due to a host of factors. Similar trends have been observed in other advanced countries – Canada, France, Germany, Japan, and Sweden.

Hours of Work

Initially, American workers worked 55 hours per week, but that has declined to less than 40 hours per week.

Table 6.1

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Table 6.2

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Labor is the most abundant and important factor of production, therefore, a country’s economic performance depends on the willingness of its people to work. A person’s discretionary time (16 hours a day) can be spent:

(a) working for pay to derive income \( Y \) for consumption,
(b) on leisure \( L \).

Some Basic Concepts

Recall that the demand for good/service depends on:

(1) The opportunity cost of the good = market price
(2) One’s level of wealth
(3) One’s set of preferences

Opportunity Cost of Leisure - The demand for leisure depends on:

- the opportunity cost of leisure, which is equal to one’s wage rate or the extra earnings a worker can take home from an extra hour of work.

Wealth and Income – Wealth and income include:

(a) family’s holdings of bank accounts
(b) financial investments
(c) physical property or properties

The effects of increases in income and wages on leisure-work preferences of a person can be categorized as:

(1) Income effect
(2) Substitution effect

Defining the Income Effect

If income increases, holding wages constant, desired hours of work will go down – demand for leisure hours will increase while the hours of work supplied by a worker to the labor market decreases. That is:

\[ \text{Substitution Effect} = \frac{\Delta Y}{\Delta W} > 0 \]

Observing Income and Substitution Effects Separately

It is possible to observe situations or programs that create only one effect or the other – receiving an inheritance is an example of the income effect, which induces the person to consume more leisure, thus reducing the willingness to work.

Both Effects Occur When Wages Rise

The labor supply response to a simple wage increase will involve both an income effect and a substitution effect; and both effects working in opposite directions creates ambiguity in predicting the overall labor supply response in many cases. If the income effect is stronger, the person will respond to a wage increase by decreasing his or her labor supply – the labor supply curve will be negatively sloped – that is, as \( W \uparrow \rightarrow H \downarrow \). If the substitution effect dominates, the person’s labor supply curve will be positively sloped – that is, as \( W \uparrow \rightarrow H \uparrow \).

Analysis of the Labor/Leisure Choice

The theory of labor supply is easier to understand by using the concept of indifference curves and budget constraints.

Preferences

\[ U = f(Y, L) \]

where

- \( U \) is an index that measures the level of satisfaction or happiness,
- \( Y \) is income (wage) and \( L \) is leisure.

Higher \( U \) means higher levels of utility that will make a person happier.
Along the indifference curve: \[ \frac{\Delta Y}{\Delta L} \cdot MU_L + \frac{\Delta L}{\Delta Y} \cdot MU_Y = 0 \]

\[-\frac{\Delta Y}{\Delta L} = \frac{MU_Y}{MU_L} \quad \text{or} \quad \frac{\Delta Y}{\Delta L} = -\frac{MU_L}{MU_Y} = MRS_{Y,L} \]

Indifference curves show the various combinations of money income (or goods and services) and the hours of leisure/work per day that will yield the same level of happiness. Characteristics of the indifference curves:

1. Consumer preferences are usually northeast on the higher or highest indifference curve – see Figure 6.2.

2. Indifference curves do not intersect.

3. Indifference curves are negatively sloped – see Figure 6.3.

4. Indifference curves are convex – steeper at the left than at the right – when income is high, leisure hours are relatively few.

5. Moving down on the indifference curve reflects value – when income is low, leisure hours are abundant – see Figure 6.3.

6. Indifference curves differ among individuals because of the differences in tastes/preferences or values – see Figure 6.4.

Figure 6.2 Two Indifference Curves for the Same Person

Figure 6.3 An Indifference Curve

Figure 6.4 Indifference Curves for Two Different People

Income and Wage Constraints
Budget constraints show the combinations of money income (or attainable consumption goods and services) and the hours of leisure per day that are possible or attainable for the individual.

For simplification:

- Let \( V = \) nonlabor income (property income, inheritances, lottery winnings, dividends) – see line Dd in Figure 6.7
- \( H = \) number of hours allocated to the labor market

Figure 6.5 Indifference Curves and Budget Constraint

- \( w = \) hourly wage rate
- \( L = \) hours of leisure per day
- \( Y = \) total income defined as: \( Y = wH + V \)
- \( Y = wH \) (if nonlabor income is zero, that is \( V = 0 \))
- \( T = \) total discretionary time (16 hours) \( \rightarrow T = H + L \)

That is, \( Y = w(T - L) + V \)

\(-\frac{\Delta Y}{\Delta L} = \frac{MU_Y}{MU_L} = -\frac{w}{\Delta L} \)

\(\frac{\Delta Y}{\Delta H} = \frac{wL}{\Delta H} \)

Wage Rate = \( \frac{\Delta Y}{\Delta H} \)

Figure 6.6 The Decision Not to Work is a “Corner Solution”

The Income Effect
Property income, inheritances, lottery prizes, and dividends are nonlabor incomes that shift the budget constraint upward holding the wage rate (\( W \)) constant. An income effect would be observed if nonlabor income increased and the person supplied 0 hours of work to the labor market. The new source of income (holding the wage rate constant) can cause the worker to supply less hours of work per day and take more hours of leisure.
Income and Substitution Effects with a Wage Increase

If nonlabor income is zero or unchanged (that is, holding wealth constant) and the wage rate ($W↑$) increased, this would cause both an income effect and a substitution effect:

- If due to $W↑$, a worker increases his or her hours of work to the labor market, then the substitution effect is stronger than the income effect.
- If due to $W↑$, a worker reduces his or her hours of work to the labor market, then the income effect is stronger than the substitution effect.

The difference between the substitution effect and income effect of a wage increase lies solely in the shape of the indifference curves.

Isolating Income and Substitution Effects

Remember that any given wage increase ($W↑$) can raise a worker’s utility level (e.g. from $U1$ to $U2$) and thus induce:

- $H↑$ and $L↓$ → substitution effect.
- $H↓$ and $L↑$ → income effect.

The hypothetical question is: What would have been the change in labor supply if the worker reached a new (higher) indifference curve with a $ΔV$ instead of a $ΔW$?

A wage increase, with $V|constant$, raises the level of utility to $U2$ and induces more hours of work – from 8 to 11 hours per day. If the wage increase is, instead, replaced by an increase in nonlabor income ($V$), with $W|constant$, a higher level of utility is attained at point $N3$ on $U2$ with $H↓$ and $L↑$. With a wage change, the person is induced to work 11 hours per day at point $N2$ on utility level $U2$. Without the $ΔW$, and $U|constant$ at $U2$, the person would have chosen to work 7 hours per day at point $N3$.

Which Effect Is Stronger

The extent of the income effect and substitution effect of a wage increase depends on the slopes of the indifference curves and the new budget constraints. If the worker had a relatively flat set of indifference curves, the initial tangency might imply a relatively heavy work schedule. If the person had more steeply sloped indifference curves, the initial tangency might imply that hours at work are fewer. Other things equal, people who are working longer hours will exhibit greater income effects when wage rates change.

For someone depicted by the indifference curve $A'$ and the budget line $DE$ in Figure 6.6, he/she was initially out of the labor force, and his/her utility was maximized at point $D$ same as point $C$ given constraint $CD$ in Figure 6.11. A wage increase (see Figure 6.6 and Figure 6.11) can induce two outcomes: The person will either begin to work for pay or remain out of the labor force. Reducing the hours of paid employment is not possible.

A dominant substitution effect will occur:

- If a wage increase induces the decision to participate.
- If a wage fall causes someone to drop out of the labor force.

The labor force participation decisions brought about by wage changes exhibit a dominant substitution effect.

Isolating Income and Substitution Effects

Figure 6.8 Wage Increase with Substitution Effect Dominating

Figure 6.9 Wage Increase with Income Effect Dominating

Figure 6.10 Wage Increase with Substitution Effect Dominating: Isolating Income and Substitution Effects

Figure 6.11 The Size of the Income Effect Is Affected by the Initial Hours of Work
A $W^\uparrow$ changes the budget line CD to CE. With flatter U curves, the point of tangency will occur at point A with H↑ and L↓. With steeper U curves, the point of tangency will occur at point B with less H and more L. Note that a person at point C is not in the labor force because the wage (WCD) – slope of line CD – may be lower than what will induce labor market participation.

The Reservation Wage
A worker takes into consideration some key factors in determining whether or not to work in the labor market:
- Reservation wage and the earning possibilities.
- Commute time per day (fixed costs of working)

A reservation wage (WR) is the wage below which a person will not work in the labor market – that is, WR represents the value placed on an hour of lost leisure time. Often, people are thought to behave as if they have both a reservation wage and a certain number of work hours that must be offered before the consideration to take a job.

Figure 6.12 Reservation Wage with Fixed Time Costs of Working

Empirical Findings on the Income and Substitution Effects
Labor supply theory suggests that the choices workers make with respect to the desired hours of work depends on:
- Wealth
- Wage rate
- Leisure-income preferences

A comprehensive review of numerous studies of the labor supply of men finds that the sizes of the estimated effects vary with both data and the statistical methodology used. Overall, the observed substitution effects are positive while the observed income effects are negative. Studies of the labor supply behavior of women generally have found a greater responsiveness to wage changes than is found among men.

Policy Applications
We use labor supply theory to analyze the work-incentive effects of various social or income maintenance programs because they create budget constraints for their recipients.

Budget Constraints with “Spikes”
The social insurance compensation programs compensate workers for work-related injuries – replaces most of the earnings/incomes lost by workers due to injuries. Compensations are paid as long as the worker is off work and disabled, and payments cease even if the worker supplies only one hour of labor. These programs affect the work-incentives of workers since the returns associated with the first hour of work are negative – reduced income for returning to work for 1 hour.

Policy Applications
Since income maintenance programs create spikes and severe work disincentive problems: What can policymakers do to minimize the effects?
- Set no-work benefits at some fraction of pre-injury earnings.
- Set benefits at Ag if the return to work for 1 hour is less than Ag.
- Set a limit on the weeks each worker can receive benefits.
- If extensions are to be granted in some cases, set up a panel – judicial or local welfare board – to review such cases.

Programs with Net Wage Rates of Zero
Other social welfare programs have different eligibility criteria and calculate benefits differently. Program benefits are paid based on the difference between one’s actual earnings (Ya) and one’s needs (Yn). Payment of benefits based on the difference between actual earnings and needs creates a net wage rate of zero.

Nature of Welfare Subsidies
The welfare agency determined the income needed (Yn) by an eligible person based on:
- family size,
- area living costs – CPI, and
- local welfare regulations.

For subsidy recipients, an extra hour of work yielded no net increase in income, because the extra earnings resulted in an equal reduction in welfare benefits – price of leisure was zero – see the slope of line BC in Figure 6.14. A welfare program that increases the income of the poor creates an income effect which tends to reduce labor supply as it also causes the wage to effectively drop to zero because every dollar earned is matched by a dollar reduction in welfare benefits. The dollar-for-dollar reduction in benefits induces a huge substitution effect, which causes welfare recipients to reduce their hours of work to zero point B – see Figure 6.14.

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Welfare Reform – The United States made/adopted major changes to its income-subsidy programs in the 1990s because of the work disincentives inherent in the traditional welfare programs. The Personal Responsibility and Work Opportunities Reconciliation Act (PRWORA) gave states more authority on how to design their own welfare programs:

1. encourage work,
2. reduce poverty, and
3. move people off welfare.

These changes appeared to have increased the LFPR of single mothers from 68% in 1994 to 78% in 2000.

Lifetime Limits – PRWORA placed a five-year lifetime limit on recipients: Reduce how long families could be on welfare. Increase work incentives by eliminating income subsidy. Potential welfare recipients must choose when to receive the subsidy and when to “save” their eligibility in the event of a future need.

Work Requirements

PRWORA of 1996 introduced a work requirement into the welfare system by requiring 6 hours of work per day (or at least 30 hours per week) a the recipient has been on welfare for two years. Enrollment in education and training programs count toward work requirement – see Figures 6.16 and 6.17. The work-incentive effects of the work requirement will depend on whether the indifference curves are steeply sloped or flatly sloped.

Figure 6.16 The Welfare System with a Work Requirement

Subsidy Programs with Positive Net Wage Rates

The PRWORA and Earned Income Tax Credit (EITC) are income maintenance programs designed by the federal government:

- PRWORA creates positive net wages.
- EITC functions as an earnings (cash) subsidy, which goes only to those who work.

The tax credit offered by the EITC programs varies with one’s earnings and the number of dependent children.

EITC recipients could experience:

- Income effect that pushes them in the direction of less work – those whose annual income falls between $13,090 and $41,952.
- Substitution effect that pushes the recipients in the direction of more work, thus the labor force participation of low-income workers will increase – those whose annual income is less than $13,090.

Figure 6.17 Earned Income Tax Credit (Unmarried, Two Children), 2012

CHAPTER 7
LABOR SUPPLY: HOUSEHOLD PRODUCTION, THE FAMILY, AND THE LIFE CYCLE

A Labor Supply Model That Incorporates Household Production

A person’s weekly (168) hours can be spent on:

- Paid work
- Household work
- Leisure
- Personal care

Time spent in these four areas differs based on gender and marital status. Women with young children spend more time in household work activities and less time in paid work than women with older children. Generally, women spend more time in household work and less time in paid work than men do.

Table 7.1

<table>
<thead>
<tr>
<th>Weekly Hours Spent in Household Work, Paid Work, and Leisure Activities by Sex and Women over Age</th>
<th>18, 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paid Work a</td>
<td>Women</td>
</tr>
<tr>
<td>Household Work b</td>
<td>Women</td>
</tr>
<tr>
<td>Leisure c</td>
<td>Women</td>
</tr>
<tr>
<td>Personal Care</td>
<td>Women</td>
</tr>
<tr>
<td></td>
<td>Men</td>
</tr>
<tr>
<td></td>
<td>Men</td>
</tr>
</tbody>
</table>

The Basic Model for an Individual: Similarities with the Labor-Leisure Model

Household production time” replaces “leisure time.” Household production activities may include:

- Doing chores
- Relaxing at home – going to the movies or shopping

Preferences

It is assumed that Sally’s household spends time on:

(a) providing a clean house,
(b) good nutritional meals,
(c) raising happy children, and
(d) relaxation activities which can enhance their utility.

Household activities listed as (a) – (d) can also be acquired through paid market work.

Therefore:

Let $Y =$ Income derive from labor market work.

$H =$ Time spent on household production activities.

$U = f(Y, H) \rightarrow Sally's household utility function.$

Along a given household’s indifference curve:

$\Delta Y.MUY + \Delta H.MUH = 0 \rightarrow utility \ is \ constant$

Budget Constraint

Similar to the budget constraint derived in Chapter 6, Sally’s household budget constraint can be expressed as:

$Y = w(M) + V$

where $w = market \ wage, \ M = market \ time \ spent \ on \ paid \ work, \ and \ V = nonlabor \ income.$ Let $T (Discretionary \ time) = H + M, \ : M = T - H$. 

Figure 6.16 The Welfare System with a Work Requirement

Figure 6.17 Earned Income Tax Credit (Unmarried, Two Children), 2012

Figure 6.16 The Welfare System with a Work Requirement

Figure 6.17 Earned Income Tax Credit (Unmarried, Two Children), 2012
Income and Substitution Effects
Applying the same concepts and interpretations as in Chapter 6, we can also conclude that:
- If \( W ↑ \) and Sally increases her or her hours devoted to labor market work (\( M ↑ \)) and decreases hours devoted to home production (\( H ↓ \)), then the substitution effect is stronger than the income effect.
- If \( W ↑ \) and Sally reduces her or her hours of labor market work (\( M ↓ \)) and increases hours devoted to home production (\( H ↑ \)), then the income effect is stronger than the substitution effect.

In Sally’s case, the difference between his/her income effect and substitution effect due to changes in \( W \) and \( V \) will depend on the shape (steepness or flatness) of Sally’s indifference curves – that is, preferences for \( M \) and \( H \).

The Basic Model for an Individual: Some New Implications
The decisions about labor supply (labor market work) and the decisions about how to produce the commodities (household production) we consume are jointly made. Household production activities – economic analysis of the family – goes beyond the simple labor supply issues to deal with issues such as: marriage, divorce, fertility, child-rearing practices, and other activities and decisions that families undertake.

The steepness or flatness of the indifference curve will reflect the household’s preference for labor market work in comparison to home production activities of the household. Steep indifference curve will mean preference for household production over labor market work (\( H ↑ \) and \( M ↓ \)). Flat indifference curve will mean preference for less household production and more labor market (\( H ↓ \) and \( M ↑ \)).

7.1 A Labor Supply Model That Incorporates Household Production

Joint Labor Supply Decisions within the Household
The allocation of time between labor market and household work involves joint decision-making by partners who live together. The decision-making about market and household work are also heavily influenced by custom. Marriage partners are assumed to have exactly the same preferences or that one partner makes all the decisions – “unitary” models – not supported by empirical evidence. The “collective” model assumes that partners have their own utility function and bargain over the allocation of each other’s time – evidence supports the bargaining model and that the partners with greater access to resources carry more influence in family decision making.

Specialization of Function
Joint decision-making by partners covers different areas of responsibilities such as:
-meal planning
- shopping
- home maintenance
- child-rearing

Theory
Deciding which partner will take primary responsibility for child-rearing by staying at home depends on how a couple answers the following (two) questions:
Who is relatively more productive at home?
Who is relatively more productive in market work?

Implications for the Future
Modeling the choice of who handles most of household duty based on the changes in \( W \) and \( V \) does not mean that customs are unimportant in shaping household preferences – they are. The theory of household production emphasizes that the distribution of household work may well change as wages, incomes, and home productivities change. A study found that when spouses work outside the home, the weekly hours that each spends in household work are affected by their relative wage rates. If \( W ↑ \) | Wives → \( H ↑ \) | Husbands while \( H ↓ \) | Wives and vice-versa.

Do Both Partners Work for Pay?
Partners can hire an outsider to do many household chores since empirical evidence shows that greater hours spent on (specializing in) household work actually reduces one’s future wage offers. More hours devoted to market work can enhance the economic resources (incomes = \( Y \)) of both partners than will be required to compensate for the lost hours of household work/time. Steeper budget constraint (holding income constant) will tend to increase – through the substitution effect – the desirability of increased market work and income (flatter indifference curves will also have same effect). Another force that could flatten the indifference curves (increased desire for market income) of household partners is the emphasis on an individual’s or family’s relative standing in society – particularly, if such social status depends on publicly observed consumption.

Figure 7.2 Home versus Market Productivity for a Partner

The Joint Decision and Independent Productivity at Home
One partner’s productivity at home is affected by the other partner’s labor supply to the market. If the wife decides to increase her hours worked in the labor market, her husband’s marginal productivity at home may rise as he takes over chores she once performed. If two partners enjoy each other’s company, the value a husband places on his time at home depends on how a couple answers the following (two) questions:

Labor Supply in Recession: The “Discouraged” versus the “Added” Worker
Changes in one partner’s productivity – either at home or in market work – on recession in the economy can alter a family/household basic labor supply decision.

Added-Worker Effect (AWE) – This is the entry/addition of the other partner (wife) into the labor force when the husband’s market productivity increased.
declines or loses his job due to a recession or awaiting to be recalled from a layoff.

Disincentive-Worker Effect (DWE) – This is the withdrawal of a worker from the labor market due to the reduced availability of job opportunities in a recession with rising unemployment rate.

During recessions, the wage rate someone without a job can expect – expected wage, \( E(W) \) – to receive if he or she looks for work falls due to:
- excess labor supply over demand - that is, \( LS > LD \) → real \( W \), for those with jobs, and
- the chances/probability \( \{n\} \) of getting/finding a job fall in a recession.

That is: \( E(W) = nW \) \hspace{1cm} (7.1)

where \( W \) is the wage of those with jobs.

The \( \downarrow W \) and \( \downarrow n \) in a recession cause the expected wage of those without jobs to fall – \( \downarrow E(W) \) – thus leading some workers to be discouraged and quit the labor market/force.

Which Effect Dominates?
AWE increases the labor force and unemployment rate during a recession while the DWE does the opposite. AWE is confined to relatively few families whose sole breadwinner loses a job but such effect is reduced by the existence of unemployment benefits. More female partners are employed in paid work just as their male partners are, so the AWE increasing is inconsequential. Fall in \( E(W) \) affects nearly every household and has a relatively strong substitution effect for married women hence the DWE has a dominant effect. The dominance of DWE creates hidden unemployment which could change the unemployment rate if reported.

Hidden Unemployment
The dominance of DWE creates hidden unemployment – people who would like to work but believe jobs are so scarce that looking for work is of no use. Some indication of the size of the hidden unemployment can be given by the overall unemployment rate, which rose from 4.6 percent in 2007 to 9.3 percent in 2009. 7.1 million people (4.6 percent of the labor force) were unemployed in 2007. 369,000 people wanted job but were not seeking because they believed job were unavailable. 14.3 million people (9.3 percent of the labor force) were unemployed in 2009. 778,000 people wanted job but were not seeking because they believed job were unavailable. The number of discouraged workers\( ] \) tends to increase with reduced job opportunities.

Life Cycle Aspects of Labor Supply
Market productivity and home productivity vary over one’s life cycle – yields the lifecycle earnings profile (LCEP)
- \( 6 \rightarrow 22/24 \) years \( \rightarrow \) devoted to schooling to acquire human capital.
- \( 25 \rightarrow 50 \) years \( \rightarrow \) devoted to labor market work
- Over 50 years \( \rightarrow \) continue labor market work or early retirement

The Substitution Effect and When to Work over a Lifetime
Decision to work over one’s life involves comparing market and home productivity over time. People work when their earning capacity is high relative to home productivity, and they engage in household production when their earning capacity is relatively low. Market Productivity over a lifetime (\( MPOL = LCEP \)) starts low and rises rapidly with age, levels off, and falls in later years.

Figure 7.3 Life-Cycle Allocation of Time

Table 7.3 shows the PV now (at age 62) of pension and earned income available to a hypothetical worker at each possible retirement age, up to age 70. If retirement is at age 62, the PV of income over the worker’s remaining lifetime expectancy is \( $153,666 \). Delaying retirement by one additional year, the PV of the remaining lifetime income rises as computed below:

<table>
<thead>
<tr>
<th>Age of Retirement</th>
<th>Yearly Soc. Sec. Benefits ($)</th>
<th>Earnings ($)</th>
<th>Soc. Sec. Benefits ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>1075</td>
<td>0</td>
<td>153,666</td>
<td>153,666</td>
</tr>
<tr>
<td>63</td>
<td>1156</td>
<td>39,216</td>
<td>157,067</td>
<td>196,283</td>
</tr>
<tr>
<td>64</td>
<td>1268</td>
<td>77,662</td>
<td>162,980</td>
<td>240,642</td>
</tr>
<tr>
<td>65</td>
<td>1339</td>
<td>115,355</td>
<td>167,502</td>
<td>282,857</td>
</tr>
<tr>
<td>66</td>
<td>1501</td>
<td>152,099</td>
<td>170,362</td>
<td>322,461</td>
</tr>
<tr>
<td>67</td>
<td>1640</td>
<td>188,538</td>
<td>173,475</td>
<td>346,013</td>
</tr>
<tr>
<td>68</td>
<td>1782</td>
<td>224,074</td>
<td>176,402</td>
<td>396,476</td>
</tr>
<tr>
<td>69</td>
<td>1938</td>
<td>259,000</td>
<td>179,827</td>
<td>442,827</td>
</tr>
<tr>
<td>70</td>
<td>2072</td>
<td>293,019</td>
<td>186,058</td>
<td>485,077</td>
</tr>
</tbody>
</table>

Changes in the Constraint
Based on the tangency of curve U1 with the budget constraint given by line \( ABJ \) in Figure 7.4, the optimum retirement age for the hypothetical worker is age 64 – see line segment CD in Figure 7.4. The impact of an increase in Social Security benefits on the choice of the worker’s retirement age would depend on which effect – income or substitution would dominate.

If the increase in Social Security benefits (that was unexpectedly added to lifetime benefits at each retirement age) shifts the budget constraint line \( AB \) to \( AB’ \) with segment \( B’ \) parallel to segment \( B \), there would be an income effect with no substitution effect – no change in the yearly net wage.

If the increase in Social Security benefits produced larger increases in the PV of lifetime benefits when retirement is deferred past age 62, this would make segment \( B’ \) to become more steeper sloped, which would induce the behavior associated with a wage increment – that is, a substitution effect that would move the hypothetical worker in the direction of later retirement, while the income effect associated with greater lifetime wealth would push in the direction of earlier retirement.

The Choice of Retirement Age
Date of retirement influences:

Muhammad Firman (University of Indonesia - Accounting)
Policy Application: Child Care and Labor Supply

Government programs aimed at supporting child care and thus increase the labor force participation are:

- tax credit to parents for child care services
- government subsidies for day care
- school lunches
- health care

Child-Care Subsidies

- Federal spending on child-care subsidies has tripled over the last decade.
- To parents, child-care costs (which may be fixed or hourly) represent a significant portion of family income and may be higher for families earning less than $36,000 per year.
- Child-care subsidies help to defray both the fixed and hourly costs of care hence increase in labor participation.

Reducing the Fixed Costs of Care

Fixed costs of child-care that must be paid will affect the labor supply incentive of a mother who has unearned income — see Figure 7.5. For those mothers who are not working, child-care subsidies that reduce the fixed cost of child care will encourage work among those previously out of the labor force. For those already working, removing the fixed cost of child care has an income effect that pushes them toward fewer hours of work — see Figure 7.6.

Reducing the Hourly Costs of Care

Child-care costs, of say $3 per hour, will reduce the hourly take-home wage rate of a working parent by $3 if government subsidy reduces the child-care costs to zero, the parent would experience an increase in the take-home wage thus representing the effect of a wage increase — creates an income effect and a substitution effect that work in opposite direction.

Observed Responses to Child-Care Subsidies

Child-care subsidies, which in actuality reduce both the fixed and the hourly cost of care, would have a theoretically ambiguous effect on the hours of work among those already in the labor market. Economic analysis/theory clearly suggests that child-care subsidies should increase the labor force participation rates among parents, especially mothers.

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Child Support Assurance

Programs to support poor single-parent families who are on welfare to make sure that absent parents in such families contribute adequately to their children’s upbringing. Child Support Assurance (CSA) is a guaranteed child support benefit paid by the government to the custodial parent when an absent parent does not make payments. Guaranteed child support assurance programs (CSAP) affect the labor supply of custodial parents. The effect on labor supply depends on the steepness or flatness (slope) of the custodial parents’ indifference curves.

There are three possibilities with respect to how the adoption of CSAP will affect a mother’s time in the household (production) and her hours at paid work:

1. For mothers with steeply sloped indifference curves, they will remain at point C — out of the labor force — and spend their entire time in the household. That is, they are contented with child support payments of AE plus welfare benefits of EC (AE + EC = AC).
2. Mothers who worked for pay before and were along budget line DB will continue to work but their utility is now maximized along (higher) budget line GF (i.e. M↓ and H↑).
3. Some mothers may move from being on welfare to seeking paid work (M↑ and H↓) — see Figures 7.7 and 7.8.

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Figure 7.7 Budget Constraints Facing a Single Parent before and after Child Support Assurance Program Adopted

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Figure 7.8 A Single Parent Who Joins the Labor Force after Child Support Assurance Program Adopted
CHAPTER 8
LABOR SUPPLY: HOUSEHOLD PRODUCTION, THE FAMILY, AND THE LIFE CYCLE

Job Matching: The Role of Worker Preferences and Information
The labor market provides signals and mechanisms by which utility maximizing workers can be matched with profit maximizing employers. Utility maximizing workers are interested in both the pecuniary and nonpecuniary aspects of their jobs—they care about their pay as well as their occupational tasks. The task of matching is not easy because of the variations in jobs and locations. Job characteristics differ—some jobs are pleasantly clean, with modern spaces, provide flexible hours and generous fringe benefits, and other are simply hazardous.

Individual Choice and Its Outcomes

Assume: Two Employers: X $8.00 Y $8.00

<table>
<thead>
<tr>
<th>Wage</th>
<th>Work environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Clean/Noise/Hazardous</td>
</tr>
<tr>
<td>Y</td>
<td>Safe/Clean/Noise</td>
</tr>
</tbody>
</table>

To remain competitive in the labor market, employer Y must offer a higher wage—compensating wage differentials (CWDs)—otherwise, it would not be able to recruit/retain workers. Employer Y could not attract unskilled workers without such a differential.

CWDs serve two related, socially desirable ends:
- It serves the social need by giving people an incentive to do dirty, dangerous, or unpleasant work, and
- At the individual level, it rewards workers who choose unpleasant jobs.

The Allocation of Labor
Some jobs, such as coal-mining, deep sea mining, and police/military/work, are inherently unsafe/hazardous or dangerous and are also costly to make safe. Recruitment for these jobs may involve drafting (into the military) and inducement (by pecuniary and other means).

Compensation for Workers
CWDs serve to reward those who are willing to accept hazardous/unpleasant working conditions more than they would otherwise receive. Workers who work in very pleasant environment—apparently zero probability of injury—are in essence, buying them by accepting lower pay. CWDs become the prices at which good/pleasant working conditions can be purchased by, or bad ones sold by, workers.

Assumptions and Predictions
Holding worker characteristics constant (e.g., skill levels, age, experience, race, gender, union status, region of the country, and so forth); the simple theory of job choice leads to the prediction that CWDs will be associated with various job characteristics:

Positive differentials (higher wages) will accompany "bad" job characteristics while negative differentials (lower wages) will be associated with "good" ones. That is: WBIC > WGJC

Assumption 1: Utility Maximization
Workers seek to maximize their utility, not income. CWDs will arise only if some people do not choose the highest-paying jobs offered, preferring instead a lower-paying but more pleasant job.

Assumption 2: Worker Information
Workers know about job characteristics of potential importance to them, therefore, employers offering hazardous working conditions with no CWDs would not be able to recruit and retain workers. Workers acquire enough information with which to evaluate the situation through direct observations or word-of-mouth reports from current or recent employees. Worker information may be incomplete because there are very obscure job characteristics that may be unknown initially.

Assumption 3: Worker Mobility
Workers are relatively mobile because they have a range of job offers from which to choose. There will be no CWDs if only the dangerous jobs were/are available to workers.

Empirical Tests for Compensating Wage Differentials
Prediction that there are CWDs is over two centuries old. Adam Smith’s proposed/identified five “principal circumstances which...make up for a small pecuniary gain in some employments and counterbalance in others.” Among the circumstances Smith listed were:
- Constancy of employment
- Occurrence of employment
- Difficulty of learning the job
- Probability of success
- Degree of trust placed in the worker, and
- The “wage of labor varies with the ease or hardship, the cleanliness or dirtiness, the Honourableness or dishonourableness of the employment.

There are problems associated with trying to estimate CWDs:

1. Ability to create data sets that allow us to make relevant job characteristics (age, education, union status, and so forth) that influence wages
2. Ability to specify in those job characteristics that are generally regarded as disagreeable (not everyone may regard outdoor work or repetitive jobs as undesirable)

Recent empirical estimates of CWDs in the United States suggest that wages tend to be around 1% higher for workers facing twice the average risk of job-related fatality than those who face the average yearly level of risk (about 1 in 25,000). Many other studies of CWDs cover various job characteristics thus the strength and the validity of their conclusions in support of the theory become problematic.

Hedonic Wage Theory and the Risk of Injury
Hedonic wage theory (HWT) enables us to analyze the theory of CWDs for negative job characteristics (where the probability of the risk injury is very high) and draw policy conclusions and/or implications with respect to government safety regulations (e.g., regulations by OSHA and other agencies).

Employee Considerations
Employees are considered to be of different preferences:
- Risk averse—dislikes being confronted with risk or danger
- Risk lover—loves taking risks (dare-devil type of individual)
- Risk neutral—individual is indifferent

Risk (probability) of injury is considered a “bad”—indifference curve showing wage (W) and risk (R) combinations will be shown as upward sloping—convex to the horizontal axis—increasing marginal wage to risk (probability of injury).

Figure 8.1 A Family of Indifference Curves between Wages and Risk of Injury

Figure 8.2 Representative Indifference Curves for Two Workers Who Differ in Their Aversion to Risk of Injury

Employer Considerations
Employers have different W and R tradeoffs, and the assumptions are:

1. It is costly to reduce risk, that is, it is expensive to transform unpleasant working conditions to safe/clean ones. Competition may force employer to operate at zero profit—this means that funds may not be available to buy risk abatement equipment. All other job characteristics are already determined such that risk reduction (R ↓) must be accompanied by wage reduction (W ↑). Employers' W and R tradeoffs are usually depicted by concave isoprofit curves which are also subject to the law of diminishing returns. Wage-risk combinations on higher isoprofit curve yield lower profit.

Figure 8.3 A Family of Isoprofit Curves for an Employer
The offer curve is a composite of segments of different firms’ isoprofit curves that show regions of potentially acceptable job offers to workers.

Major Behavioral Insights
The HWT generates two major behavioral insights:
- Wages rise with R, hence there will be CWDs for job attributes that workers view as undesirable or unpleasant.
- Workers with strong preferences for safety will be matched with employers who can provide safety most cheaply, and that those who are risk-loving and accept higher W, higher R jobs will be matched with firms that find safety costly to “produce.”

Figure 8.4 The Zero-Profit Curves of Two Firms

The Matching of Employers and Employees
It is assumed that if employees have two offers at the same wage (W), they will choose the lower risk. If employees receive two offers with the same level of risk (R), they will accept the offer with the higher wage (↑W).

Employers are constrained by two forces:
1. They cannot make outrageously lucrative offers due to competition.
2. They cannot make ridiculously low offers because they will not be able to attract and retain workers.

These two forces will compel employers to operate on the zero-profit isoprofit curves.

Figure 8.5 Matching Employers and Employees

Assume: Two employers: A and B
Two employers: X and Y

Worker A maximizes utility along A2 by working for Employer X for W_{ex} and risk level R_{ex}.
Worker Y maximizes utility along B2 by working for Employer Y for higher wage W_{ey} and high risk level R_{ey}.

If Worker A accepts Worker B’s offer (W_{ey} and R_{ey}), their higher level of utility will be along A2 and as someone who values safety very highly, this is not high enough to accept such offer.

Worker B who has flatter indifference curve – risk lover – finds W_{ey} and R_{ey} to be superior to W_{ex} and R_{ex}. This means Worker B is not willing to take a pay cut to W_{ex} in order to reduce risk from R_{ey} to R_{ex} since that place him/her on a lower utility level along B2.

\[ \text{Hedonic wage function} \]

Normative Analysis: Occupation Safety and Health Regulation
Are Workers Benefited by the Reduction of Risk?
The Occupational Safety and Health Act (OSHA) of 1970 directed the US Department of Labor to issue and enforce safety and health standards for all private employers in order to reduce the risk of traumatic injury in the workplace. The ideal that employees should face the minimum possible risk in the workplace as a social policy is not necessarily in the best interest of workers. Reducing R in some cases can lower the workers’ utility levels (Figure 8.7). Mandated/Decreed standards can reduce the wage and utility of workers and the profits of firms. Safety regulations can improve workers’ welfare when workers consistently underestimate the true risks. The hedonic analysis of wages (HWT) provides the conceptual tools to analyze such issues or questions as the need for regulation and, if needed, what the goals of the regulation should be.

Figure 8.7 The Effects of Government Regulation in a Perfectly Functioning Labor Market

How Strict Should OSHA Standards Be?
There are risks of injuries or health hazards that workers may not know but become known to the government later, and therefore wishes to mandate a standard. Since risk reduction is costly, governments’s mandated standard could force employers to hold the line on wage increases or compel them to institute other cost-reduction measures that may be equivalent to wage reduction.

Costs of compliance with mandated standard will fall on workers:
Reduced employment opportunities for workers as employers cut back on employment of new workers

- Permanent layoffs that force workers to find jobs elsewhere, which may not be utility maximizing.

Figure 8.8 A Worker Accepting Unknown Risk

Benefit-Cost Analysis
The benefit-cost analysis (BCA) weighs the likely costs of government regulation against the value that workers place on the expected benefits. BCA is useful in determining by how much the government should reduce the risk level between R0 and R2. If the government mandates that the risk level should fall from R2 to R1, then:

- Employer costs would require wage offer to fall to \( W'' \)
- Per worker cost of the mandate would be \( W_1 - W'' \)
- Employer benefits would be \( W'' - W^* \) if the employer can force workers to \( W^* \)
- Per-worker benefits would be the reduction in R (from R2 to R1) and \( W'' - W^* \).

Workers are willing to pay or forgo \( W_1 - W^* \) for R2 to R1, and since \( W_1 - W'' \) exceeds \( W_1 - W^* \), the benefits to the workers is \( W'' - W^* \) if the employer cannot force employees’ wage down to \( W^* \). OSHA mandate is Pareto improving because workers are better off and employers are not worse off—profit is unchanged since the employers remained on the same isoprofit/offer curve.

Impact of OSHA Regulations when Workers Misperceive Risks

Workers earn a wage of \( W^* \) and incorrectly believe that their probability of injury is only \( p_0 \). In fact, their probability of injury is \( p^* \). The government can mandate that firms do not offer a probability of injury higher than \( p^* \), making the uninsured workers better off (that is, increasing their actual utility from \( U^* \) to \( U - P \)).

Employee benefits are means by which employers can attract workers with certain characteristics the firm is searching for and will discourage applications from others.

Employer Preferences
Payments in Kind—These are compensation schemes other than money (e.g., employer-provided insurance or paid vacation) that offer employees a sizeable tax advantage.

Deferred Compensation—These are compensation schemes (e.g., pension plans) that are restrictive due to the lack of access to such funds but enjoy a tax advantage over cash payments.

Indifference Curves—Indifference curves are used to analyze the relationship between wages (cash) and employee benefits (in-kind payments/transfers and deferred compensations).

Figure 8.9 An Indifference Curve between Wages and Employee Benefits

Employer Preferences
Employers can choose among the mix of cash compensation and employee benefits that they offer to workers, and the mix can be summarized graphically by using the isoprofit curves.

Isoprofit Curves With a Unitary Slope—This shows the trade-offs between cash compensation and employee benefits offered to their workers—that is, employers are indifferent between \( \$X \) on cash (wage) compensations and \( \$X \) on employee benefits since both options cost the same (which means the slope = -1).

Isoprofit Curves With a Flatter Slope—This shows that the trade-offs that employers make between cash and employee benefits are not one-for-one since employee benefits have tax or other advantages to the firm.

Isoprofit Curves With a Steeper Slope—This shows that employee benefits may be more expensive in other areas than paying in cash—e.g., an increase in insurance benefit may produce an income effect with no corresponding increase in the price of leisure.

Figure 8.10 An Isoprofit Curve Showing the Wage/Benefit Offers a Firm Might Be Willing to Make to its Employees: A Unitary Trade-Off
The utility-maximizing choice is $H^*$ with $W^*$ at point C and nonlabor income assumed to be zero. If $H^*$ is yearly work hours, it is easy to understand that a worker may prefer a job that involves layoff if two options are given: Option 1: If $H^* = 1,500$ hours — three-quarters of the typical —fulltime| of 2,000 hours, one could work 6 hours a day, 5 days a week for 50 weeks. Option 2: If $H^* = 1,500$ hours, one could work 8 hours a day, 5 days a week for 9 months and agree to be laid off for 3 months. Which alternative holds more appeal to any given individual depends on his/her preferences with respect to large blocks of leisure time, which many people would prefer.

Constrained Hours of Work

If a worker is constrained by a predictable layoff which compels him or her to work less hours ($H^*$) that is lower than the desired hours ($H^*$), he/she would prefer the unconstrained hours ($H^*$ with $W^*$). If he or she works $H^*$ hours at the wage of $W^*$ due to predictable seasonal layoffs, this will put the him/her on a lower utility level, which is assumed to pass through point A — see Figure 8A.1. If $H^*$ hours are offered with a wage of $W^*$, and $W^* > W^*$ enough that point B is reached along the same indifference as point C ($H^*$ and $W^*$), even though point B is not utility maximizing at the higher wage $W^*$, however, he or she is considered to be constrained to work hours equal to $H^*$ — see Figure 8A.1. He or she is, therefore, indifferent because he/she is on the same indifference curve that yielded $H^*$ and $W^*$, hence, $W^* = W^*$ is the compensating wage differential because he/she is constrained ($H^*$) below the desired work hours ($H^*$) — see Figure 8A.1.

The Effects of Uncertain Layoffs

Layoffs are uncertain and unpredictable because layoff rates vary across or within industries over the years. Example: Suppose a worker is confronted with two job choices: (a) job with certainty offering $H^*$ hours at wage $W^*$, and (b) job with uncertainty offering the same $H^*$ hours at wage $W^*$.

Job with certainty: $WH = Y(H^*)$ = Labor income, and his/her utility derived from working $H^*$ yearly is: $U(H^*)$.

Job with uncertainty: $H^* = 0.5Hh + 0.5Hl$ → $WHh + WHl = WH = Y(H^*)$, and his/her average utility derived from working $H^*$ yearly is: $U(H^*)$.

Given risk aversion: $U(H^*)$ with certainty $> U$ with uncertainty.

This illustrative example shows that when workers are risk averse with concave utility function, they would prefer the job paying $W^*$ and offering $H^*$ hours with certainty to the one paying $W^*$ and offering the same $H^*$ hours (with uncertainty) only on the average.

The Observed Wage/Layoff Relationship

For CWDs to arise, employers must be willing to pay their employees for their lost utility, CWDs may not arise.

A study that examined the relationship between wages and layoffs suggests that the compensating wage differential for an average probability of layoff is around 4% of wages. Workers in high-layoff industries of automobile manufacturing and construction received estimated CWDs ranging over the early 1970s from 6% to 14% and 6% to 11%, respectively. A study of farm workers around 1990 found that those workers...
who risked unemployment by working seasonally were paid from 9% to 12% more per hour than those who held permanent jobs in farming.

CHAPTER 9
INVESTMENT IN HUMAN CAPITAL: EDUCATION AND TRAINING

Typically, investments involve initial costs or outlays of expenses with the hope and expectation to recoup/payoffs overtime. Workers undertake three major kinds of labor market investments:
1. Education and training
2. Migration
3. Search for new jobs

Investment in knowledge and skills of workers takes place in three stages:
- Early childhood human capital where such decisions are made by others – parents.
- Acquisition of knowledge and skills as full-time student in high school, college, or vocational training program.
- On-the-job training when in the labor force.

Human Capital Investment: The Basic Model
Costs of acquiring or adding to human capital fall into three categories:
- Out-of-pocket or direct expenses – tuition costs, expenditures on books, and other supplies.
- Forgone earnings – salaries/income given up.
- Psychic losses – occur because learning is often difficult and tedious for some people.

Expected returns to education and training investments (human capital) are in the form of:
- Higher future earnings,
- Increased job satisfaction over one’s lifetime, and
- A greater appreciation of nonmarket activities and interests.

The Concept of Present Value
Investment returns or expected future benefits are subject to delays, risks, and uncertainty, therefore, investment decisions are made by comparing present value (PV) of investment outlays with the expected future values/returns one year, two, three, or T-years later (FV = B_i, i = 1, 2, 3,...,T). The FV (= B1) of $100 at 5% interest rate a year from now is:

\[ B_1 = B_0 + B_0(r) = B_0(1 + r) = 100(1.05) = 105 \]  

where \( r \) = market interest rate, and \( (1 + r) \) = discount factor.

and solving for \( B_0 \) (PV) yields:

\[ B_0 = \frac{B_i}{1+r} = 105 \]

The Demand for a College Education
People attend college when they believe they will be better off by so doing. College as a consumption good has consumption benefits that are unlikely to change much over time. A person considering college education has two streams of earnings (stream A and B) over her/his lifetime:
- Stream A begins at the age of 18 and has a negative income for the first four years owing to college costs and rises above stream A.
- Stream B has a positive income for the first four years owing to college costs and rises above stream A.

The Demand for a College Education
Predictions of the Theory
Present-Orientedness – Present-oriented people are less likely to go to college than forward-looking people (other things equal). – Present-oriented people tend to have higher rates of discount (r) and they impute smaller benefits to college education in comparison to future-looking people.

Age – Most college students will be young. – Young people have larger PV of total benefits than older workers because the younger workers would have longer labor market experience, therefore, T is greater for younger people than for older ones.

Costs – College attendance will decrease if costs of college rise. – Human capital investments are more likely to go to college than forward-looking people when costs are lower.

Earnings Differentials – College attendance will increase if the gap widens between the earnings of college and HS graduates.
education is positively related to the increases in expected (but uncertain) lifetime earnings/benefits that a college education allows.

Table 9.1

| Year | College Enrollment Rates of New High School Graduates | Ratios of Mean Earnings of College vs. High School Graduates, Ages 21-24, Prior Year
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (%)</td>
<td>Female (%)</td>
</tr>
<tr>
<td>1970</td>
<td>55.2</td>
<td>48.5</td>
</tr>
<tr>
<td>1980</td>
<td>46.7</td>
<td>51.8</td>
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<td>1990</td>
<td>58.0</td>
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<tr>
<td>2000</td>
<td>59.9</td>
<td>66.2</td>
</tr>
<tr>
<td>2010</td>
<td>62.8</td>
<td>74.0</td>
</tr>
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</table>

Other Factors That Can Affect the Demand for a College Education after Controlling for Parental Influence

Uncertainty

Even if individuals know the average earnings differentials between college and high school graduates, they must also assess their own probabilities of success in specific fields requiring a college education/degree. The presence of role models can help reduce the uncertainty that surrounds the estimates of future success in specific areas. Current returns to human capital may be an unreliable estimate of future returns, that is, returns observed currently may not persist into the future.

Friends

Friends could be important in human capital decisions (fit with the crowd).

Ethnic affiliation/origin

The importance attached to human capital investments varies across ethnic groups.

Neighborhoods in the human capital decisions of individuals

Human capital investments decisions in affluent neighborhoods will not be the same as those in poor-inner-city neighborhoods.

Education, Earnings, and Post-Schooling Investments in Human Capital

Four notable characteristics of the age/earnings profiles for both male and female workers depicted in Figures 9.3 - 9.5:

Average Earnings and Educational Level

Average earnings of more educated full-time workers exceed those of less educated workers, that is, more education is associated/correlated with higher pay.

On-the-Job Training and the Concavity of Age/Earnings Profiles

Training Declines with Age

The age/earnings profiles typically rise steeply early on, then tend to flatten, that is, workers’ investments in OJT tend to be greatest when young and tend to fall gradually as they grow older.

Figure 9.4 Money Earnings (Mean) for Full-Time, Year-Round Female Workers, 2011

The Fanning Out of Age/Earnings Profiles

Earnings differences across workers with different educational backgrounds tend to become more pronounced as they age.
in human capital tend to be more likely when expected earnings differentials are greater and when people have the ability to learn more quickly or faster — which may shorten the training period. Human capital theory suggests that workers who invested more in schooling will also invest more in post-schooling job training. People with the ability to learn quickly select the ultimately high-paying jobs where much learning is required and thus put their abilities to greatest advantage.

Women and the Acquisition of Human Capital

The traditional/historical role of women in childrearing and household production contributed to their shorter expected work life and the skills atrophy when they drop-out of the labor force as well as their reduced labor force attachment. Earnings of women who work full-time year-round are lower than those of men of equivalent age and education. Women’s earning within each group identified in Figure 9.4 rise less steeply with age.

Women and Job Training

Women receive less OJT than men because employers expect women workers to have shorter work lives due to drop out.

Women and Formal Schooling

There have been dramatic changes in the level of formal education received by women in recent years, which no doubt reflect the increased returns to human capital investments and increased labor force attachment and longer expected work lives.

Table 9.2

<table>
<thead>
<tr>
<th>Occupation Type</th>
<th>Mean</th>
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<tbody>
<tr>
<td>Women</td>
<td>68.0</td>
</tr>
<tr>
<td>Men</td>
<td>61.0</td>
</tr>
</tbody>
</table>

On the average, women are less likely than men to be in the labor force and, if employed, they are less likely to work full-time. Women employed full-time averaged fewer hours of work per week than men in each of the occupations shown.

Figure 9.6 The Increased Concavity of Women’s Age/Earnings Profiles

![Figure 9.6 The Increased Concavity of Women’s Age/Earnings Profiles](image)

Women’s expected labor force attachment has grown so fast that investing in bachelor’s and master’s degrees has become more attractive over the last four decades.

Is Education a Good Investment?

The question of whether more education would be a good investment is one that concerns both individuals and government policymakers. Individuals must decide whether the increase in the monetary and psychic income is enough to justify the costs of additional education. Government must decide if the expected social benefits of enhanced productivity outweigh the opportunity costs of investing more of the scarce social resources in the educational sector.

Is Education a Good Investment for Individuals?

Is there evidence that investment in a college education, which involves monetary costs of at least $25,000 per year, pays off for the typical students?

Many studies reported the rate of return that fall into the range of 5 – 12 percent, but there are problems with these conventional estimates due to:

Ability Bias

Conventional estimates may overstate the gain an individual could obtain by investing in education because they do not distinguish between the contribution that (innate) ability makes to higher earnings and the contribution made by schooling. Results of studies of identical twins with the same genes suggest that ability bias in the conventional estimates may not be very large.

Returns for Whom?

People who seek more schooling may have lower psychic costs of learning, or lower discount rates, than those who do not make the investment — returns to schooling for those who do invest may be very different than the returns facing those who chose not to invest.

Is Education a Good Social Investment?

The idea of education as a social investment is not unique to the United States, it is in fact a worldwide issue because of three related developments, which may undermine the productivity of America’s future workforce relative to workers elsewhere: Product markets have become more global, thus increasing the elasticity of both product and labor demand. The growing availability of high-technology capital has created new products and production systems that may require workers to have greater cognitive skills and to be more adaptable, efficient learners. American elementary and secondary school students have scored relatively poorly on achievement tests in mathematics and science.

Table 9.4

<table>
<thead>
<tr>
<th>Country</th>
<th>2009 Math Score</th>
<th>Science Score</th>
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<tbody>
<tr>
<td>France</td>
<td>549</td>
<td>597</td>
</tr>
<tr>
<td>Germany</td>
<td>532</td>
<td>520</td>
</tr>
<tr>
<td>Japan</td>
<td>524</td>
<td>524</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>514</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>502</td>
<td></td>
</tr>
</tbody>
</table>

The poor performance of American elementary and secondary students on achievement tests raises some pertinent policy questions:

1. Are we devoting enough resources to educating our current and future workforce?
2. Should the resources we devote to education be reallocated in some way?
3. Should we demand more of students in elementary and secondary schools?

The Social Cost

Among some of the highly industrialized countries, the United States devotes relatively more resources (over a tenth of its gross domestic product) to education, from elementary schools to universities. The relatively poor performance of American students on achievement tests has led to questions about whether we are devoting too many or too few resources to education.

The Social Benefit

If an individual’s productivity increases because of more schooling, then that increases society’s stock of capital. Education has positive externalities so that the social benefits are larger than the private benefits.

The Signaling Model

Apart from observing certain indicators (age, experience, education, and personal characteristics) that are correlated to productivity, employers cannot determine the actual productivity of any applicant during the interviewing and hiring process, therefore, they rely on the formal education that workers acquire. Some see the educational system as a way of finding out who is productive, not of enhancing worker productivity. Employers use education as a signaling device, which enables them to sort workers into different levels or categories of productivity rather than assume that all workers/applicants are —average.[1]

Figure 9.7 The Benefits to Workers of Educational Signaling

![Figure 9.7 The Benefits to Workers of Educational Signaling](image)
An Illustration of Signaling
Employers use education to classify workers with less than \( \ast \) years of education as lower-productivity workers that should be rejected or prevented from any job paying a wage above 1. Those workers with at least \( \ast \) or more years of education beyond high school are considered to be the higher-productivity workers who can obtain a wage of 2. Note that if education is a signaling device which yields a wage of 2, all workers would want to acquire the signal of \( \ast \) if it were costless for them to do so.

Figure 9.8 The Lifetime Benefits and Costs of Educational Signaling

If 50 years ago being a high school graduate signaled above-average intelligence and work discipline, why incur the enormous costs of expanding college attendance only to find out that now these qualities are signaled by having a bachelor's degree?

Signaling or Human Capital?

Some evidence of the role schooling (signaling or human capital) plays in society is difficult to obtain because of the different views. Advocates of the signaling hypothesis argue what is learned in school is proportional to the time spent there and that an added bonus, which is the rate of return, just for a diploma is proof of the signaling hypothesis.

Advocates who are of the view that schooling enhances human capital argue that those who graduate after four years of college have more than four times what the freshman dropout learned. Proponents of the signaling and human capital theory of education can agree that people of higher cognitive ability are likely to be more productive; where they disagree is whether better schools (by improving cognitive skills) can enhance worker productivity.

School Quality

Advocates of the signaling viewpoint cite studies that emphasize the difficulty of showing the relationship between schooling expenditures and student performance on tests of cognitive skills. Advocates of the human capital view cite studies that support the relationship between earnings and school quality – students attending higher-quality schools have higher subsequent earnings.

Arguable Possibilities:
- Better quality schools enhance productivity by enhancing creative skills or promoting better work habits.
- Better schools give students better information about their own interests and abilities, thus helping them to make more successful career choices.

Does the Debate Matter?

The fact is that schooling investments offer individuals monetary rates of return that are comparable to those received from other forms on investment. The fact that employers continue to emphasize (and pay for) educational requirements in the establishment of hiring standards suggests one of two things:
1. Either more education does enhance worker productivity
2. It is a less expensive screening tool than any other that firms could use.

The fact that employers are willing to pay a high price for an educated workforce seems to suggest that education produces social benefits.

Is Public Sector Training a Good Social Investment?

Evaluating the benefits of different (voluntary and mandatory) government programs such as the Jobs Corps requires comparing the costs per worker/trainee with an estimate of PV of the benefits measured in terms of the increase in wages made possible (other the success of the training program(s)). Many studies have analyzed the benefits of these programs by comparing what would be earned in the absence of the training programs. Studies found that per-student, the direct costs of these training programs have been in the range of $4,500 to $9,100, but they also had opportunity costs in the form of forgone output. Studies also found that adult women are the only group among the disadvantaged that clearly benefit from these training programs.

A "Cobweb" Model of Labor Market Adjustment

Boom-and-bust cycles for highly technical workers occur in the labor market due to the failure of supply to respond immediately to changes in labor market conditions.

An Example of "Cobweb" Adjustments

When the demand for certain fields/professions (e.g. MD, CPA, CNA) increases, the supply may be slow to adjust because it takes a long time for people/workers to be certified in those fields/professions. In the immediate market period (at the moment) supply will appear to be perfectly inelastic until more people decide to enter into those fields/professions and supply their services.
Adaptive Expectations
The Adaptive Expectations Hypothesis/Theory (AEH) asserts that people form their expectations of the future (or predict the future) based on current and past life experiences. If in the labor market wage expectations are formed adaptively, this means that future expected wages will be equal to the weighted average of current and past wages. Forecasting future wages in the labor market using AEH (based on backward-looking forecasting) may lead workers to first overpredict and then underpredict the equilibrium wage — workers are extremely shortsighted and make errors in predictions. Overprediction of the wage may overshoot the equilibrium wage, underprediction of the wage may undershoot the equilibrium wage. Given the "cobweb" adjustment of wages in the labor market, how workers form expectations about future wages (prices) is important in understanding many labor market issues.

Rational Expectations
The Rational Expectations Hypothesis/Theory (REH) asserts that an individual will use all available information in forming their expectations about future economic variables such as wages and prices. REH assumes that workers (implicitly assumed to be economists or statisticians) will not be fooled into overpredicting or underpredicting future wage levels as indicated by the "cobweb" model. REH assumes that if there are errors in expectations, they would be random errors not based on the available information or theory. The important lesson from the cobweb model and the application of REH is that adjustments in certain technical fields will be slow and wages in those markets may overweight or underweight, therefore, governmental predictions and market interventions should be based on rational expectations.

CHAPTER 10
WORKER MOBILITY : MIGRATION, IMMIGRATION, AND TURNOVER

Over the past two or more decades, the dramatic increase in the number of immigrants has stimulated some angry calls for stricter limits or tighter — border security measures. Proposals to impose stricter limits on immigration, including those to expel immigrants without work visas are based on the arguments that immigrants lower wages of natives or impose other financial burden on the — host country. For market economies, worker mobility plays a critical role in promoting voluntary exchange or free movement of workers among employers.

What factors influence the decision to emigrate and what are the labor market effects of immigration? What are the causes and consequences of worker mobility both within and across national boundaries? What are the monetary and psychic costs of mobility?

The Determinants of Worker Mobility
The human capital model/theory views mobility as an investment with initial costs outlay with the expectations of return in the future. The assumption is that if the PV of the benefits associated with mobility exceeds the monetary and psychic costs, people/workers will decide to change jobs, or move, or both. PV of the net benefits of mobility will be larger if the:
- utility derived from the new job (if less happy at the former job)
- is greater,
- immediate costs (C) associated with the job changes are smaller,
- worker stays longer (the greater T is) on the new job or lives in the new area.

Geographic Mobility
Mobility of workers among and within regions in a country and across countries is motivated by economic factors.

The Direction of Migratory Flows
Studies of migratory flows support human capital theory, which predicts that migration will flow from areas of relatively poor earnings (push of poor opportunities) to places where opportunities are better (pull of good/better opportunities). Studies find that people are attracted to areas where the real earnings of full-time workers are highest, and that there is no consistent relationship between unemployment and in-migration because the number of those moving from job to job outnumber the number moving to look for work.

Personal Characteristics of Movers
Migration is a highly selective activity that not all people can engage in, but it tends to be common among the young and highly educated workers.

Age
This is one of the important factors in determining who migrates. For the young workers, the longer the T over which benefits from investments can be obtained, the larger the PV of these benefits. A large part of the costs of migration is psychic — losses associated with giving up friends, community ties, etc; and this may be minimal for younger workers who have no strong friends/community ties.

Education
While age is the best predictor of who will move, education is the best single indicator of who will move within an age group. Those with college degrees are much more likely to make an out-of-state move, more so if job is more national than localized.

The Role of Distance
Human capital theory predicts that as migration costs rise, the flow of migrants will fall. The costs of moving increase with distance for two reasons:
1. Cost of acquiring trustworthy information about job opportunities elsewhere
2. Time and money cost of a move and for trips back to see friends and relatives — the psychic costs of the move rise with distance.

The Earnings Distribution in Sending Countries and International Migration
Age, access to information, the potential gains in earnings, and distance are all relevant to international migration. Immigrants — like others who make significant investments in human capital — are more likely to have lower-than-average personal discount rates. Distribution of earnings in the sending country as compared with the receiving country is very important in the analysis of international flows of labor — useful in predicting which skill groups within a sending country are most likely to migrate. Equality or inequality of earnings between skilled and unskilled workers is another important factor in the decision to emigrate.

The Returns to International and Domestic Migration
Migrants generally move to places that offer them greater jobs/earnings opportunities.

Internal Migration for Economic Reasons
Those whose move is motivated by the acceptance of a better job offer tend to experience the largest earnings increases. Migrants from migration — studies found that earnings increase by 14% to 18% in 1979-1985. Those who quit voluntarily and migrated for economic reasons without a prior job search earned 6% to 9% more than if they had stayed put/back.

Family Migration
With migration, a decision to move might well be made if the family as a whole experiences a net increase in total earnings. Family migration decisions could impact tied movers — women — adversely. The impact of migration on tied movers factors into why college-educated couples prefer to live in large urban areas where both people have access to many alternative job opportunities without moving.

Returns to Immigration
It is not feasible to compare the earnings of international immigrants with what they would have earned had they not migrated because of lack of data on earnings in their home country. Mexican immigrants in the U.S. received between $9,000 to $16,000 per year in 2000 in comparison to similar workers in Mexico. Men who immigrated to U.S. decades ago, have earnings path relative to those of native-born Americans with similar amounts of labor market experience.

Immigrants’ Initial Earnings
The initial earnings of immigrants are substantially less than those of U.S. natives, even after controlling for the effect of education. The fall in initial earnings of successive immigrants groups relative to U.S. natives may reflect the increasing number coming from countries with lower levels of educational attainment — hence less human capital.
Unauthorized immigration can be divided into two categories of roughly equal size:

- Those immigrants who enter legally but overstay or violate the provisions of their visas.
- Those immigrants who enter the country illegally — undocumented.

Many (roughly 30 million people) enter the United States each year under nonimmigrant visas — e.g., students and/or visitors — and are not authorized to seek employment with such visas. Many immigrants from the Caribbean often enter through Puerto Rico and gain free entry to the mainland.

Other immigrants:
1. Walk across the US/Mexican border
2. Are smuggled into the United States or use false documents to get through entry stations

Between 1990 and 2007, yearly increase in the number of unauthorized immigrants was estimated to be in the range of 350,000 to 580,000 for an estimated 11.8 million in population. Almost three-quarters of all unauthorized immigrants are from Mexico, and about 12% from Central America.

Immigrants from Mexico
There are two reasons for the large number of authorized and unauthorized immigrants from Mexico:
1. The huge differential in income per capita between the two countries
2. Both countries share a very long border

The roughly 12 million Mexican immigrants who live in the United States in 2007 constituted about one-third (⅓) of the entire foreignborn population. The typical Mexican immigrant is less educated than the average American because the educational levels are generally lower in Mexico. Recent immigrants from Mexico come from the middle (a group where 23% of them in Mexico has between 10 and 15 years of schooling) of Mexico's skill distribution, not the bottom.

Surveys done in areas of Mexico suggest that between 80% and 95% of undocumented entrants into the U.S. use the paid (about $1,680 in 2004) services of smugglers (coyotes). Chances of apprehension (and returned to Mexico) are about 1 in 3. Policy advocates base their beliefs on the consequences of immigration on employers, consumer, taxpayers, and workers of various skill levels and ethnicities.

Naive Views of Immigration
Here are two opposing views of illegal immigration that can be considered naive:
- One view is that every employed illegal immigrant deprives a citizen or legal resident a job — substitution effect.
- The opposing view is that illegal immigrants perform jobs no Americans citizens would do.

Both views — though simplistic — ignore the slopes (or elasticities) of the demand and supply curves. Are illegal immigrants taking away the job of citizens or legal residents? Are Americans unwilling to do the rough jobs that illegal immigrants do?

Unauthorized immigration has both economic and cultural consequences. The economic effects of immigration lie at the center of the current debate about immigration in the United States, particularly, the immigration status of those workers considered to be "unauthorized" because they have no documentation necessary to legally reside in the country. On the cultural aspect of immigration, there is evidence that people's view on the desirability of immigration may be based largely on their attitudes toward cultural diversity.

U.S. Immigration History
Generally/Traditionally, the United States has also been an attractive place for immigrants from nearly all parts of the world because of its unrestricted immigration policy for the first 140 years of its history after independence (the only restrictions were placed on Asians and on convicts). The flow of immigrants was especially large after 1840 when industrialization and political upheavals in Europe made immigration an attractive investment for millions of people.

Table 10.1

<table>
<thead>
<tr>
<th>Period</th>
<th>Number (in Thousands)</th>
<th>Annual Rate (per Thousand U.S. Population)</th>
<th>Year</th>
<th>Number (in Thousands)</th>
<th>Annual Rate (per Thousand U.S. Population)</th>
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<tbody>
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</tr>
</tbody>
</table>

Figure 10.2 Demand and Supply of Rough Laborers

In the absence of immigration, equilibrium wage of $W_I$ and the employment of $N_I$ citizens for these "rough laborer" jobs would be at point $B$.

With the influx of illegal immigrants, the labor market supply shifts to the right with the new equilibrium wage of $W_I$ and employment of $N_I$ workers at point $C$.

If we deport $N_I - N_M$ immigrants working at wage of $W_I$ and keep all other immigrants out of the "rough laborers" market, this would bring unemployment back to $N_M$ and wage to $W_R$, thus leading to $N_I - N_M$ jobs being destroyed by the rising wage.

Deportation would increase the employment and wage levels of Americans in the labor market but not one on-for-one basis.
An Analysis of the Gainers and Losers

As analyzed in Figure 10.2, both the wages and employment levels of Americans working as laborers are reduced when immigration increases the overall labor supply. Total wage bill paid to American laborers fall from W10N1B to W20N3D – see Figure 10.2. Some Americans leave the market and those who remain earn less. Although if the immigration of unskilled workers were to adversely affect domestic laborers, it would be a mistake to conclude that it is necessarily harmful to Americans as a whole.

Consumers

Immigration of “cheap labor” benefits consumers who buy output produced by these workers. A recent study suggests that the influx of low-skilled immigrants has made it easier for American college-educated women to pursue careers while simultaneously rearing children.

Employers

Employers of rough labor also benefited as profit increased from W1A to W2A – see Figure 10.2.

1. The increase in profitability raises the return to capital thus investors will increase investments in new plants and equipment.
2. Increased profits will induce more people to become employers.

Even though profit will be driven down to normal levels due to the increased capital and the number of employers, the country’s stock of capital is increased and opportunities are created for some workers to become owners/entrepreneurs.

Employees in the “Rough Labor” Market

Immigration increases the population of consumers in the United States, thereby increasing the demand for mechanics, bus drivers, retail clerks, teachers, construction workers, truck drivers, and so forth. The population increase due to immigration may directly call for more rough laborers such as roofers and meat packers. Increase in demand for other low-wage jobs such as landscape workers, parking lot attendants, and childcare workers may arise because more natives are working, or working longer, outside the home.

Employees in Other Labor Markets

The influx of rough laborers affects natives in other labor markets (“skilled”) which require certain characteristics – ability to communicate clearly in English – that make the substitution of immigrants for native workers difficult. A wage increase in the market for rough labor will have scale and substitution effects that work in opposite directions. If wages for rough laborers fall, and skilled and unskilled workers are substitutes in production, the substitution effect will tend to reduce the demand for skilled workers. The falling cost of unskilled labor may also trigger a scale effect that increases the demand for skilled labor – and the size of the scale effect would be enhanced by the overall growth in population.

Scale and Substitution Effects

Workers who are not close substitutes for unskilled immigrant labor may benefit from immigration because of the increase in consumer demand. In the case of immigration, the scale effect is assumed to be very large because as the working population rises, the economy’s aggregate demand increases.

Empirical Estimates of the Effects on Natives

Studies found the influx of low-skilled immigrants into cities to have rather small/negligible effects on wages of workers with a HS education or less. Some economists argued that many low-skilled natives left the cities in response to the influx of immigrants thus these studies could not actually measure the ultimate effects on their wages. Other studies concluded that immigration between 1980 and 2000 reduced the average wages of natives by less than half a percent both in the short-run and the long-run other found negative effects but small.

Do the Overall Gains from Immigration Exceed the Losses?

What Do Immigrants Add?

 Authorized or unauthorized immigrants are both consumers and producers, therefore, whether their influx makes a country richer or poorer depends on how much the immigrants add to overall production in comparison to how much they consume. Elderly immigrants who are here to be re-united with their adult children are likely to be dependent on their children or on the American taxpayers thus decreasing the overall per capita disposable income of natives. If immigrants work after their arrival, they will not be paid more than the value of their marginal revenue product, therefore, if they rely on their own earnings to finance their consumption, they would not reduce the per capita disposable income of natives.

Immigrants, Taxes, and Public Subsidies

If taxes paid by immigrants are sufficient to cover the benefits that immigrants receive, their presence will not affect per capita disposable income of natives adversely. If immigrants are high users/consumers of government provided public goods and services and if the taxes they pay do not cover the value of their benefits, the “fiscal burden” of immigration could be large enough to reduce aggregate income of natives. Studies found that immigration increases the overall in taxes as they receive in government benefits. A recent study suggests that immigrants may even be less likely to put a burden on their host communities than the native-born.

Overall Effects of Unauthorized Immigration

Undocumented immigration has been the major focus because of the perception that they are the beneficiaries of many government services but are able to avoid paying taxes due to their undocumented status – they pay sales taxes. Unauthorized immigrants are associated with greater propensity to commit crimes in their host communities and states. Unauthorized immigrants are here mainly to work, therefore, they add to the production of domestic goods and services – some use fake Social Security card to secure employment. Unauthorized immigrants receive emergency-room treatment and their children get schooling, but they are ineligible for most government programs.

Employee Turnover

Unlike geographical mobility, employee mobility or turnover (or “separations”) of employees among employers can take place without a change of residence. Human capital theory highlights certain patterns in employee turnover/separations. Individuals have different personal discount rates and psychic costs that they attach to quitting one employer to find another – mobility/turnover will depend on these differences even if those in both groups are given the same set of wage offers. If wage rates are similar, the probability of turnover is lower, other individual idiosyncrasies, there are systematic factors that influence the patterns of job mobility/turnover.

Wage Effects

Human capital theory predicts that a given worker has a greater probability of quitting a low-wage job for a higher-paying one. Virtually all studies found that employees in lower-wage-industries have higher quit rates, other things equal. At individual levels, research shows that those who change employers have more to gain.

Effects of Employer Size

Quit rates tend to decline as firm size increases because they offer more opportunities for transfers and promotions. Large firms have highly mechanized production processes, and they pay higher wages to reduce the turnover/quit rates. Large firms have greater needs for dependable and steady workers because employee quitting could impose great costs – hence they establish “internal labor market.”

Muhammad Firman (University of Indonesia - Accounting)
Motivating Workers: An Overview of the Fundamentals
Employers and workers each have their own objectives, concerns, and interests that can be aligned through different incentive schemes or systems. Employers can develop/design various compensation schemes to induce high productivity among their workers.

The Employment Contract
Employment relationship can be viewed as a contract between the employer ("principal") and the employee ("agent") – the "principal-agent" problem.

Formal Contracts –Once a formal contract is signed, it cannot be abrogated by either party without penalty – that is, it is legally enforceable.

Implicit Contracts – Most employment contracts are incomplete and implicit – there are many unspecified informal understandings.

Coping with Information Asymmetries
Opportunities for cheating/deception are enhanced when information is asymmetric – when one party knows more than the other about its intentions or performance under the contract.

Discouraging Cheating: Signaling – One way to avoid being cheated is to make transaction with the "right kind" of person and find a way to induce the other party to reveal – or signal – the truth about his or her actual characteristics/intentions.

Discouraging Cheating: Self-Enforcement – The key to a self-enforcing agreement is that losses are imposed on the cheater without proving that a violation has occurred. Self-enforcement requires that both employer and employee derive more gains from honest continuation of the existing employment relationship than from severing it.

Creating a Surplus – Incentives for both parties to live up to implicit contract are strongest when workers get paid (W) more than they could get elsewhere yet less than their VMPL to the firm (W-VMPL).

Figure 11.1 Two Alternative Divisions of the Surplus

Workers are utility maximizers who can be induced through different systems of rewards to put forth their best efforts. How can employers create rewards that give employees the incentives to work hard toward the goals of the company?

Pay for Performance – This is the most obvious way to motivate workers but has both benefits and costs to employers. Persistent mechanical breakdowns can hinder performance based pay. problem of picking an output (quantitative and qualitative aspects) measure that coincides with employer's ultimate objective.

Time-Based Pay with Supervision – Compensates workers for the number of hours worked, and avoids the variability/uncertainty in performance-based pay. The problem: close supervision is costly.

Motivating the Individual in a Group
The importance of the group in motivating individuals presents both problems and opportunities for the employer.

Issues of Fairness – The issue of fairness in treatment relative to others is of importance to both employers and employees. Workers may quit, reduce their work effort level, steal from the employer, or even sabotage output in order to "settle the score" if they feel they have been unfairly treated.

Group Loyalty – Most people are willing to make sacrifices for their team, school, work group, community, or country; and employers may nurture group/organizational loyalty through some compensation schemes.

CHAPTER 11
PAY AND PRODUCTIVITY: WAGE DETERMINATION
WITHIN THE FIRM

The relationship between compensation and productivity is complex, therefore, employers must continually choose management strategies and compensation schemes to obtain the right (profit-maximizing) kind of employees. Employers must make managerial decisions that are rooted in practical realities, because: Workers differ from each other in work habits and human capital investments. If we control for lower wages and shorter careers of other women, there appears to be no difference between the sexes in the propensity to quit a job.

Cyclical Effects
Human capital theory predicts that workers will have a higher probability of quitting a job for another during economic booms. Quit rates tend to fall when labor markets are loose and rise when labor markets are tight. The unemployment rate is a good measure of labor market conditions – unemployment rate is inversely related to quit rate.

Gender Differences
Women workers have higher quit rates, and shorter job tenures than men. Higher quit rates in women may reflect lower levels of firm-specific human capital investments. If we control for lower wages and shorter careers of other women, there appears to be no difference between the sexes in the propensity to quit a job.

Table 10.2
Monthly Quit Rates per 100 Workers by Firm Size, Selected Industries

<table>
<thead>
<tr>
<th>Industry</th>
<th>&lt;50</th>
<th>50-199</th>
<th>200-499</th>
<th>500-999</th>
<th>1,000 and Over</th>
</tr>
</thead>
<tbody>
<tr>
<td>All manufacturing</td>
<td>3.25</td>
<td>3.12</td>
<td>3.00</td>
<td>2.70</td>
<td>2.20</td>
</tr>
<tr>
<td>Food and kindred products</td>
<td>3.46</td>
<td>4.11</td>
<td>3.35</td>
<td>2.10</td>
<td>2.20</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>3.22</td>
<td>3.64</td>
<td>2.10</td>
<td>2.00</td>
<td>1.20</td>
</tr>
<tr>
<td>Electrical machinery</td>
<td>3.12</td>
<td>3.27</td>
<td>2.60</td>
<td>1.20</td>
<td>1.80</td>
</tr>
<tr>
<td>Transportation equipment</td>
<td>2.70</td>
<td>2.97</td>
<td>2.00</td>
<td>1.20</td>
<td>1.40</td>
</tr>
<tr>
<td>Total</td>
<td>3.00</td>
<td>3.10</td>
<td>2.90</td>
<td>2.50</td>
<td>2.30</td>
</tr>
</tbody>
</table>

The unemployment rate as a good measure of labor market conditions – tightness or looseness – shows the inverse relationship with the quit rate.

Employer Location
Industries with high concentrations of employment in urban areas appear to have higher turnover/quit rates because workers do not incur additional costs that a change of residence would require.

Is More Mobility Better?
Mobility is socially useful because it promotes both individual well-being and the quality (or better) job matches. More workers and more employers in the market provide the economy with the option of finding the "right kind" of job match that best adapt to a changing environment. Lower mobility costs (and greater mobility) among workers also weaken the incentives of both employers and employees to invest in specific training or information peculiar to a job match. On a cautionary note, there is the concern that employers may have created "job lock" by providing pension plans and health care policies that are not portable if the worker leaves the firm.

The Employment Contract

Employers and employees are legally bound by an agreement that is enforceable. A violation has occurred.

Implicit Contracts

Most employment contracts are incomplete and implicit – there are many unspecified informal understandings.

Coping with Information Asymmetries

Opportunities for cheating/deception are enhanced when information is asymmetric – when one party knows more than the other about its intentions or performance under the contract.

Discouraging Cheating: Signaling – One way to avoid being cheated is to make transaction with the "right kind" of person and find a way to induce the other party to reveal – or signal – the truth about his or her actual characteristics/intentions.

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Creating a Surplus – Incentives for both parties to live up to implicit contract are strongest when workers get paid (W) more than they could get elsewhere yet less than their VMPL to the firm (W-VMPL).

Figure 11.1 Two Alternative Divisions of the Surplus

A surplus is the difference between the value of marginal revenue product to the firm and their alternative wage, which must be shared between employers and employees in order to make the implicit contract self-enforcing.

Firms can create a surplus by investing in and building on their reputations – e.g., being known for keeping promises – in order to attract higher productivity workers at lower cost than can employers with poor/bad reputations.

When a surplus is created and regardless of how it is divided, both employer and employees would experience a loss if employment is terminated.

Muhammad Firman (University of Indonesia - Accounting) 37
Productivity and the Basis of Yearly Pay
Employers can compensate workers for their time (most common form in the U.S.), their output, or some hybrid of the two. Compensation schemes must be seen to be satisfactory to both employers and employees.

Employee Preferences
1. Piece rate – Workers earn certain amount for each item/output they produce.
2. Commission –Workers/salespeople receive a fraction or percentage of the value of item/output they sell.
3. Gain sharing – The types of group-incentive plans that at least partially tie earnings to gains in group productivity.
4. Profit-sharing and bonus plans – These relate workers’ pay to the profits of their firms or subdivisions.

Variability of Pay – Due to the presumed risk aversion, workers prefer (why?) the certainty attached to time-based pay rather than the output-based pay plans because of the variability associated not only with this plan but other pay schemes, and the other external factors. Employers would have to pay a compensating wage differential to induce risk-averse employees to accept output-based pay.

Worker Sorting – Workers or Salespeople who choose output-based or commissions-based pay schemes may be signaling (sorting out) to their employers that they are above-average producers.

Pay Comparisons – Earnings of workers on output-based pay might be more than those paid to workers on time-based pay because:
- incentive pay motivates employees to work harder,
- it attracts the most productive and hardworking employees,
- it involves risk that may call forth a compensating wage differential.

Employer Considerations
Employers consider the costs and benefits of offering incentive pay schemes to workers. With incentive pay schemes, employers can afford to spend less time screening and supervising workers because workers bear the responsibility for their high or low productivity. With a time-based pay plan, the employer accepts the risk of variations in workers’ productivity – profits rise when productivity rises and vice-versa. Employers may be less anxious about these variations than workers are.

Pay for Output: Individual Incentives
To employers, the big advantage of individual output-based pay scheme is that it is a way to induce workers to accept a set of work goals that are directly related to output.

The disadvantages are:
- The objective measure of output is difficult to determine, and output quality may be disregarded due to the fast pace of production – quality-control supervision can be very costly.
- The tendency for workers to work so fast, and in the process, proper maintenance and safety procedures are ignored.
- The performance or professional development of others on their work team may be neglected.

Pay for Output: Group Incentives
An employer adopts group incentive pay schemes as the means to more closely harness or align the interests of the employer and employee. The disadvantages are:
- Groups are composed of individuals thus there exists the free-rider problem, and the incentive for some members of the team to shirk since the profits will be shared by all members of the team.
- Admission of wrong sort of workers/members into the group could lead to the exit of good workers in the group.
- Employers may have to devote managerial resources to building organizational loyalties in order to discourage free-riding and shirking.

Group Incentives and Executive Pay
Profit-maximizing firms tie executive pay to firm’s profits, offer them company stock or the options to buy it in the hope to align the interests of the executives (agents) and shareholders (principal). Disadvantages of paying executives or high-ranking corporate decision-makers with company stocks are:
- A company’s stock price is affected by more than its performance, it is also influenced by overall investor “bullishness.”
- Economy-wide fluctuations in stock prices also cause executives’ pay to vary because of things beyond their control, which may force firms to pay them a compensating wage differential for the added riskiness of their pay.
- The incentives that stocks provide are related mainly to the long-term perspective – they induce corporate executives to take when making decisions that affect a company’s strength; once an executive sells his or her stock in the company, these incentives are lost.

Pay for Time, with Merit Increases
Due to risk aversion and the difficulty in devising appropriate measurable outcomes for individual-and group-incentive plans, most employers opt for some form of time-based pay. With time-based pay, compensation and output are not directly linked. Employers try to cope with this problem by using merit-pay plans, which award larger pay increases to workers whose supervisors rate them as the better performers. The problems relating ratings/rankings for merit-based pay are:
- The effort induced among employees may not be consistent with the employer’s interests – effort and output may not correlate well.
- Ratings/rankings of employees by their supervisors may be more subjective due to politicking and the appearance of productivity.

Productivity and the Level of Pay
Due to the difficulties created for both employers and employees by pay-for-performance plans, employers search for other monetary incentives that can be used to motive their workers.

Why Higher Pay Might Increase Worker Productivity
Paying higher wages is assumed to increase worker productivity for several reasons.

Attracting Better Workers – Paying higher wages can attract better workers by enlarging the pool of applicants thus enabling many employers to be very selective in their choice of workers.

Building Employee Commitment – Paying wages above-market wages can help to build employee commitment because:
- paying higher wages relative to what workers could receive elsewhere can minimize the quit rate and the possibility of shirking on the job.
- employees are committed to their employers because losing the job that pays above-market wages could be very costly now and over their lifetime.

Perceptions of Equity – Workers who believe they are being treated fairly are likely to put forth effort, and those who think their treatment is unfair may—get even—by holding effort or even engage in sabotage.

Efficiency Wages
Efficiency wage is the above-market pay at which the marginal revenues to the employer from a further pay increase equal the marginal costs, and this is the level that maximize profits. Payment of efficiency wages has a wide set of implications, and studies show that firms that use efficiency wages are those that:
- stand to gain the most from enhancing worker reliability – perhaps because they have a lot invested in expensive equipment or
- find it most difficult to properly motivate their workers throughout output-based pay or supervision.

Productivity and the Sequencing of Pay
Employers with internal labor markets have options for motivating workers that grow out of their employees’ expected careers with the organization. Prospective applicants to and current employees of employers with internal labor markets are concerned with the present value (PV) of career compensation.

Underpayment Followed by Overpayment
It may be beneficial to both employers and employees to arrange workers’ pay so that employees are “underpaid” early in their careers and “overpaid” later on. Pay sequencing will increase worker productivity and enable firms to pay higher PV of compensation than otherwise, for reasons both related to worker sorting and to work incentives.

Worker Sorting – Pay plans that delay at least a part of employees’ compensation to a time later in their careers have a significant signaling or sorting component.

Worker Incentives – A company that pays poorly at the start but pays well later on increases the incentives of its employees to work diligently/industriously so as to qualify for the later overpayment.

Constraints – There are two constraints with the pay sequencing of W < VMPL/MPRL in a worker’s early career and W > VMPL later:
- PV of the earnings streams offered to employees must be at least equal to alternative streams offered to employees in the labor market.
- the scheme must also satisfy the equilibrium conditions that the firm maximizes profits and does not earn supernormal profits.
Problems – Promotion tournaments tend to attract entrants who are overconfident about their abilities and may harm the interests of their employers by making too many risky decisions – may be overly aggressive. Contestants may allocate effort away from increasing their own output and toward reducing the output of their rivals – where sabotage exists, promotion tournaments can actually reduce an organization’s total output. Another problem of promotion tournaments is about how to treat the losers when the tournaments are over – treating losers callously will not attract future contestants.

Career Concerns and Productivity
Note that employees see themselves as members of a profession or field rather than a member of a particular firm, and are more likely to impress other employers across the industry – due to “career concerns.”

The Distortion of Effort – Other employers can observe objective measures of output performance more easily than the subjective measures, therefore, employees with career concerns have an incentive to allocate their efforts toward measurable areas of performance and deemphasize areas that other employers cannot observe/measure – a strategy that may yield short-run profits even if doing so harms the long-term interests of their current employers.

Piece Rates and Effort – Job opportunities with other employers can distort workers’ allocation of their efforts, and with constantly changing technologies and products, piece rates must be continually reset. Employers can never know for sure just how long it takes to complete a task, even though production workers exert a reasonably high level of effort during production. Workers have incentives to “go-slow” during trial runs so that management will overestimate the time it takes to complete the task and then set a relatively high piece rate.

The Sequencing of Effort – Employees who are concerned about future promotions with current and future employers are driven by two general incentives:

1. one’s current pay, and
2. the chances of future promotion.

Workers who are more likely to be motivated by career concerns and less by pay for performance are the young-inexperienced workers whose abilities are unknown to themselves and their employers. For those with career concerns, the incentive to work hard is strong because they realize that employers are observing them to estimate their abilities and willingness to put forth effort – promotions depend on employers’ beliefs about their ability.

Applications of the Theory: Explaining Two Puzzles
The conceptual issues analyzed so far shed light on two compensation questions that puzzle labor economists:

1. why pay increases with seniority, and
2. why larger employers/firms pay higher wages.

Why Do Earnings Increase with Job Tenure?
There are three sets of explanations for why wage increases should be associated with job tenure, holding age or the general labor market experience constant:

- general human capital and better job matches for both parties
- firm-specific human capital investments shared by both parties
- delayed compensation incentives or systems

Figure 11.3 Alternative Explanations for the Effect of Job Tenure on Wages

Longer tenure and increase in wages reflect the same phenomenon – that better and more productive workers are the ones who stay longer. Firm-specific investments are jointly undertaken by workers and their employers which creates a surplus that is shared between the worker and the firm. Wages are below and rise more slowly. That is, $\text{W} = \text{MRP}$. Why Do Large Firms Pay More?

The explanations that have been offered as to why larger firms pay higher wages are rooted in claims that they need better workers and/or that they have better opportunities to make their workers more productive.
Large firms have economies of scale in job training, and are therefore more likely to offer it, hence they have greater need to attract workers willing to undertake it. Large firms also make use of highly interdependent production processes, which require that workers be exceptionally dependable and disciplined. Larger firms find job vacancies more costly because they tend to be more capital-intensive, therefore, an unfilled job or an unexpected quit could more severely disrupt production. Workers in larger firms are more productive because larger firms have more option for allocating workers to various tasks and machines efficiently.

Note that employers have options of pay schemes that can be used to motivate productivity and thus attract those workers who are seeking long-term attachments. Efficiency wages are a more effective motivator when there is an expected long-term attachment because workers' losses from being terminated rise with both their wage level and the length of their future expected tenure. Large firms pay higher wages and they have enough capital, labor, and customers, so that workers experience less idleness and the most productive workers can be paired with the newest and productive machines.

Deferred-compensation schemes and promotion tournaments can be used only in the context of long-term attachment. Large firms make available to their workers many steps in a career ladder so that long-term attachments between workers and employers are more attractive than in smaller firms. Large firms have more opportunities for adopting efficiency wages, delayed/deferred-compensation plans or promotion tournaments, they may also have a greater need to adopt one or more of these schemes. Due to the sheer size of large firms, they find it more difficult to monitor their employees and thus they must turn to other methods to encourage high levels of efforts.

CHAPTER 12
GENDER, RACE, AND ETHNICITY IN THE LABOR MARKET

There are many forces responsible for the remarkable demographic changes in the U.S. labor market in recent decades – from the increasing labor market attachments of women to the legal and illegal immigration. White workers, who were about 78% of the labor force in 1990, constituted less than 68% by 2010, and are projected to fall to about 62% in 2020 – see Table 12.1. The shares of some of the major demographic groups: women, African Americans, Asian Americans, and Hispanics in the labor force steadily increased during the past two decades – the share of latter group more than doubled from 1990 to 2010 – see Table 12.1. Despite the most rapid growth of the Hispanics in the labor force, they still earn substantially less, on average, than white males for full-time work – see Figure 12.1.

Figure 12.1 (MEAN EARNINGS)

<table>
<thead>
<tr>
<th>Year</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
<th>2020 (Projected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(non-Hispanic)</td>
<td>77.7</td>
<td>72.0</td>
<td>67.5</td>
<td>62.3</td>
</tr>
<tr>
<td>Women (all races)</td>
<td>45.2</td>
<td>46.5</td>
<td>46.7</td>
<td>47.6</td>
</tr>
<tr>
<td>Blacks (both genders)</td>
<td>10.9</td>
<td>11.5</td>
<td>11.6</td>
<td>12.6</td>
</tr>
<tr>
<td>Asians</td>
<td>3.7</td>
<td>4.4</td>
<td>4.7</td>
<td>5.5</td>
</tr>
<tr>
<td>Hispanics (all races, both genders)</td>
<td>8.5</td>
<td>11.7</td>
<td>14.8</td>
<td>18.6</td>
</tr>
</tbody>
</table>

Women of all races who are over the age of 24 and work full-time earned an average of around 70% of what white males earned in 2008 – slightly higher than the 67% in 1990 and much higher than 58% observed in 1970 and 1980.

Age and Education
Age and education are two important and measurable factors that influence earnings. Most recent cohorts of women have levels of schooling at least equal to those of men, the same cannot be said of older cohorts. Age/earnings profiles for women are flatter than the ones for men.

Female/male earnings ratios tend to fall with age for the three educational levels.

Occupation – Women are overrepresented in low-paying occupations and underrepresented in high-paying ones, therefore, some of the difference between the average pay of women and men can be attributed to different occupational distributions. Within the same occupations, women earn less than men.

Hours and Experience – Women average fewer (1% to 5%) hours of market work per week than men do in the same occupation. The major reason for the fewer hours and “experience gap” is the interruptions in labor market attachment due to child-rearing.

Unexplained Differences – There are other unexplained differences for the female/male earnings differentials. Unobserved characteristics that affect productivity discriminatory treatment of women (and other demographic groups)

Table 12.2

<table>
<thead>
<tr>
<th>Age</th>
<th>High School Degree (%)</th>
<th>Bachelor's Degree (%)</th>
<th>Master's Degree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-39</td>
<td>75</td>
<td>80</td>
<td>68</td>
</tr>
<tr>
<td>35-44</td>
<td>67</td>
<td>74</td>
<td>76</td>
</tr>
<tr>
<td>45-54</td>
<td>66</td>
<td>70</td>
<td>61</td>
</tr>
<tr>
<td>55-64</td>
<td>79</td>
<td>72</td>
<td>68</td>
</tr>
</tbody>
</table>

Defining Discrimination – Labor market discrimination exists if individual workers with identical productive characteristics are treated differently because of the demographic group to which they belong.

Wage Discrimination – Wage discrimination is said to be present when prices paid by employers for a given productive characteristic are systematically different for different demographic groups men and women (or minorities and nonminorities) with equal productive characteristics are paid unequally, even in the same occupations.

Occupational Discrimination – With respect to gender, occupational segregation is reflected when there is female-dominated occupations and maledominated ones, and that the occupational choices are directly limited or if they are influenced by lower payoffs to given human capital characteristics.

Measurement: Occupational Segregation – One of the measures used to summarize the inequality of gender representation across detailed occupational categories is the index of dissimilarity, which indicates the percentage of the other gender that would have to change occupations for the two to have equal occupational distributions.

Measurement: Occupational Segregation

- The index would equal 100 if all occupations were completely segregated.
- The index would equal 0 if men and women were equally distributed.
- The computed index for 470 narrowly defined occupations showed a decline in the index of dissimilarity from 68 in 1970, to 59 in 1980, to 53 in 1990.
- The effects of occupational segregation on the earnings of women are more pronounced in the U.S. than in many European countries.
- Not all gender segregation is the result of labor market discrimination because pre-market differences or preferences

Muhammad Firman (University of Indonesia - Accounting)
formed before labor market entry or choices made later explain part of gender earnings differences.

**Measurement: Wage Discrimination**

Wage discrimination can be measured in a four-step process.

1. Collect data for men and women separately in the following areas: age, education and training, experience, tenure with current employer, hours of work, firm size, region, intensity of work effort, industry, and the job’s duties, location, and working conditions.

2. Use regression analysis to estimate the statistical importance and the explanatory power of each of these characteristics in the earnings of women.

3. After step 2, then estimate how much women would earn if their productive characteristics were exactly the same as those of men.

4. Compare the hypothetical average earnings level calculated for women (in step 3) with the average actual earnings of men. This comparison would yield an estimate of wage discrimination because it reflects the effects of the different prices for productive characteristics paid to men and women.

**Can We Infer Wage Discrimination?**

There are two problems with this “ideal” measure of wage discrimination.

1. Isolating the effects of labor market discrimination requires us to separately categorize the effects of pre-market differences in productive characteristics on overall wage differentials — a question that is difficult to answer is the extent to which these pre-market choices are themselves affected by discrimination in the labor market. For example, are women’s pre-market preferences and occupational choices free of or are they constrained by the discriminatory behavior in the labor market?

2. There are no available data on all the pre-market variables that affect wages, therefore, the four-step procedure may overstate the extent of labor market discrimination. Lack of data on relevant pre-market variables will be captured in the residual of the regression equation, hence, we cannot conclude that all the unexplained residual is caused by labor market discrimination.

**Analyzing Wage Differences — Studies using 1998 and 2000 data estimated that women in the sample earned about 80% as much as men and that they would have earned about 91% as much if their productive characteristics had been equalized.**

Studies found: that differences in labor market experience explained the largest part of the observed gender gap in earnings, while differences in occupational distribution contributed roughly 3 percentage points of the original 22% gap evidence that it is experience as a full-time worker that is crucial for both men and women.

**Earnings Differences between Black and White Americans**

The racial earnings gaps narrowed in the 1970s but have not been eliminated. In the 1970s, however, there was no major difference in the fraction of adult male employees in the two groups who work part-time. Significant disparity exists in the employment-to-population ratios see Table 12.4.

**Differences in Employment Ratios — The employment ratio is a function of two published rates: the group’s labor-force participation rate (LFP) and its unemployment rate. Black women have had higher LFP than white women over the 1970 to 2009 period; while black men have had consistently lower LFP than white men.**

Table 12.4

<table>
<thead>
<tr>
<th>Year</th>
<th>Blacks (%)</th>
<th>Whites (%)</th>
<th>Blacks (%)</th>
<th>Whites (%)</th>
<th>Unemployment Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>71.9</td>
<td>77.8</td>
<td>77.6</td>
<td>81.0</td>
<td>7.3</td>
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<tr>
<td>1980</td>
<td>62.5</td>
<td>74.0</td>
<td>72.1</td>
<td>70.3</td>
<td>13.5</td>
</tr>
<tr>
<td>1990</td>
<td>61.8</td>
<td>73.2</td>
<td>70.1</td>
<td>67.9</td>
<td>11.8</td>
</tr>
<tr>
<td>2000</td>
<td>63.4</td>
<td>72.9</td>
<td>69.0</td>
<td>75.4</td>
<td>8.1</td>
</tr>
<tr>
<td>2012</td>
<td>54.1</td>
<td>65.8</td>
<td>63.6</td>
<td>71.0</td>
<td>15.0</td>
</tr>
</tbody>
</table>

The unemployment rates of blacks are a cause of their lower employment-to-population ratios, and for both men and women, the unemployment rate among blacks is approximately twice that among whites. Black workers suffer disproportionately in a recession despite the apparent constancy of the black/white ratio of unemployment rates.

**Ocational Segregation and Wage Discrimination**

Findings show that occupational segregation appears to be less prevalent by race than by gender and that racial occupational dissimilarities are smaller and have fallen faster over time than gender related ones. Studies of wage discrimination conclude that the conventionally measured productive characteristics account for much, but clearly not all, of the observed earnings gap between black and white. A study estimated that if black men had the same productive characteristics as white men, they would receive earnings 89% of those received by whites.

**Earnings Differences by Ethnicity**

Full-time earnings of men from selected ancestral groups relative to the U.S. average show the relatively high earnings of men whose ancestry was Russian, Italian, or Japanese in comparison to the low earnings of those whose ancestry is Native American, Mexican, or Puerto Rican.

Men of Japanese, Chinese, and Russian ancestry had average levels of college attainment roughly twice the national average of 1.6 years in 1990 while men from Puerto Rican and Mexican backgrounds had average levels that were under half the national average. Recent studies have found evidence that there are important intergenerational transfers of “ethnic human capital” some of which is manifest in divergent rates of return to education.

**Theories of Market Discrimination**

Three general sources of labor market discrimination that have been hypothesized are: personal prejudice, statistical prejudgment, and noncompetitive forces in the labor market.

**Personal-Prejudice Models: Employer Discrimination**

The models on personal prejudice assume that employers, customers or employees have prejudicial tastes — they have preferences for not associating with members of certain demographic groups.

Some Simplifying Assumptions:

- Assume that white male employers are prejudiced against women and minorities but that customers and fellow employees are not.
- Women and minorities are assumed to have the same productive characteristics as white males.

If employers have a decided preference for hiring white males in high-paying jobs despite the availability of equally qualified women and minorities, they will act (subjectively) as if women and minorities were less productive than the white males.

Let MRP = marginal revenue productivity of all workers in aparticular labor market

\[ d = \text{the coefficient of discrimination or the extent to which productivity is subjectively devalued for minorities and women} \]

\[ 	ext{if market equilibrium for white males is reached when their wage (WM) equals MRP, that is:} \]

\[ 	ext{MRP} = \text{WM} \quad (12.1) \]

For women and minorities, equilibrium is achieved only when their wage (WF) equals their subjective value to firms/employers:

\[ \text{MRP} - d = \text{WF} \quad (12.2) \]

or

\[ \text{MRP} = \text{WF} + d \quad (12.2a) \]

Since MRPs are equal by assumption, equations (12.1) and(12.2a) are equal to each other, we can see that WM > WF:

\[ \text{WM} = \text{WF} + d \quad (12.3) \]

or

\[ \text{WF} = \text{WM} - d \quad (12.3a) \]

The economic logic of this algebraic expression is that the relative productivity of women and minorities is devalued by employers, workers in these groups must offer their services at lower wages than white males in order to compete for jobs.
**Profits under Employer Discrimination**

The model of employer discrimination has two major implications, as illustrated by Figure 12.2 and equation (12.2a): A discriminatory employer faced with a market wage of WF for women and minorities will hire less workers (N0), because at that point MRP = WF + d → see Figure 12.2. Profit-maximizing employers will hire N1 workers, that is, they will hire until MRP = WF → see Figure 12.2. The profits of nondiscriminatory profit-maximizing employers will be higher than those who discriminate—that is, discriminators give up profits in order to indulge in their prejudices.

**Figure 12.2 Equilibrium Employment of Women or Minorities in Firms That Discriminate**

![Figure 12.2](image)

**Pay Gaps under Employer Discrimination**

Employers differ in their preferences – some are willing to hire women or minorities at small wage differentials and others require larger ones – see Figure 12.3. There a number of nondiscriminatory profit-maximizing employers who will hire up to Na women and minorities at relative wage of unity (that is, at WF = WM). For those employers with discriminatory preferences, WF must fall below WM (such as WF = 0.75WM ) to induce them to hire women and minorities – see Figure 12.3.

**Figure 12.3 Market Demand for Women or Minorities as a Function of Relative Wages**

![Figure 12.3](image)

**Theories of Market Discrimination**

From Figures 12.3, 12.4, and 12.5, there are three empirical predictions about race-related wage gaps:

1. Race-related pay gaps will be greater (holding human capital constant) when the black population in a region is greater.
2. Pay gaps will be larger, other things equal, when the prejudice of the white employers who hire blacks is greater.
3. Pay gaps will be unaffected by the level of prejudice of the most prejudiced employers (the ones who do not hire blacks).

**Which Employers Can Afford to Discriminate?**

The employer discrimination model implies the discriminators maximize utility (satisfying their prejudiced preferences) instead of profits, and as a result, their survival is questionable because with the presence of competitive forces, the nondiscriminatory firms would make more profits and end up buying them out and take over the market. The opportunity to indulge in discriminatory preferences is especially strong among monopolies that face government regulation, because the costs of this wasteful practice make profits look smaller to regulatory bodies. Studies of the banking and trucking industries provide evidence that is consistent with greater presence of race and gender discrimination among regulated monopolies.

**Personal-Prejudice Models: Customer Discrimination**

As a personal-prejudice model, it stresses customer prejudice as a source of discrimination: in some situations, customers may prefer to be served by white males and by women or minorities in others. One of the implications of customer discrimination is that it will lead to segregation in the occupations with high customer contact: Firms that cater to discriminatory customers will hire only the preferred group of workers, pay higher wages, and charge higher prices. A study of TV viewership for professional basketball games in the United States found that ratings rose when there was greater participation by white players.

**Personal-Prejudice Models: Employee Discrimination**

As a personal-prejudice model it stresses the situations in which white male workers may avoid to interact with minorities or women in ways they consider distasteful. White males with discriminatory preferences tend to quit or avoid working for employers who hire and promote on a nondiscriminatory basis. It is costly to eliminate employee discrimination because white males constitute a large fraction of the labor force, and producing without them will be difficult. The most direct test for the presence of employee discrimination comes from a study that found young white males earned more in racially integrated workplaces than if they worked in segregated environments.

**Statistical Discrimination**

Statistical discrimination occurs when in addition to using personal characteristics of the applicants, the average characteristics of the group are factored into the hiring decision even in the absence of personal prejudice. Statistical discrimination can be viewed as part of a screening problem that arises when observable personal characteristics that are correlated with production are not perfect predictors. The use of group data in making hiring decisions can give rise to market discrimination because people with the same measured productive characteristics (test scores, education attainment experience, etc) will be treated differently depending on group affiliation.

**Figure 12.6 The Screening Problem**

![Figure 12.6](image)
The assumption is that two grades of workers applied for a secretarial job: those who can type 70 words per minute (wpm) over the long haul and those who can type 40 wpm. It is also assumed that the workers’ actual productivities are unknown to the employer. The test-score distributions for both groups of workers showed that those who can actually type 70 wpm score 70 on average, but half score less. Likewise, half of the other group score better than 40 (say 55) on the test. If the employer automatically rejects those scoring 55, this may lead to rejecting some good workers, and if it accepts those scoring 55, some bad workers will be hired.

Noncompetitive Models of Discrimination
The noncompetitive models of discrimination are based on the assumption that individual firms have some degree of influence over the wages they pay, either through collusion or through some source of monopsonistic power.

Crowding – the existence and extent of occupational segregation by gender (“male” jobs or “female” jobs) have caused some to argue that it is the result of a deliberate crowding policy intended to lower wages in certain occupations.

Women are artificially crowded into certain jobs with lower wages, and one would expect that firms employing only men would find it attractive and profitable to replace these men with less-expensive women workers, and that this profit-maximizing behavior should eventually eliminate any wage differential.

Figure 12.7 Labor Market Crowding

In Panel (a), wage WH is relatively high while Panel (b) depicts a market in which crowding causes supply to be large relative to demand thus resulting in wage WL that is comparatively low – femaledominated sector.

Dual Labor Markets
As a variant of the crowding hypothesis, the more recent view is that the labor market is divided into two noncompeting sectors, namely: the primary labor market (or sector), which offers jobs with relatively high wages, stable employment, good working conditions, and opportunities for advancement the secondary labor market (or sector), which offers jobs with low wages, unstable employment, dead-end jobs with poor working conditions, and the returns to education and experience are thought to be close to zero. Women and minorities are relegated to the secondary sector, and they are at a disadvantage and undesirable workers with little hope of acquiring primary-sector jobs.

Search-Related Monopsony
As the third model covering restricted mobility, the search-related monopsony is built around the presence of job search costs for employees because some employers will refuse to hire women or minorities due to:
– their own prejudices,
– prejudices of their customers, or
– prejudices of their employees.

Minorities and women looking for jobs search longer and harder than do white men to generate the same number of job offers, therefore, their search costs are greater. As workers, white men, women, and minorities have the same level of productivity, that is, same MRP; but minorities and women have higher search costs than white men.

Figure 12.8 Search-Related Monopsony and Wage Discrimination

Panel (a) depicts the supply curve and MRPL for white males with relatively low search costs. The labor supply curve (SM) is relatively flat, which means the marginal expense of labor curve (MEL) is relatively flat. A profit-maximizing employer will hire EM workers from this group and pay them WM, which is slightly below MRPL. Panel (b) shows the relevant curves for women and minorities with higher search costs, which imply a more steeply sloped labor supply curve (WF) and marginal expense of labor curve (MEL)P. In this group, EF workers are hired at a wage of WF, which is much below their MRPL. Comparing panels (a) and (b), WF < WM despite the fact that both groups have the same MRPLs.

The search-related monopsony invites two comments:

1. The monopsony model is a potential explanation for the small and uncertain responses to employment to mandated wage increases under minimum wage laws; and it explained the lack of employment decline associated with mandated wage increases for women under the United Kingdom’s Equal Pay Act of 1970. If prejudice increases the job search costs for women and minorities so that members of these groups are less likely to search for alternative offers of employment, their job matches will be of lower quality than job matches for white men.

Collusive Behavior
As one of the more explicit collusive theories of discrimination, it is argued that prejudice and the conflicts it creates are inherent in a capitalist society because they serve the interests of owners. Workers divided by race or gender are harder to organize and, if they are unionized, they are less cohesive in their demands; and as argued, the capitalists gain, while all workers—but particularly minorities and women— lose from discrimination. If all white employers (say, A through Y) conspire by agreement to keep women and minorities in low-wage, low-status jobs, they can all reap monoply profits. Employer Z can break the agreement by hiring women or minorities cheaply and enhance its profits by hiring these equally productive workers, even though other employers agree not to hire them.

A Final Word on the Theories of Discrimination
All models of discrimination agree on one thing: any persistence of labor market discrimination is the result of forces that are either noncompetitive or very slow to adjust to competitive forces. No model is superior to the others in explaining the facts, the various theories and the facts they seek to explain suggest that government intervention might be useful in eliminating the noncompetitive (or sluggish) influences.

Federal Programs to End Discrimination
The government has taken several approaches to combat the causes or effects of discrimination: Mandate nondiscrimination – implying that race, ethnicity, and gender in their personal decisions and take steps to ensure that protected groups are not underrepresented.

Equal Pay Act of 1963
Before 1960s, sex discrimination was officially sanctioned by laws that limited women’s total weekly hours of work and prohibited them from working at night, lifting heavy objects, and working during pregnancy. The Equal Pay Act of 1963 outlawed all these laws and also outlawed separate pay scales for men and women using similar skills and performing work under the same conditions. The Equal Pay Act took a step toward the elimination of wage differentials, but in doing so, it tended to suppress a market mechanism that helped women obtain greater access to jobs. The Act failed to acknowledge that if labor market discrimination is to be eliminated, legislation must require that both equal pay and equal opportunities in hiring and promotions for people of comparable productivity.

Title VII of the Civil Rights Act
Title VII of the Civil Rights Act of 1964 applies to all employers in interstate commerce with at least 15 employees, and it corrected some defects in the Equal Pay Act of 1963 by making it unlawful “to refuse to hire or to discharge any individual, or otherwise to discriminate against any individual with respect to his compensation, terms, condition, or privileges
of employment, because of such individual’s race, color, religion, sex, or national origin.”

The Equal Employment Opportunity Commission (EEOC) is responsible for enforcing all the provisions of Title VII, and it has the authority:
- to mediate complaints,
- encourage lawsuits by private parties or the U.S. attorney general, or
- bring suits itself against employers.

The federal courts have fashioned two standards of discrimination that may be applied when discriminatory employment practices are alleged – disparate treatment and disparate impact. Disparate treatment occurs under Title VII if individuals are treated differently based on their race, sex, color, religion, or national origin and it can be shown that there was an intent to discriminate. The disparate impact standard addresses the present effects of past discrimination – it is the result that matters, and not the motivation. Enforcement of Title VII using the disparate impact standard has raised several issues regarding hiring, promotion, and pay decisions—such as defining who should be considered in a firm’s potential hiring pool – statistical: what constitutes convincing (significant) evidence of underrepresentation;
- how employers award seniority to workers
- how to judge “equal pay” when occupations are segregated

Seniority—Many firms use seniority as consideration in allocating promotion opportunities and in layoff situations—hired last, first fired. Seniority can be calculated either as tenure within the plant or as time served within a department of the plant. In both cases, such systems have worked against minorities and women who have been hired or promoted to nontraditional jobs as a result of Title VII or some other antidiscrimination program.

Comparative Worth: In Theory—Because occupations are so segregated by gender and that men and women rarely do “equal work,” some have come to support the goal of equal pay for jobs considered to be of “comparable worth.” For example why is the “male” occupation of maintaining machines (general maintenance mechanics) paying, say $15 per hour, while the “female” job of maintaining children (child-care worker) pays, say $8.50 per hour? Should those who take care of human beings be paid less than those who take care of machines?

Comparative Worth: In Practice—Comparative worth policies relied on job-rating schemes used by employers with internal labor markets to determine if job pay differentials associated with job titles or promotion steps. The process involves:
- assigning points to each job according to knowledge and problem-solving abilities required,
- its level of accountability,
- the physical conditions of work,
- other job characteristics,
- jobs with equal point values would receive equal pay, and
- jobs assigned higher point values would receive higher pay.

The critical aspect which both sides of the comparable worth argument see as a problem is the process by which points are awarded to each job. Opponents of comparable worth argue that job ratings can be used to unjustifiably raise the pay in targeted jobs above market level, while proponents argue that job ratings now used within firms unfairly lower the value of women’s jobs. The major push for comparable worth in the United States has come in the state and local government sector. The estimated effects of implementing comparable worth in the United States, Canada, and the United Kingdom have been neither as positive as its proponents had hoped nor as dire as its critics had portended. The effects on male-to-female wage differentials appear small, as do any negative effects on female employment.

The Federal Contract Compliance Program
The U.S. Office of Federal Contract Compliance Program (OFCCP) was established in 1965 to monitor the hiring and promotion practices of federal contractors. OFCCP requires contractors above a certain size to analyze the extent of their underutilization of women and minorities and to propose a plan (affirmative action plan) to remedy such underutilization. Affirmative action planning (affects both hiring and promotion practices) is intended to commit firms to a schedule for rapidly overcoming unequal career opportunities afforded to women and minorities. Apart from the argument that affirmative action has responded to the reverse discrimination against white males, the potential effects of the contract compliance program have been questioned on two grounds:
- If underrepresented groups are to be given preference in hiring, will firms be required to hire less-qualified workers?
- Since the program covers only federal contractors, will qualified minorities and women just be shunted from the noncovered to the covered sector, with no overall gain in employment?

Those in favor of affirmative action point out that even if nondiscrimination in personnel actions were to be scrupulously followed, it still would not be an expeditious way to overcome the adverse effects of past discrimination. For the hypothetical firm above, black workers represent 12% of the firm’s hiring pool, but in year 0, they are only 6.25% of the firm’s 1,600-person workforce. If the firm is not growing, the only opportunities come when workers quit, which they do at rate of 20% each year. Because of these limited hiring opportunities, and 20% of black workers hired subsequently leave each year, the table shows that nondiscrimination in hiring would not achieve proportionate representation even in 10 years.

Effectiveness of Federal Antidiscrimination Programs
A comprehensive review of federal affirmative action programs concluded that they have redistributed employment opportunities (considered not to have been very large) among federal contractors (who generally pay more than noncontractors) toward blacks and women. The ratio of black to white incomes has risen since 1960, but the debatable issue is whether this rise was the result of government efforts or other forces worked to accomplish this result. Three other forces commonly cited are:
- (1) the improvement in the educational attainment of black workers relative to those of whites during this period played an important role in raising the ratio of black to white earnings,
- (2) there is evidence that the quality of schooling improved more after 1960 for blacks than for whites — study found that from 195% to 20% of the increased earnings ratio can be attributed to enhanced school quality,
- (3) the large reduction in the labor force participation rates among blacks was centered in the least-educated group of workers, the average earnings of those who remained employed were thereby increased, giving the appearance of improvement.

The greatest gains in black/white earnings ratio during the 1960–1975 period were in the South, where segregation was most blatant and where federal antidiscrimination efforts were greatest.

Estimating Comparable-Worth Earnings Gaps: An Application of Regression Analysis
It is difficult, even for economists, to establish the worth of a job independent of market factors even though formal job evaluation methods existed for a long time, Minnesota, in conjunction with Hay Associates, began an evaluation of state government jobs in 1979 using the “Hay Points.”

Hay Points (HPs) are the sum total of scores based on four job characteristics:
1. Required know-how
2. Problem-solving
3. Accountability
4. Working conditions

The basic idea is to ask what the relationship is between the salary (Si) each male job pays and its total HPI score. Using the method of least squares, the application of this method to the data for the male occupation in the Minnesota data yielded a simple regression estimate as:

\[ Si = 1012 + 3.3 \text{HPI} \]  

(12A.1)

For example, if male job i were rated at 200 HPs, the monthly salary for male job i would be:

\[ Si = 1012 + 3.3 \times 200 = 1,672 \]

If there is no wage discrimination against women and the value of a job could be determined solely by reference to its job evaluation score, male and female jobs rated equal in terms of total HP scores would pay equal salaries.

Figure 12A.1 Estimated Male Comparable-Worth Salary Equation

Table 12.6

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Estimating Comparable-Worth Earnings Gaps: An Application if Regression Analysis
A test of whether female jobs are discriminated against is to see if the salaries paid to women and minorities are systematically less than that predicted by equation (12A.1). Figure 12A.2 shows the scattered plots of salary and HP combination for female jobs in which:

- Line AA is the estimated male job i salary equation, which represents the best line of fit for salary/HP for male job i on the female salary/HP job,
- All scattered plots for female jobs fall below the AA line (except for three instances).

Take any specific HP (say, HP = 300) for both male and female and compare: see Figure 12A.2.

The Legal Structure of Unions in the United States
Prior to the Great Depression, the public did not favor unions and employers frequently used “yellow dog contracts.” Under the New Deal in the 1930s, the legal environment treating unions and employers changed. Four major public laws influenced the movements of unions:

The Norris-LaGuardia Act of 1932
restricted court orders and injunctions that hampered union movement made yellow dog contracts unenforceable in federal courts National Labor Relations Act of 1935 (Wagner Act)
- defined unfair labor practices (firing, blacklisting, etc) for employers required employers to bargain in good “faith” with unions
- gave workers the right to organize
- the National Labor Relations Board runs and hold certification elections

Taft-Hartley Act (The Labor-Management Relations Act of 1947)
- curbed excessive power of unions
- allowed states to pass right-to-work laws
- allowed union members to hold decertification elections

Landrum-Griffin Act (The Labor-Management Reporting and Disclosure Act of 1959)
- passed to curb corruption of union leaders
- required complete disclosure of union activities and finances
- required regularly scheduled elections and accountability of union leadership

Government Unions
Before the 1960s, workers in the public sector were prohibited from organizing. Executive Order No. 10988 of President Kennedy in 1962 gave federal workers the right to organize/unionize and bargain over working conditions but not over wages. The Civil Service Reform Act of 1978 superseded President Kennedy’s executive order – it prohibits public workers from going on strikes.

Union Membership
Union membership peaked in the years following World War II at about one-third. Unionized workers in the United States are members of “local” unions organized at the level of the plant, the employer, or (especially for construction unions), AFL-CIO is not a union but as a federation or association of unions, it is at the top of the union structural “pyramid.” American Federation of Teachers, United Mine Workers, and the Actor’s Equity Association – account for 80% of union members in the U.S. National unions are also affiliated with AFL-CIO. Consist of local unions or craft unions. AFL-CIO and national unions also engage in political lobbying to provide political voice for its diverse members.

Table 13.1
Union Membership and Bargaining Coverage, Selected Countries, 1990, 2008-2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Union Membership as a Percentage of Workers</th>
<th>Percentage of Workers Covered by a Collective Bargaining Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1990</td>
<td>2010</td>
</tr>
<tr>
<td>America</td>
<td>48.5</td>
<td>58.1</td>
</tr>
<tr>
<td>France</td>
<td>1.9</td>
<td>1.6</td>
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<td>Sweden</td>
<td>60.0</td>
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<td>Australia</td>
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<td>18.3</td>
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<td>Netherlands</td>
<td>24.3</td>
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<td>United Kingdom</td>
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<td>72.4</td>
</tr>
<tr>
<td>Canada</td>
<td>34.0</td>
<td>27.5</td>
</tr>
<tr>
<td>Japan</td>
<td>35.4</td>
<td>18.4</td>
</tr>
<tr>
<td>United States</td>
<td>85.5</td>
<td>11.4</td>
</tr>
</tbody>
</table>

The degree of political effectiveness of union movements.

Table 13.2

<table>
<thead>
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<th>Chapter 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIONS AND THE LABOR MARKET</td>
</tr>
</tbody>
</table>

Union Structure and Membership
Labor (industrial or craft) unions are organizations of workers whose primary objectives are to improve (maximize) the pecuniary and nonpecuniary conditions of employment among their members. Unions can flourish only when firms earn above-normal profits. Unions bargain with employers and they influence practically all aspects of the employment contract:

- pay and employees benefits,
- conditions of work,
- policies regarding hiring, overtime, job assignment, promotion, and layoff, labor turnover and job satisfaction
- the means or process by which grievances or disputes between workers and management are to be resolved.

International Comparisons of Unionism
Unionization in the United States has declined more rapidly than in other nations. The United States and Japan are notable in the relatively small percentage of their workers who are covered by collective bargaining agreements. Australia and most European countries have collective bargaining coverage that extends to a very high fraction of workers who are not union members. Differences in unionization across countries arise from variations in the degree of political effectiveness of union movements.

Figure 12A.1
Monthly Salary for Each Male Job ($M$)

Figure 12A.2
Monthly Salary for Each Female Job ($F$)
Constraints on the Achievement of Union Objectives

According to Samuel Gompers (founder of the AFL), labor unions want “More,” therefore, their objectives are quite numerous and complex. Some of the objectives of unions are procedural, especially in handling of various personnel issues.Procedural objectives are not always costly to the employer who may want a mechanism through which employee participation in management decisions can be achieved. The fundamental market constraints on the ability of unions to accomplish their objectives are:

- the shape of the downward-sloping labor demand curve, and
- the elasticity of the labor demand curve.

Figure 13.2 Effects of Demand Growth and the Wage Elasticity of Demand on the Market Constraints Faced by Unions

The Monopoly-Union Model

The monopoly unionism is a model where the union sets the price (wage) of labor and the employer responds by adjusting employment to maximize profits. It is assumed that the union values both wages and the employment levels of its members. The union’s utility function is assumed to depend on wages ($W$) and employment ($E$) of members:

\[ U = f(W, E) \]

If an employer agrees with the wage set by the union and adjusts the employment levels, this will reduce the level of employment of union workers.

Figure 13.3 Union Maximizes Utility Subject to the Constraint of the Labor Demand Curve

The Efficient-Contracts Model

The contract curve depicted by line ed in Figures 13.5.

(1) The contract curves lie off and to the right of the firm’s labor demand curve, which means that the firm is using more labor than it would if it had a unilateral control over employment.

(2) It is not necessary for the slope of the contract curve to be up and to the right. The shape of the contract curve will depend on the shapes of the union’s indifference curve and the firm’s isoprofit curves.

The Contract Curve

There are two things to point out about the contract curve depicted by line ed in Figures 13.5.

The Activities and Tools of Collective Bargaining

Are Contracts Really Efficient?

The language of collective bargaining agreements provides the best evidence as to whether or not contracts are efficient – evidence from studies are ambiguous as to whether contracts are really efficient. Many collective bargaining agreements show evidence of joint agreement on employment levels such as teachers’ contracts that specify maximum class sizes or minimum teacher/student ratios, or the no lay-off provisions for certain core workers in private sector contracts. Many contracts contain specific (or very rigid) languages with respect to the use of excess labor such as the requirement that duties cannot be performed “out of job titles,” so a custodian could not paint a scuffed wall (a painter would be required).
Unions provide a voice for union membership and they use the political process in the attempt to alter the market constraints they face. Unresolved disputes/grievances between unions and employers could lead to the call for strike or a resolution through a third-party arbitration.

**Union Membership: An Analysis of Demand and Supply**

The desire for workers to be union members depends on the price (initiation fees, monthly dues, and value of the expected time spent on union activities) of union membership. Price and membership are inversely related — the higher the price, the lower the fraction of employees that will want to be union members.

Figure 13.6 The Demand for and Supply of Unionization

Demographic Changes

Despite the substantial increase in the fraction of women in the labor force over the past decades, women have historically tended not to join unions; therefore, these demographic changes are unlikely explanation for the decline in union membership in the United States. The benefits from union membership depend on individuals’ expected tenure with firms, seniority provisions, job security, and retirement benefits, which are not worth much to individuals who expect a shorter tenure with a firm.

Changing Industrial Mix

The decline in union membership in the United States over the years can be attributed to the shift in the industrial composition of employment, and the substantial decline in the employment shares of the most heavily unionized industries in the private sector: manufacturing, mining, construction, transportation, and public utilities. The sectors (wholesale and retail trade, finance, insurance, real estate, and service industries) where the employment has increased over the past years are the least-unionized; and they are small establishments where competition is very high with high price elasticity of product demand and thus high elasticity of labor demand — the concept of derived demand.

Regional Shifts in Employment

The movement in population and employment that occurred since 1955 from the industrial Northeast and Midwest to the South and West may have also contributed to the decline in union strength. South and Southwest are heavily represented by 22 states that have right-to-work laws where employed workers cannot be compelled to become union members. South and Southwest are heavily represented by 22 states that have right-to-work laws where employed workers cannot be compelled to become union members as a condition for employment. In Figure 13.6, this means the supply curve shifts to the left with higher P and lower percentage of the workforce unionized. Between 1955 and 2010, the proportion of workers working in right-to-work states increased from 24 to 44 percent.

Competitive Pressures

Increased foreign competition in manufacturing and the deregulation of the airline, trucking, and telephone industries (which tend to be heavily unionized in the past) also contributed to the decline in unionization in the United States. Increased product-market competition may well call forth employer responses — such as relocation to areas where workers are less likely to unionize — that affect workers’ demand for unions. Increased competition may cause employers to resist union-organizing efforts more vigorously.

Employer Resistance

Employers play active roles in opposing union-organizing campaigns using both legal and illegal means. According to the National Labor Relations Act, it is legal for employers to present arguments to employees detailing why they think it is the workers’ best interests to vote against a union. Employers can also hire consultants to advise them on how to best conduct a campaign to prevent a union from winning an election. It is illegal for an employer to threaten to withhold planned wage increases if the union wins the election or for a firm to discriminate against employees who are involved in the union-organizing efforts. Employers’ resistance to unionization increased during the 1970s and 1980s due to sharp increases in union wages and the increased competition from foreign producers.

Table 13.3

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Percent Won by Union</th>
<th>NLRB Complaints against Employers</th>
<th>Basic Complaints to Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920</td>
<td>8,074</td>
<td>52</td>
<td>1,474</td>
<td>0.083</td>
</tr>
<tr>
<td>1925</td>
<td>8,577</td>
<td>48</td>
<td>2,375</td>
<td>0.272</td>
</tr>
<tr>
<td>1930</td>
<td>1,199</td>
<td>47</td>
<td>2,941</td>
<td>0.436</td>
</tr>
<tr>
<td>1935</td>
<td>2,824</td>
<td>42</td>
<td>2,900</td>
<td>0.416</td>
</tr>
<tr>
<td>1940</td>
<td>4,010</td>
<td>46</td>
<td>3,182</td>
<td>0.756</td>
</tr>
<tr>
<td>1945</td>
<td>1,386</td>
<td>47</td>
<td>1,536</td>
<td>0.991</td>
</tr>
<tr>
<td>1950</td>
<td>3,277</td>
<td>46</td>
<td>2,919</td>
<td>0.891</td>
</tr>
<tr>
<td>1955</td>
<td>3,985</td>
<td>50</td>
<td>2,036</td>
<td>0.364</td>
</tr>
<tr>
<td>1960</td>
<td>2,973</td>
<td>33</td>
<td>1,767</td>
<td>0.601</td>
</tr>
<tr>
<td>1965</td>
<td>2,640</td>
<td>36</td>
<td>1,160</td>
<td>0.438</td>
</tr>
<tr>
<td>1970</td>
<td>1,023</td>
<td>62</td>
<td>1,166</td>
<td>0.649</td>
</tr>
</tbody>
</table>

Union Actions to Alter the Labor Demand Curve

Unions take many actions in the attempt to relax the market constraints they face so as to increase the demand for union labor or reduce the wage elasticity of demand for their members’ services.

Shifting Product Demand — To increase product demand and thus shift the labor demand curve for union workers to the right, unions have supported import quotas that restricted the importation of foreign-made goods and lobbied against legislation such as NAFTA that reduces tariffs on imported goods.

Restricting Substitution: Legislation — Unions have sought through legislation strategies that increase the costs of other inputs that are potential substitutes for union workers. For example, construction unions have persuaded states to require that nonunion contractors working on public projects pay the “prevailing wage.”

Restricting Substitution: Bargaining — Unions have used collective bargaining to restrict the substitution of other inputs for union labor. For example, unions in the airline, railroad, and printing industries sought and won guarantees of minimum crew sizes. Some unions have won contract provisions that included:

- Staffing requirements which prevented employers from substituting capital for labor.
- Subcontracting provisions that some unions have won in their contracts also prohibited employers from subcontracting for some or all of the services that they provide.
- Craft unions have provisions that limit the substitution of unskilled union labor for skilled union labor by establishing rules about the maximum number of apprentice workers that can be employed relative to the experienced journeymen workers.

Bargaining and the Threat of Strikes

A union and an employer may agree (explicitly) to a settlement in which real wages are increased in return for certain work-rule changes that will result in increased productivity — productivity bargaining. When an agreement cannot be reached with an employer, the threat of a strike (work stoppage) can force both parties to reach an agreement. A Simple Model of Strikes and Bargaining — The simplifying assumption is that the union and employer are bargaining over one issue: the size (in percentage) of the wage increase to be granted.

Figure 13.7 Hicks’s Bargaining Model and Expected Strike Length

The probability of a strike (Ps) increases if the unions wage demand without a strike and the employers pre-strike wage offer.

ZC is the upward sloping employers concession schedule, which shows their willingness to increase their wage offers as a strike lengthens.

UR is the downward sloping union resistance curve as the strike lengthens.

At S1, a settlement is reached on the size of the wage increase and both parties will agree to; and the strike is called off.

Implications of the Model — There are three important implications of the strike model:

(1) Holding EC schedule constant, anything lower unemployment rate or ability to collect unemployment benefits or the unwillingness of unions to modify their wage demand as the strike proceeds) that shifts the UR curve upward will lengthen the expected strike duration and raise the wage increase that can be expected.
(2) Anything that strengthens the resistance of employers will lower the EC curve thereby lengthening expected strike duration and reduce the expected wage settlement.

(3) Strikes appear to be unnecessarily wasteful because if the expected settlement had been reached without a strike, or with a shorter strike, both parties would have spared some losses.

The argument is that unions use the threat of a strike to enhance their bargaining positions and influence future negotiations. Strikes may be useful devices by which internal solidarity of a union can be enhanced against the common adversary—employers.

**Strikes and Asymmetric Information**

Strikes occur because of the information that both sides have about each other’s goals and intentions to resist may be imperfect—symmetric information. Unions/workers doubt the employer’s willingness to be completely truthful about current and expected profit levels—unions use strike as a signal. An implication of the asymmetric model of strike activity is that the greater the uncertainty about an employer’s willingness and ability to pay for wage increases, the greater the probability that a strike will occur (with either a short or long duration).

**Union Leaders and the Union Members**

Misunderstandings caused by asymmetric information may be difficult to eliminate because there are three major parties to a negotiation, not just two.

The union side consists of two groups:
1. union leaders
2. rank-and-file union members

Rank and file members may suspect their leaders of withholding information from them, and the union leaders may have better information than rank and file members about the employer’s true financial/profit position—hence there is asymmetric information within the union itself. If a settlement is smaller than what the membership wants, the union leaders have two options:

(1) leaders can return to members and try to persuade them to accept the offer.

(2) they can encourage members to go out and strike (just to show strength) even though the leaders know that the strike will probably not lead to a larger settlement.

**Bargaining in the Public Sector: The Threat of Arbitration**

While some states have granted some selected public sector employees the right to strike, others still continue the historic prohibitions against strikes by state and local government workers.

Where strikes are forbidden and both parties come to an impasse, laws provide for third parties to enter the dispute resolution process through the following steps:
1. mediation—listening to each party separately to find a solution,
2. fact-finding—gathers information and writes a report that proposes a (nonbinding) settlement,
3. arbitration—a single or a panel of arbitrators may hear the case.

Both parties are bound by the contents of the arbitration report once it is issued.

**Forms of Arbitration**

The arbitration associated with the bargaining process could be interest arbitration or grievance arbitration, which can take two forms:

(1) Conventional arbitration—the arbiters are free to decide on any wage settlement of their choosing.

(2) Final-offer arbitration—an arbitrator is constrained to choose the final, pre-arbitration offer either of the union or of management. This compels both parties to put forth a reasonable final offer to each other so as to increase the chances of their being the one accepted by the arbitrator.

**The Contract Zone**

If the preferred decision sets of both parties happen to overlap, there is a contract zone of possible voluntary agreements that both parties will prefer instead of the gamble of arbitration. A party’s preferences for negotiation over gambling on arbitration are increased by greater aversion to risk and greater uncertainty of how the arbitrator might rule/decide. Increased aversion to losing, or the inability to predict what arguments or facts the arbitrator will find persuasive will widen the set of negotiated outcomes they prefer instead of the gamble of arbitration. A wider contract zone opens up more feasible outcomes to the two parties, which may enhance the chances of voluntary agreements and may also give both parties more to argue about.

**Persuading the Arbitrator**

If the decision is to go to final-offer arbitration, chances of winning are improved by developing a final pre-arbitration offer that the arbitrator is likely to regard as reasonable. Trying to influence the final-offer arbitration amounts to both parties guessing what the arbitrator thinks the outcome should be and then crafting an offer that approaches it.

Union will approach it from above, and management will approach it from below.

If both parties go through conventional arbitration, it is less likely that their offers can influence the arbitrator’s decision because the arbitrator is free to choose a settlement of its own—can simply split the difference between both parties. When both parties make the same (correct) guess about the arbitrator’s preferred outcome, their final offers will bracket the arbitrator’s decision—appeared as if the arbitrator used split-the-difference rule.

**Effects of Arbitration**

Arbitrators have their own strongly held views on what should be the appropriate outcome in any particular case. When both parties position their offers around what they expect to be the arbitrator’s preferred outcome, and whatever the form of arbitration is used, the behavior of both parties and the arbitrator should be more or less the same. Studies found that negotiated wage settlements are comparable with arbitrated settlements in states requiring that disputed settlements go to arbitration. A study of police contracts found wages in states requiring arbitration of disputed settlements are more or less the same as those in states without that requirement.

**The Effects of Unions**

Labor unions affect wages, total compensation, employment levels, hours of work, productivity and profits.

**The Theory of Union Wage Effects**

It is assumed that we have the wage rates of two groups of workers identical in every aspect except that one group was unionized and the other was not.

Let $W_u =$ wage paid to union members

$W_n =$ wage paid to nonunion members

$R =$ the relative wage advantage (not the absolute amount, in percentage terms), which is defined as:

$$R = \frac{W_u - W_n}{W_n}$$

**Figure 13.8 Spillover Effects of Unions on Wages and Employment**

Panel (a) is the union sector and panel (b) is the nonunion sector. Suppose initially that both sectors are nonunion and that mobility between them is costless. Movement will occur between both sectors until wages are equalized, and the common equilibrium wage will be $W_0$ and employment will be $L_0$, respectively, in the two sectors. Once the sector in panel (a) is unionized and wages increase to $W_0^*$, what happens to wages in the other sector depends on the responses of workers who are not employed in the union sector.

**Spillover Effects**

When a union succeeds in raising wages to when supply shifts to $L_1$, this will cause employers to decline to workers thus leading to unemployed workers in the nonunion sector.

The observed relative wage advantage ($R_1$) is computed as:

$$R_1 = \frac{W_u^1 - W_n^1}{W_n^1}$$

The observed union relative wage advantage will tend to be greater than the true absolute effect of the union on its members’ real wage. The absolute effect ($A$), stated in percentage terms is defined as:
There are two views on how unions affect labor productivity.

(1) Unions increase worker productivity, given the firm’s level of capital, by providing a “voice” mechanism through which workers’ suggestions and preferences can be communicated to management.

(2) Unions place limits – work rules or staffing requirement – on managerial prerogatives in terms of using the cost minimizing levels of the labor input.

Normative Analyses of Unions

Opinions differ as to whether or not unions enhance or reduce social welfare.

Potential Reductions in Social Welfare — A unionized labor market may not arrive at a point of Pareto efficiency because of the arguments that unions reduce social welfare.

(1) Unions represent the interests of only their members, not of others.

(2) When labor and management agree to restrictive work rules, the use of excess workers in the production process creates wastage – and therefore social loss – in the use of labor.

(3) Unions reduce social welfare because:

- unions create wage (and productivity) differentials among equivalent workers by raising wages in the union sector above those in the nonunion sector.
- the higher and inflexible union wage reduces employment in the high-paid sector and prevents workers in lower-paying jobs from moving into higher-productivity sector – society’s output is lower than it would be otherwise.

Potential Increases in Social Welfare

The arguments that unions reduce social welfare lose some of their force if, in the absence of unions, labor or product markets are not as competitive. With respect to the issue of working conditions, employers’ behavior can be influenced in two ways:

(1) entry and exit — workers who are unhappy with certain conditions of employment can leave, and if enough workers do so, employers will be forced to rectify the offending condition(s).

(2) voice — workers can vocalize (voicing by individuals may be costly) their concerns and hope that employers will respond.

Unions offer workers the mechanism of collective voice in the establishment of their working conditions, and in doing so, they solve the free-rider problem. Unions potentially provide formal channels through which workers can more effectively communicate with management about workplace processes.

Arbitration and the Bargaining Contract Zone

Note that if party A were to be awarded the share with certainty, it would receive the same utility level it receives under uncertain situation, where it expects with equal probability that the arbitrator will award it with either $\frac{1}{4}$ or $\frac{1}{2}$ of the pie. Hence, party A prefers the certain outcome at point $d$.
If party B is similarly risk-averse (as party A was) and has identical expectations of what the arbitrator’s decision will look like, the set of contracts, SB, party B would voluntarily agree to can be expressed as:

\[ S_B^1 \leq S_B \leq S_B^2 \leq \frac{1}{2} \]

The minimum share that each party B would agree to receive is less than \( \frac{1}{2} \), it follows that the maximum share that party B would give to party A. The set of contracts that both parties would find preferable rather than going to arbitration (and thus potentially would voluntarily agree to) is given by all shares for party A (SA) that lies between the two extremes (contract zone) – see Figure 13A.1. The degree of both parties’ uncertainty about the arbitrator’s decision and the extent of their risk aversion are important determinants of the size of the contract zone.

### Figure 13A.2 Increased Uncertainty about Arbitrator’s Decision Increases Size of the Contract Zone

At first, party A expects that the arbitrator will assign it \( \frac{1}{4} \) of the pay that it believes this will occur by receiving shares of \( \frac{3}{4} \) and \( \frac{5}{8} \). The utility at both shares will be \( U(A) \) at point \( f \) and \( U(A) \) at point \( g \).

The average expected utility is \( E(U(A)) = 0.75U(A) + 0.25U(B) \) – which means the expected share is less than 2, but it is now with greater uncertainty of “spread” of possible outcomes that led to a reduction in its expected utility, \( E(U(A)) \), to point \( g \).

Note that \( E(U(A)) \) at point \( f \) is greater than \( E(U(A)) \) at point \( g \), therefore, the contract zone (not shown) is bigger than the previous contract zone.

\[ S_A^1 \leq S_A \leq S_A^2 \leq \frac{1}{2} \]

The degree of both parties’ uncertainty about arbitrator’s decision and the extent of their risk aversion are important determinants of the size of the contract zone.
Frictional Unemployment

Even in a market-equilibrium or full-employment situation, there will still be some frictional unemployment, because some people will move between jobs – some workers will quit their jobs to search for other employment opportunities. Frictional unemployment occurs because the labor market is characterized by frictions:

- Information flows are imperfect – that is, information about the characteristics of those searching for work and the nature of the jobs opening are unknown at the time and for effort for unemployed workers and employers with job vacancies to find each other. Random fluctuations in demand across firms will cause some firms to close or lay off workers at the same time that other firms are opening or expanding employment.

The demand curve $D_1$ and the supply curve $S_1$ intersect at the point where the equilibrium wage $W_1$, and employment is $E_1$. The implicit (but incorrect) assumption here is that there is no unemployment associated with this labor market equilibrium.

In a market-equilibrium or full-employment situation, there will still be some frictional unemployment, because people will move between jobs.

If wages are downwardly rigid, shift from $D_1$ to $D_2$ will lead to a fall in employment from $E_1$ to $E_2$, thus $E_2 - E_1$ additional workers will become cyclically unemployed.

### A Stock-Flow Model of the Labor Market

#### Rates of Flow Affect Unemployment Levels

To focus on the level of unemployment and to understand the determinants, we must analyze the flows/movements of individuals between the various labor market states:

- $E \rightarrow N$,
- $E \rightarrow U$,
- $U \rightarrow N$,
- $U \rightarrow U$,
- $E \rightarrow U$.

The unemployment rate for a group may be high due to a host of factors; and the appropriate policy prescriptions to reduce the unemployment rate will depend on which one of the labor market flows is responsible for the high rate. If we assume that labor markets are roughly in balance, with flows into and out of unemployment equal, then the $u$ for a group can be expressed as:

$$u = f(P_{en}, P_{ne}, P_{pu}, P_{epu}) \quad (14.2)$$

- $P_{en}$ is the fraction of employed who leave the labor force
- $P_{ne}$ is the fraction of those not in the labor force who enter the labor force and find employment
- $P_{pu}$ is the fraction of unemployed who leave the labor force
- $P_{epu}$ is the fraction of unemployed who become employed

The social concern over any given level of unemployment focuses on both the incidence of unemployment (or the fraction of people in a group who become unemployed) and the duration of the spells of unemployment. The bulk of measured unemployment could be attributed to the fact that many people experience short spells of unemployment – quick flow through the unemployed state. Evidence also suggests that prolonged spells of unemployment for a relatively small number of individuals characterize those found in the stock of the unemployed at any given time.

### A Model of Job Search

#### The Theory of Job Search

The level of frictional unemployment is determined by the flows of individuals into and out of the labor market and the speed with which unemployed individuals find and accept jobs.

#### A Model of Job Search

Due to imperfect information about job opportunities and workers’ characteristics, it takes time and effort to match unemployed workers with potential employers. The lower the probability of unemployed workers finding jobs in a period (that is, $\frac{4}{P_{en}}$), the higher the expected duration of unemployment and the unemployment rate.

Given $P_{en}$, it is important to know what can affect it; and to do so, we develop a model with the assumptions that:

- Wages $W$ are associated with the characteristics of jobs and not the characteristics of the individuals.
- Employers differ in the set of minimum hiring standards they use educational requirements
  1. job training
  2. work experience
  3. performance on hiring tests, etc.

- The set of attributes/characteristics can be represented as $K$.
- Associated with each job is a wage, $W(K)$, which means that wage is a function of the required skill levels.
- $W$ is an increasing function of $K$, therefore, if two employers use the same $K$, they will offer the same $W$.

Different employers have different hiring standards $K$, this implies that there will be a distribution of wage offers associated with job vacancies in the labor market, which is denoted as $f(W)$ – probability distribution of wage offers. The area of $f(W)$ = 1 (100% of wage offers in the market) It is assumed that an employer knows the shape of the distribution of wage offers but does not know which particular firm’s wage offer or hiring standard will be Job search process will be random visits to firms’ employment offices. Hiring standard or skill levels $K$ and wage $W$ will be highly related as no firm will hire a worker that does not meet its hiring standards.

#### Figure 14.3 Choice of Reservation Wage in a Model of Job Search

*If job market information is imperfect and a firm’s hiring standard exceeds $K$, a person with skill level $K$ is rejected for the job.

*If the hiring standard is $K$ or less, the person with skill level $K$ is offered the job.

Accepting a job offer depends on the number of job offers accumulated, the individual’s reservation wage $W^*$ as well as the match between $K$ and $W$ within the $W$ and $W^*(K)$ range.

#### The Reservation Wage

| Sources of Unemployment, United States, Various Years |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Year | Unemployment Rate | Job Losers | Job Leavers | Reentries | New Entrants |
| 1970 | 4.9 | 44.3 | 13.4 | 30.0 | 12.3 |
| 1974 | 5.6 | 43.5 | 14.9 | 28.4 | 13.2 |
| 1978 | 6.1 | 41.6 | 14.1 | 30.0 | 14.3 |
| 1982 | 9.7 | 50.7 | 7.9 | 22.3 | 11.1 |
| 1986 | 6.9 | 48.9 | 12.0 | 26.2 | 12.5 |
| 1990 | 5.5 | 46.3 | 14.8 | 27.4 | 9.5 |
| 1994 | 6.1 | 45.7 | 9.4 | 34.8 | 7.6 |
| 1998 | 4.5 | 45.5 | 11.8 | 34.3 | 8.4 |
| 2002 | 5.8 | 55.0 | 10.3 | 28.3 | 6.4 |
| 2006 | 4.6 | 47.4 | 11.8 | 32.0 | 8.8 |
| 2009 | 9.3 | 64.2 | 6.2 | 22.3 | 7.3 |
| 2012 | 8.1 | 55.0 | 7.7 | 26.7 | 10.5 |
Recall from Chapter 6 that the reservation wage is the value that a worker places on an hour of lost leisure time, that is, it is the wage below which a person will not work. A person who has skill level $K^*$ and whose reservation wage $WR^*$ will accept job offers that pay between $WR$ and $W^*(K^*)$ – see Figure 14.3. The higher the probability of finding a job in the range between $WR$ and $W^*(K^*)$, the lower the expected duration of unemployment and the expected average wage, $E(W)$, weighted average of the job offers in the range $WR$ and $W^*(K^*)$.

If the choice of $WR$ is higher than that indicated in Fig 14.3:
- The worker will reject more low-wage jobs and $E(W)$ would increase
- Rejecting more jobs offers decreases the probability of finding a job, thus increasing the expected duration of unemployment.

Implications of the Model

As long as $WR$ is not set equal to the lowest wage in the market, the probability of finding a job will be less than 1; and hence some unemployment can be expected to result. Since $WR$ will always be chosen to be less than the wage commensurate with the individual's skill level, $W^*(K^*)$, virtually all individuals will be underemployed once they find a job that is, their expected earnings, $E(W)$, will be less than $W^*$. Two unemployed individuals with the same skill level could choose the same WR and have the same expected post-unemployment wage, but the wage they actually wind up with will depend on pure luck. Anything that causes an unemployed worker to intensify their job search will reduce the duration of unemployment. If the cost to an individual of being unemployed were to fall, and the person's $WR$ increases, this would increase both the expected duration of unemployment and the expected post-unemployment wage rate.

Effects of Unemployment Insurance Benefits

Virtual every advanced country offers varying forms of unemployment compensation to workers who lost their jobs. In the U.S., the unemployment insurance (UI) system varies across states and for the unemployed workers, the eligibility for UI benefits is based on their previous labor market experience (or earnings level) and reason for unemployment. For work experience, each state requires unemployed individuals to demonstrate —permanent[]attachment to the labor force. In all states, covered workers who are laid off and meet these labor market experience tests are eligible for UI benefits. In some states, workers who voluntarily quit their jobs are eligible for benefits in certain circumstances. New entrants or reentrants to the labor force and workers fired for cause are ineligible for benefits.

Figure 14.4 Weekly Unemployment Insurance Benefits as a Function of Previous Earnings

In panel (a), all eligible unemployed workers are entitled to at least a minimum benefit level $B_{min}$ given previous weekly wage $W_{min}$. After previous earnings rise above a critical level ($W_{max}$), benefits increase proportionately with earnings up to a maximum earnings level ($W_{max}$), past which benefits remain constant at $B_{max}$. In panel (b), the ratio of an individual’s UI benefits to previous earnings varies according to his/her past earnings. This ratio or replacement rate shows the fraction of previous earnings that the UI benefits replace. Over the range between $W_{min}$ and $W_{max}$, where the replacement rate is constant, most states attempt to replace around 50 percent of an unemployed worker’s previous earnings.

Do Generous Benefits Increase Unemployment?

More generous UI benefits should cause an increase $WR$ of the unemployed workers, which will tend to reduce $P_{ue}$ and $P_{un}$, and thus lengthens the duration of unemployment and this will increase the unemployment rate. Evidence from empirical studies suggests that higher UI replacement rates are indeed associated with longer durations of unemployment for recipients.

Effects of Benefits Eligibility

More eligibility of workers for unemployment compensation benefits has been found to influence workers’ job search behavior. In the US, there is a huge jump in the probability of a worker taking a job during the week his/her eligibility for UI benefits ends.

Do More Generous Benefits Improve Job Matches?

Increased WR and more-generous unemployment insurance benefits will tend to increase the duration of unemployment spell, but it should also raise the expected post-unemployment wage.

Structural Unemployment

Structural unemployment arises due to a mismatch between skills demanded and supplied in a given area or across areas. Market adjustments would quickly eliminate this type of unemployment if wages were completely flexible and if costs of occupational or geographic mobility were low.

Occupational and Regional Unemployment Rate Differences

We use a two-sector labor market model to illustrate how structural unemployment can arise by assuming that:
- the sectors refer to markets for occupational classes of workers
- they are two geographically separate labor markets.

OCCUPATIONAL IMBALANCES

– Assume that market A is the market for production workers in the automobile industry
– Market B is the market for skilled computer specialists

Figure 14.5 Structural Unemployment Due to Inflexible Wages and Costs of Adjustment

In Labor Markets A and B, (DOA, SOA) and (DOB, SOB) show the demand and supply curves, equilibrium wage and employment combinations are shown to be (W0A, E0A and (W0B, E0B), respectively. The wages need not be equal in the two markets because differences in training and nonpecuniary conditions of employment. If the demand for automobile workers falls to $D_{1A}$ due to foreign import competition, while the demand for computer specialists rises to $D_{1B}$ because of the increased use of computers, and since real wages are inflexible downward in market A because of union contract provisions, employment falls to $E_{1A}$. Employment and wages of computer specialists will rise to $E_{1B}$ and $W_{1B}$, respectively. Unemployment of $E_{1A} – E_{0A}$ will be created in labor market A in the short run. Can these unemployed workers move over to labor market B?

Geographic Imbalances

Assume that:
- Market A is located in a Snowbelt city, and
- Market B is located in a Sunbelt city; and that
- Both markets employ the same type of labor

If demand falls in the Snowbelt and unemployment increases because wages are not completely flexible, the unemployed workers will continue to wait for jobs in their home city for at least three reasons:
- information flows are imperfect, hence workers are unaware of jobs that could be available elsewhere
- the direct money costs of a move, including moving costs and the transaction costs involved in buying and selling a home, are high
- the psychological costs of moving long distances are substantial because friends and neighbors and community support systems must be given up

Structural factors can cause substantial differences in unemployment rates across states in a given year, but these differences usually do not persist indefinitely due to adjustments caused by movements of workers.

International Differences in Long-Term Unemployment

Structural unemployment exists when the unemployed workers have a small probability of finding work that is, Pue is low, and the duration of unemployment is long. The percentage of the labor force that is unemployed for more than one year is typically much higher in most of Europe than the United States because: The United States spends much less on government training programs than most of Europe – training and retraining programs tend to accelerate movements from U to E. European countries typically have job-protection policies (notification to the government, consultation with worker representatives) that are intended to reduce layoffs – these policies discourage the creation of new jobs/hires and thus increase the duration of unemployment. The United States requires some employers to notify their workers in advance of large-scale layoffs. A comparative study found that as the stringency of job-protection laws rose, so did the average duration of unemployment.
Do Efficiency Wages Cause Structural Unemployment?
Recall from Chapter 11 that efficiency wages increase worker productivity for two reasons:
- Gives workers the gift of a generous wage, and employers expect that employees will reciprocate through the gift of diligent work.
- If the employee’s effort is not diligent, the employee can be fired and will be faced with earning a lower wage or with unemployment.

Efficiency Wages Affect Unemployment
If some employers were to follow a strategy of paying WEfficiency > WMarket, then supply would exceed demand and unemployment would result.

Unemployment Affects Efficiency Wages
The higher the unemployment rate in an area, the poorer are the alternative employment opportunities for workers and thus the less likely the workers are to risk losing their jobs by shirking — the employers, then need not pay wage premiums (WE) that are as high. Other factors held constant, there should be a negative association between average wage rates and the unemployment rates across areas.

Efficiency Wages and the Wage Curve
Studies of data on wages and regional unemployment rates within 12 countries (controlling for the effects of human capital characteristics of individual workers) found that there was a strong negative relationship between regional unemployment rates and wages in all countries. Regions with higher rates of unemployment will experience lower wage levels for comparable workers. The negative relationship between regional unemployment rates and wages is shown by a downward sloping wage curve — see Figure 14.6. The negatively sloped wage curve depicted by these studies can be found in the efficiency-wage explanation of structural unemployment.

Figure 14.6 The Wage Curve

Demand-Deficient (Cyclical) Unemployment
Demand-deficient unemployment is associated with fluctuations in business activity (—business cycle). Occurs due to the decline in aggregate demand in the output/product market or when firms temporarily lay off workers during recessions (remember that demand for labor is a derived demand).

Demand-deficient unemployment affects labor market flows and wages:
Flows from E to U will increase, hence ↑Peu
Retired positions and/or vacancies due to quits will not be filled immediately, thus:
- flows from N to E will decrease, hence ↓Pne.
- flows from U to E will decrease, hence ↓Pue.

With flexible wages, demand-deficient unemployment will decrease real wages to W2 and employment to E2 — see Figure 14.2.

Downward Wage Rigidity
Downward (nominal) wage rigidity is one of the factors thought to contribute to demand-deficient unemployment in the US labor market. Real wages can fall due to rising prices or if nominal wages increase less than the increase in prices. Common cuts in workers’ nominal wages or forced wage concessions, which are normally common during business downturns do lead to declining real wages of workers. Studies which suggested that nominal wages are not completely rigid in a downward direction also concluded that nominal wages are resistant to cuts, thus, employment adjustments during recessions are larger and more common than they would be with complete nominal wage flexibility.

Demand-Deficient (Cyclical) Unemployment
Why do firms find it more profitable to reduce employment than wages? Why are workers who face unemployment not more willing to take wage cuts to save their jobs?

Wage Rigidity and Unions
Employers are not free to unilaterally cut nominal wages because of the presence of unions — only about 12 percent of US workers are unionized. Nowadays, some unions make temporary wage cuts (which reduce the earnings for all workers) to save unionized workers from layoffs.

Wage Rigidity and Specific Human Capital
Wage rigidity can also occur in nonunion firms, and layoffs do occur as well, but they occur less frequently than in unionized firms: Employer investments in workers — firm-specific human capital or training — and the incentive to minimize voluntary turnover and to maximize their employees’ work effort and productivity. Layoffs affect only the least-experienced workers — those in whom the firm has invested the smallest amount of resources.

Wage Rigidity and Asymmetric Information
Employers with internal labor markets frequently promise, at least implicitly, a certain path of earnings to employees over their careers. This form of implicit labor contract involves some pay structure with the expectation of seniority over the employee’s career with the firm. The firm has more accurate information about the true state of its demand than does its workers, therefore, if employers ask employees to take a wage cut in periods of low demand and if employees do not believe that low demand exists, this will reduce employees’ productivity due to lack of trust or low morale. Temporarily laid off workers may come to accept such an action as a signal that the firm is indeed in trouble — that is, the asymmetry of information between employers and employees may make layoffs the preferred policy.

Wage Rigidity and Risk Aversion
Firms with long-employer-employee job attachments — internal labor markets — tend to have wage rigidity because they may be encouraged by the risk averse of older employees to engage in seniority-based layoff (UFO) rather than wage cuts for all workers. With internal labor markets or implicit labor contracts, the risks of income/wage fluctuations are confined to the initial (junior) years of employment.

Wage Rigidity: Worker Status and Social Norms
If we assume that large employers tend to have internal labor markets, rigid wages, and lay off workers during business downturns, why don’t the laid off workers take jobs with smaller employers? Smaller employers pay lower wages and are not constrained, as much as the large firms, from reducing wages further during downturns.

Unemployed workers (due to layoffs) do not flock to the lowwage employment due to their wage status (their relative standing in society). Individuals may prefer unemployment in a good job to unemployment in an inferior one. The hesitation (due to their sense of status) of laid off workers in taking jobs with low-wage employers prevents the expansion of jobs and further reduction of wages in the low-wage sectors during recessionary periods. Prevailing market wages paid by small, competitive firms, may be accepted as social norms that inhibit the unemployed from trying to undercut the wages of the employed workers to find employment. Due to future considerations rather than with status, unemployed workers are apparently more willing to face unemployment than secure or accept employment at a reduced wage.

Financing U.S. Unemployment Compensation
The incentives for employers to engage in temporary layoffs are also affected by key characteristics of the U.S. unemployment insurance system: its methods of financing benefits.

The UI Payroll Tax
Unlike the Social Security payroll tax paid solely by employers, the benefits paid out by the UI system are financed by a payroll tax. The UI tax payment (T) that an employer pays for each employee is given by

\[ T = \text{constant} \times (W - \text{UI threshold}) \]

where
- \( t \) is the employer’s UI tax rate
- \( W \) is an employee’s wage earned during the calendar year
- \( \text{UI threshold} \) is the taxable wage base (the level of earnings ater which no UI tax payments are required)

For example, in 2010, WB ranged from $7,000 to $14,000 in about two-thirds of the states in the US, and the other one-third of the states had higher WB. The employer’s UI tax rate (T) is determined by:
- General economic conditions in the state
- The industry the employer is operating
- The employer’s layoff experience

Since the UI system is an insurance system, employers who lay off workers frequently and make heavy demands on the system’s resources should be assigned a higher UI tax rate — experience rating.

Imperfect Experience Rating
Experience rating is typically imperfect in the sense that the MC to an employer of laying off an additional worker is often less than the added
UI benefits the system must pay out to that worker. Each state has a minimum UI tax rate (t(min) below which a firm’s UI tax rate cannot fall and a maximum UI tax rate (t(max) above which the UI tax rate cannot rise. When a firm’s layoff experience reaches some critical value (l(min), the firm’s UI tax rate rises with increased layoff experience over some range until it reaches the maximum (l(max)) level at which the maximum UI tax rate (t(max)) is also reached. Each state has a ceiling on the UI tax rate (t(max)). Additional layoffs after l(max) will not alter the firm’s tax rate. The UI system is imperfectly experience-rated because for firms below l(min) or above l(max), variations in their layoff rate have no effect on their UI tax rate.

Figure 14.7 Imperfectly Experience-Rated Unemployment Insurance Tax Rates

Does the UI Tax Encourage Layoffs?
The key characteristic of the UI system that influences the desirability of temporary layoffs is the imperfect experience rating of the UI payroll tax. If the UI system were constructed in a way that its tax rate were perfectly experience-rated, a firm laying off a worker would have to pay added UI taxes equal to the full UI benefit received by the worker. This would make temporary layoffs more expensive than permanent layoffs, as paid vacations.

Seasonal Unemployment
Seasonal unemployment is similar to demand-deficient unemployment because it is induced by fluctuations in the demand for labor during certain periods of the year. Fluctuations can be regularly anticipated and follow a systematic pattern over the course of a year. Why do employers respond to seasonal patterns of demand by laying off workers rather than reducing wage rates or hours of work? A study showed that the expansion (in the early 1970s) of the UI system that led to the coverage of most agricultural employees was associated with a substantial increase in seasonal unemployment in agriculture. Studies of seasonal layoffs in nonagricultural industries also suggest that imperfect experience rating of the UI tax significantly increase seasonal unemployment.

Why would workers accept jobs in industries in which they knew in advance they would be unemployed for a portion of the year?
- The existence of UI benefits and the knowledge by workers that they would be rehired as a matter of course at the end of the slack-demand season allowed them to view the layoffs as paid vacations.
- Seasonal industries attract workers by paying higher wages to compensate them for being periodically unemployed.

When Do We Have Full Employment?
Governments constantly worry about:
- unusually high rate of unemployment because the maximum tax rate is a handy barometer of an economy’s health.
- unusually low rate of unemployment because it reflects a situation in which there is excess demand in the labor market that could lead to rising wages and thus lead to inflationary pressures.

Governments will take steps to stimulate the labor market to encourage a rise in wages and reduce unemployment.

Questions:
1. If both too much and too little unemployment are undesirable, how much is just right?
2. What unemployment rate represents full employment?

Defining the Natural Rate of Unemployment
The full-employment or (natural) rate of unemployment is difficult to define precisely: the natural rate of unemployment (NRU) is defined as the rate at which wage and price inflation are either stable or at acceptable levels. Full employment is the rate of unemployment at which job vacancies equal the number of unemployed workers. NRU is the level of unemployment at which any increases in aggregate demand will cause no further reductions in unemployment or unemployment is voluntary, the NRU is affected by such factors as voluntary turnover rates among employed workers, movements in and out (s) of the labor force, and the length of time it takes for the unemployed to find (f) acceptable jobs.

Unemployment and Demographic Characteristics
Unemployment and its demographic characteristics tend to show consistent patterns over the recent years/decades. The demographic composition of the labor force has changed dramatically with the growth in the labor force participation rates of females and substantial changes in the relative size of the teenage, black, and Hispanic populations. Between 1975 and 2005, the proportion of the labor force that was female grew from 40% to 46%. The Hispanic labor force grew three times faster than the average — from 4% to 13%. The teenage share of the labor force dropped from over 9% in 1975 to 5% by 2005. The overall unemployment rate reflects both the tightness of the labor market and the composition of the labor force.

Table 14.3

“Hispanic” refers to those of Hispanic origin: depending on their race, these individuals are also included in both the white and black population group totals.

What Is the Natural Rate?
The estimates of the natural rate of unemployment (NRU) have varied over time; it was about:
- 5.4% in the 1960s
- 7% in the 1970s
- 6% to 6.5% in the 1980s

Milton Friedman, as a leader in the development of the NRU concept cautioned against any attempts to forecast it. Some level of unemployment is unavoidable associated with the frictions in a dynamic labor market burdened with imperfect information. Arthur Okun pointed out that every one-percentage-point decline in the aggregate unemployment rate was associated with a threepoint increase in output the United States produces.

CHAPTER 15
INEQUALITY OF EARNINGS

Workers as individuals, and society as a whole, are concerned with both the level and the dispersion of income in the economy.
- Concerns about the level of income stem from income being an important determinant of the consumption of goods and services by individuals.
- Concerns about the distribution/dispersal of income stem from the importance that we, as individuals, place on our relative standing in society and the importance that our society places on equity.

The distribution of family incomes (both earned and unearned) or earnings is important in assessing the issues of poverty and relative consumption opportunities. Earnings, as part of overall incomes, are a reflection of:
- marginal productivity
- investment in (and returns to) education,
- training,
- migration activities, and
- access to opportunities.

Measuring Inequality
For example, if everyone had the same earnings, say $20,000 per year, there would be no dispersion – see Figure 15.1. If there were disparities in these earnings people received, these disparities could be relatively large or relatively small. If the average level of earnings were $20,000, and virtually all people received earnings very close to the average, the dispersion of earnings would be small. If the average were $20,000 but...
some made much more and some much less, the dispersion of earnings would be large.

Figure 15.1 Earnings Distribution with Perfect Equality

Distribution A exhibits smaller dispersion than Distribution B, that is, earnings B exhibit a greater degree of inequality. Graphs (Figures 15.1 and 15.2) can help illustrate the concepts of dispersion, but they are a dummy tool for measuring inequality. There are various quantitative indicators of earnings inequality, and the most obvious measure of inequality is the variance of the distribution. This is expressed as:

\[ \text{Variance} = \frac{1}{n} \sum (E_i - \bar{E})^2 \]  

where
- \( E_i \) is the earnings of person \( i \) in the population
- \( \bar{E} \) is the mean (average) level of earnings in the population
- \( \sum \) is the summation sign indicating the sum over all persons in the population
- \( n \) is the number of people in the population

One problem with the use of variance is that it tends to rise as earnings grow larger – thus variance is a better measure of the absolute than of the relative dispersion of earnings. An alternative to the variance is the coefficient of variation (CV); the square root of the variance (or the standard deviation, \( \sigma \)) divided by the mean (\( \mu \)). If all earnings were to double, the coefficient of variation, unlike the variance, would remain unchanged. The most widely used measures of earnings inequality involve ranking the population by earnings level and then classifying them into percentiles to which a given level of earnings falls.

Classification of earnings levels into percentile will enable us to either compare the earnings levels associated with each given percentile or compare the share of total earnings received by each. Comparing shares of total income received by the top and bottom fifth (or "quintiles") of households in the population is a widely used measure of income inequality. Another commonly used measure is comparing the ratio of earnings at, say, the 80th (90th) percentile to earnings at the 20th (10th) percentile.

For example, in 2011:
- earnings of men in the 20th percentile = $21,361 earnings of men in the 80th percentile = $80,561
- Ratio of earnings = 0.26, households in the top fifth (quintile) of income distribution received 50.2% of all income, while those in the bottom fifth $80,561 received 3.3%.

Earning ratio (of 3.58 in 2008) of the 80th percentile to the 20th percentile is not very enlightening or useful unless it is compared with something such as the ratios of prior years to see if earnings distribution of men and women was becoming stretched. Earnings became more unequally distributed. Earning ratios 80:20 and/or 90:10 focus on two arbitrarily chosen points in the distribution and ignores what happens on either side of the chosen percentiles. If the earnings of 10th percentile decline and the earnings of the 20th percentile is unchanged, the ratio would decline. If the earnings at the 20th and 80th percentiles were to remain the same, but the earnings in between were to become similar, this step toward greater overall equality would not be captured by the simple 80:20 ratio.

Earnings Inequality Since 1980: Some Descriptive Data

Earnings distributions for both men and women, using the 80:20 ratio, showed that both earnings and the ratios for the 80th: 20th varied throughout the period – see Table 15.1. Other ratios (apart from the 80:20) are: 80:50, 50:20, 90:10, 90:50, and 50:10. It is important to know whether the changes in the upper end of the earnings distribution and the lower end are roughly the same:
- Are both halves of the earnings distribution becoming more stretched?
- We might ask what was happening to earnings in each tail of the earnings distribution over this period.

Table 15.1

<table>
<thead>
<tr>
<th>Earnings at</th>
<th>80th Percentile (a)</th>
<th>20th Percentile (b)</th>
<th>Ratio (a/b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>77,759</td>
<td>23,286</td>
<td>3.30</td>
</tr>
<tr>
<td>1990</td>
<td>77,780</td>
<td>22,128</td>
<td>3.52</td>
</tr>
<tr>
<td>2005</td>
<td>81,717</td>
<td>23,927</td>
<td>3.43</td>
</tr>
<tr>
<td>2011</td>
<td>82,361</td>
<td>21,361</td>
<td>3.84</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>41,500</td>
<td>11,268</td>
<td>3.70</td>
</tr>
<tr>
<td>1990</td>
<td>47,022</td>
<td>10,226</td>
<td>4.60</td>
</tr>
<tr>
<td>2005</td>
<td>55,310</td>
<td>14,028</td>
<td>3.94</td>
</tr>
<tr>
<td>2011</td>
<td>56,610</td>
<td>14,110</td>
<td>3.99</td>
</tr>
</tbody>
</table>

From 1980 to 1990, the 80:20; 80:50; 50:20; 90:10; 90:50; and 50:10 ratios tell the same story for men and women – earnings inequality clearly grew among men and women. Tables 15.1 and 15.2 suggest that:
- a. Inequality unambiguously increased during the 1980s
- b. Pronounced fall in relative earnings occur at the very bottom of the distribution (lowest 10th percentile)
- c. Earnings have become less dispersed in the lower half of earnings distribution since 1990
- d. Since 1990, earnings at the 90th percentile have pulled farther away from the median (50th percentile) than have earnings at the 80th percentile.

Changes in the distribution of earnings since 1980 have occurred along two dimensions:
- Increased returns to investments in higher education, which have raised the relative earnings of those at the top of the distribution
- The growth in earnings disparities within human-capital groups, which stretches out earnings at both the higher and lower ends of the distribution

The Increased Returns to Higher Education

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Masterbook of Business and Industry (MBI)
The real earnings of men between age 35 and 44 with college or graduate school education have risen since 1980 – particularly among those with graduate degrees – while those with high school education or less have experienced decreases in real earnings. The rising returns to investing in a bachelor’s degree or a graduate degree are also observed for women, although the underlying changes within each level of education are different.

Table 15.3

| Means Earnings and the Returns to Education among Full-Time, Year-Round Workers between the Ages of 35 and 44 (Expressed in 2011 Dollars) |
|---|---|---|---|
|  | Dropout (%) | H.S. Grad (%) | Bachelor’s (%) | Grad School (%) | H.S./ Drop | Bachelor’s/H.S. | Grad/ Bachelor’s |
| Men |  |  |  |  |  |  |  |
| 1980 | 40,063 | 55,256 | 78,807 | 90,026 | 1.40 | 1.41 | 1.14 |
| 1990 | 35,269 | 49,891 | 81,567 | 100,718 | 1.41 | 1.64 | 1.24 |
| 2005 | 33,670 | 48,520 | 92,609 | 127,444 | 1.44 | 1.57 | 1.37 |
| 2011 | 32,647 | 46,867 | 85,947 | 115,879 | 1.42 | 1.81 | 1.94 |

Growth of Earnings Dispersion within Human-Capital Groups

Earnings within narrowly defined human-capital groups became more diverse, if for example, those at the top of the earnings distribution are older workers with college educations (and are better-paid), while those at the bottom are younger workers who dropped out of high school (unskilled group with lower wages) – increase in the overall 80:20 or 90:10 ratio. Division of men into different groups by age cohorts and education (college and high school) revealed that earnings disparities grew among each human-capital group since the 1980s – see Table 15.4.

Table 15.4

| Ratio of Earnings at the 80th to 20th Percentiles for Males, by Age and Education, 1980-2005 |
|---|---|---|---|
|  | 1980 | 1990 | 2005 |
| Male Bachelor’s Graduates |
| Ages 25-34 | 2.27 | 2.49 | 2.60 |
| 35-44 | 2.47 | 2.52 | 2.78 |
| 45-54 | 2.62 | 2.93 | 3.00 |
| Male High School Graduates |
| Ages 25-34 | 7.47 | 7.78 | 7.90 |
| 35-44 | 7.40 | 7.85 | 7.65 |
| 45-54 | 7.45 | 7.75 | 7.23 |

The Underlying Causes of Growing Inequality

The rapidity and scope of workplace technological change associated with the introduction of computerized processes required workers to acquire new skills. Economic theory suggests that those with lower learning costs are likely to invest more in education, so it should be no surprise to find that workers with more schooling were the ones who adapted more quickly to the new, high-tech environment. Within-human-capital groups, the psychic costs of learning cause some workers to be more resistant to change than others, and as some adapt more quickly and completely than others, it is quite likely that earnings disparities within human-capital groups will grow.

Table 15.6

| Share of workers who are managers or professionals or service increased while the share of workers in office and administrative support job declined. These findings lend some credence to the hypothesis that technological change has had a polarizing effect on employment. |
|---|---|---|---|
| Changes in Demand: Technological Change |
| Shifts in labor demand curves were a prominent factor raising inequality since 1980. |
| Rightward shifts in labor demand curve will ↑Wand ↑E for university educated workers. |
| Leftward shifts in labor demand curve will ↓Wand ↓E for high school education or less. |
| “Skill-based technological change” and/or “high-tech” investment that increased productivity of highly skilled workers and reduced the need for low-skilled workers cause these shifts in demand curves. Recall that capital and skilled labor tend to be gross complements, while capital and unskilled labor are more likely to be gross substitutes. |

The Underlying Causes of Growing Inequality

The widening gap between the wages of highly educated (skilled workers) and less-educated workers (unskilled workers) suggests three possible causes:

1. The supply of less-educated workers might have risen faster than the supply of college graduates.
2. The demand for more-educated might have increased relative to those for less-educated workers.
3. Changes in institutional forces such as minimum wage or the decline in unions.

Changes in Supply

The changes in supply (increase and/or decrease) can be the dominant force/cause of the wage changes or the increasing gap and thus the growth of wage inequality in recent years – see Figure 15.3. If supply shifts are primarily responsible for the increasing gap between the wages of highly educated (skilled) and less-educated workers, we should observe that the employment of less-educated workers increased relative to the employment of the college-educated workforce. Table 15.4 contains data indicating that supply shifts could not have been the primary cause – shows earnings and employment were positively correlated.

Figure 15.3 Changes in Supply as the Dominant Cause of Wage Changes

Share of workers who are managers or professionals or service increased while the share of workers in office and administrative support job declined. These findings lend some credence to the hypothesis that technological change has had a polarizing effect on employment.

Changes in Demand: Earnings Instability

Given technological change and coupled with growing competition within the product markets through deregulation and the globalization of
production, also may have led to a growth in the instability of earnings for individual workers – thus growth in earnings inequality.

Product-market changes that contribute to employment or unemployment of those workers in the lowest quintile would cause their earnings to fluctuate if; Some workers in this group may be unlucky to experience unemployment that reduces their earnings. Other workers in this group may be lucky enough to experience temporary earnings increases through overtime work or profit-sharing bonuses.

Changes in Institutional Forces

Two other causes of growing earnings inequality come from:
1. The decline in unions, and this could have caused the increase in the 80:50 or 90:50 ratios.
2. Minimum wage remained constant over much of the period since 1980, while wages in general rose, thus the falling real minimum wage could have reduced wages at the very bottom of the earning distribution.

Note that the declining share of unionized workers in the United States started in the 1950s and has continued unabated throughout each decade. Recall that women are less highly unionized than men, therefore, the fall in their rates of unionization has been considerably smaller, yet increases in the returns to education were as large among women as among men, or larger, after 1980.

Studies that estimated the effects of the declining unionization on wage inequality concluded that it explains perhaps 20 percent of the growth in inequality for men (but not women) in the 1980s but played no important role after 1990. Findings corroborate the summary observations that the sizeable growth in the 80:50 ratio in the 1980s, but stopped after 1990. That the increases in the 90:50 ratio after 1990 were also a function only of rising relative earnings at the very top of the distribution (which unionization does not affect). The nominal minimum wage was constant throughout the 1980s and with increases in general wages, the legal minimum had fallen to about one-third of the average wage by the time it was again increased in the early 1990s.

Lorenz Curves and Gini Coefficients

The most commonly used measures of distributional inequality involve grouping the distribution into deciles or quintiles and comparing the earnings (or income) received by each.

It is assumed that:
- Each household in the population has the same income
- Each fifth of the population receives a fifth of the total income

<table>
<thead>
<tr>
<th>Quantiles</th>
<th>Equal Share of Income</th>
<th>Cumulative Share of Households</th>
<th>Cumulative Share of Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Fifth</td>
<td>20%</td>
<td>20% or 0.2</td>
<td>20% or 0.2</td>
</tr>
<tr>
<td>Second Fifth</td>
<td>20%</td>
<td>40% or 0.4</td>
<td>40% or 0.4</td>
</tr>
<tr>
<td>Third Fifth</td>
<td>20%</td>
<td>60% or 0.6</td>
<td>60% or 0.6</td>
</tr>
<tr>
<td>Fourth Fifth</td>
<td>20%</td>
<td>80% or 0.8</td>
<td>80% or 0.8</td>
</tr>
<tr>
<td>Highest Fifth</td>
<td>20%</td>
<td>100% or 1.0</td>
<td>100% or 1.0</td>
</tr>
</tbody>
</table>

The equality shown in the table above will yield the straight line AB in Figure 15A.1, its slope is 1, and the area of the Δ is 0.5. As indicated in the table below, the distribution of income is not perfectly equal. Plotting the cumulative income yields Lorenz curve ACDEFB for 2002 in Figure 15A.1, which shows unequal distribution of household income in the United States in 2002. With two Lorenz curves as shown in Figure 15A.1, we can conclude that one that lies closer to line AB – perfect equality – shows better distribution than the one farther from line AB.

Figure 15A.1 Lorenz Curves for 1980 and 2002 Distributions of Income in the United States

The Gini coefficient (GC) is generally between 0 and 1

\[ \text{Gini Coefficient (GC)} = \frac{0.5 - 0.2866}{0.5} = 0.4268 \]  

Gini coefficient (GC) is not always susceptible to an unambiguous answer.
Globalization/trade has made it increasingly unclear what — American workers or foreign workers — gain and no one loses. Transactions across international borders take place between countries and these transactions are also beneficial to all countries involved. Overall, most economists would agree that trade is mutually beneficial, more so, in the diffusion of technology.

Why Does Trade Take Place?
Recall that the function of a market is to facilitate mutually beneficial transactions, which will be socially beneficial (Pareto improving) if some gain and no one loses. Transactions across international borders take place between countries and these transactions are also beneficial to all countries involved. Overall, most economists would agree that trade is mutually beneficial, more so, in the diffusion of technology.

Trade between Individuals and the Principle of Comparative Advantage
Make-or-buy decisions are made by weighing the opportunity costs of doing tasks ourselves against the costs of buying the goods or services from others. Fostering specialization and trade. Performing all activities (household or other) by ourselves without specialization will lead to inferior outcomes and prevent us from utilizing our time in others ways, which may be either more productive or more pleasant.

The first step in the make-or-buy decision is for each party to perform an internal comparison: individuals must consider their own opportunity costs of producing the good or service in question. Economists agree that comparative advantage is the basis of trade between two or more individuals/countries. The principle of comparative advantage underlies all decisions about trade with others. Individuals have the incentive to specialize in the production of goods or services in which they have comparative advantage and buy from others the goods or services they would find more expensive to produce themselves.

The Incentives for Trade across Different Countries
Economists generally agree that international trade has the potential for enlarging the output of the countries engaging in it.

Production Possibilities without Trade
Simplifying Assumptions
In the past, trade between two countries was severely limited by either the imposition of tariffs on imported goods or by technological restrictions. Countries A and B can produce two goods: clothing and food with their available resources and a given level of technology. Production possibilities curve differs between both countries because productive resources are different.

Comparative Advantage
Identifying comparative advantage starts with calculating the domestic (internal) opportunity costs of production as indicated below:

<table>
<thead>
<tr>
<th>Country</th>
<th>Opportunity cost of producing 1 unit of clothing (1C)</th>
<th>Opportunity cost of producing 1 unit of food (1F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country A</td>
<td>2F</td>
<td>0.5C</td>
</tr>
<tr>
<td>Country B</td>
<td>1.5C</td>
<td>2C</td>
</tr>
</tbody>
</table>

The opportunity cost of producing food in Country A is lower than in Country B, thus, Country A has the comparative advantage in food production, which implies its has a comparative disadvantage in the production of clothing. The opportunity cost of producing clothing in Country B is lower than in Country A, thus, Country B has the comparative advantage in clothing production and comparative disadvantage in producing food.

Production Possibilities with Trade
Each country (A and B) would be better off by specializing in making the goods for which it has comparative advantage and trading for the other good. With trade, the production possibilities of Country A shifted out from line XY to line YZ, which means it can obtain a unit of clothing at a cost of only one unit of food — trade enables it to consume more of both clothing and food. With trade, the production possibilities of Country B also shifted out from line YZ’ to line YZ”, which means it can also obtain a unit of food by giving up only one unit of clothing. For both countries, trade can be thought of as creating a new technology for making goods for which they have comparative disadvantage.

Reallocating Resources
For potential gains from trade to be realized in both Country A and Country B, resources must flow from one sector to another within each country. From clothing production to the food production sector in Country A, and vice versa. By reallocation of resources, the overall output of a country is debatable because causality between (openness) trade and faster economic growth could run in the opposite direction.

Effects of Trade on the Demand for Labor
Both trade and technological change open up new opportunities for acquiring goods and services, therefore, expanded trade affects the demand for labor. Recall that the demand for a given type of labor is derived from:
(a) conditions in the market, and
(b) the prices and productivities of other factors of production.

Trade affects both product demand and the availability of other factors of production.

Product Demand Shifts
When exports increase, the demand for workers involved in the production of those exports will shift to the right, due to the expanded scale of production. An increase in imports associated with increased trade will tend to directly or indirectly reduce the demand for some domestically produced goods or services. The shifts in product demand associated with increased international trade also create shifts in labor demand. Expanded employment opportunities and higher wages for workers if the labor demand curve shifts rightward. Downward pressure on both employment and nominal wage levels for workers if the labor demand curve shifts leftward.

Shifts in the Supply of Alternative Factors of Production
Production sharing, due to international trade, has effectively brought a huge number of lower-paid foreigners into direct competition for jobs with...
higher-paid Americans. Access to lower-paid workers in other countries has reduced the cost of an alternative source of labor for American firms.

What are the effects on American labor when lower-wage labor becomes available in other countries? There is a cross-effect on the demand for labor; that is, the overall effect on the demand for a given kind of labor is the summation of the substitution and scale effects, which work in opposite directions.

**The Substitution Effect**
In order to substitute foreign labor for American labor, employers consider the ratio of wages to the marginal productivity in both countries. Only if the ratio of wages to marginal productivity is lower for foreign workers will firms consider substituting foreign workers for Americans. Analysis of the size of a potential substitution effect requires that we must use/review two Hicks-Marshall laws of demand and supply. One law suggests that the size of the substitution effect depends in part on the supply response of American workers, which means that the substitution effect will be greater if the supply of Americans to the relevant occupations is more elastic. The other Hicks-Marshall law strongly related to the substitution effect is the ease with which foreign workers can be substituted for Americans—many workers are in manufacturing production jobs that could be transported across borders to lower-wage countries, other jobs cannot be performed in a remote location.

**The Scale Effect**
Substituting lower-cost labor in poorer countries for American labor in a particular industry will lead to a fall in production costs and thus a fall in product price and an increase in product demand. The substitution effect of offshoring will push toward reducing the demand for American labor, the scale effect associated with lower costs will tend to increase it—not with overall demand but with displaced sectors will fall. The size of the scale effect that accompanies the use of lower-wage labor or workers depends principally on two factors:

1. (1) the elasticity of demand for the final product in the industry that is cutting its labor costs,
2. (2) the share of labor (in this case, foreign labor) in total cost.

If the foreign workers’ wages constitute a larger part of production costs, the resulting effect on production costs and product price will be greater, and the larger will be the associated scale effect.

**Changes in the Elasticity of Demand for Labor**
Given that increased international trade will cause the labor demand curve to shift rightward or leftward, reducing the barriers to international transactions will tend to increase the elasticity of demand for labor, for two major reasons:

1. (1) A greater ability to substitute foreign for domestic workers will increase the strength of the substitution effect, other things equal.
2. (2) As foreign-made goods and service are allowed to compete with those produced domestically, the elasticity of product demand will tend to increase.

Those American workers who face more elastic labor demand curves will be displaced more than others. Those who are skilled and unskilled workers within a country strongly related to the substitution effect is the—wage countries, other jobs cannot be performed in a remote location.

**The Net Effect on Labor Demand**
Increased trade in goods and services (including production sharing) with foreign countries will benefit some workers but displace others. Often, less-skilled workers are most likely to lose from trade because foreign workers can readily perform in these jobs. Displaced workers suffer greater losses if it is difficult or costly for them to switch occupations or industries. Workers most likely to gain are those in sectors that have comparative advantage in production or are in jobs that are complementary with production workers overseas.

**Estimates of Employment Effects**
It is difficult to isolate the effects of trade on employment levels because there are many other factors (immigration, technology, personal incomes, and consumer preferences) that affect labor supply and demand. A study that estimated the effect of the Canadian-United States Free Trade Agreement found that employment fell by 12% in those sectors that experienced increased trade and unskilled workers in Canada was the same in 2002 as it was in 1988. Estimates from studies on the job losses in the United States from offshoring of jobs to foreign countries suggest that the percentage losses have been considerably smaller.

**Estimates of Wage Effects**
Trade is but one of many factors that affect demand for labor and the level of wages in a country. Focusing on relative wages—the differences between wages received by skilled and unskilled workers within a country of interest—one of the estimates of the effects of trade on wages in the United States suggest that these effects are small (less than 10% of fall in wages) when compared to the contributions of other forces. Studies that examined the wage effects of trade and production sharing on poorer countries—the recipients of offshored jobs—suggest that these countries have also experienced increased differences between the wages of skilled and unskilled workers that can be traced to increased trade and outsourcing.

**Will Wages Converge across Countries?**
Recall that when firms consider moving production to the lower-cost country, they compare the costs represented by the ratio of wages to the marginal productivity of workers (W/MPL = MC) in each country. If firms are free to move production from a higher- to lower-cost country, the profit-maximization process would produce a result consistent with the law of one price—equalization of wages (factor prices or product prices) across countries. Wages would equalize only if marginal productivities are equalized. Cross-country differences in educational levels, work practices, managerial and organizational skills, and the technology used in the production process could all affect the degree to which wage levels are equalized.

Even though differences in W/MPL = MC across countries lead firms to consider shifting production to the lowest-cost location, it does not imply that workers will actually move. The costs of international transactions, crossing national borders are very high, and there are other significant costs of:
- communicating in other languages
- transporting goods (especially from poorer countries)
- dealing in foreign currencies
- acquiring information on local laws and regulations
- enforcing contracts internationally

These costs which are associated to international transactions reduce the incentives for firms to relocate to lower-cost areas, and they impede the convergence of W/MPL ratios predicted by the law of one price. One study of increased trade between the United States and Mexico found no evidence of wage convergence.

**Policy Issues**
As discussed in Chapters 3 and 4, we concluded that society as a whole is better off with some amount of technological change if:
- everyone gains from it
- some gain and no one else loses, or
- some gain and no one lose, but the gainers fully compensate the losers.

Since enhanced trade does displace some workers in a society, normative considerations require that those who gain from reducing the barriers to international trade be compensated those who lose from this policy change.

**Subsidizing Human-Capital Investments**
Those workers who are displaced by enhanced trade experience spell of unemployment and they may have to:

1. Invest in training to qualify for another job
2. Invest in moving to a new city or state to secure employment
3. Compensate workers who are displaced due to policy change.
4. Help displaced workers qualify for and find new jobs.

The Trade Adjustment Assistance (TAA) program, as amended in 2002, is an example of a program that is designed to subsidize human-capital investments by displaced workers. Those who are certified to be eligible for the TAA benefits receive:

- up to 104 weeks of training or remedial education, during which they also receive unemployment benefits if they are displaced by displacement by displaced workers, who are displaced by enhanced trade. A program that targets those displaced by trade is wage insurance, under which affected workers receive a payment from the government if their current wage is less than previous.

**Income Support Programs**
A solution to the problem that some training or relocation investments may not be worth making is for the government to offer enhanced unemployment benefits for displaced workers or provide funds so that other workers affected by displacement can retire early. Another form of income support, which encourages employment, is to directly subsidize targeted individuals who work—an example is the Earned Income Tax Credit (EITC) Program, even though it does not currently target workers who are displaced by enhanced trade. A program that targets those displaced by trade is wage insurance, under which affected workers receive a payment from the government if their current wage is less than previous.

**Subsidized Employment**
Another solution to the problem that not all training will create net social benefits is for the government to subsidize displaced workers for whom training costs are relatively high or expected benefits are relatively low. Empirical studies suggest that payroll subsidies to employers who hire displaced older or lower-skilled workers are more effective than training in speeding the reemployment of workers. The other form of subsidy which is for the government to become the—employer of last resort, by directly employing targeted workers to perform work public works projects for a period of time.
How Narrowly Should We Target Compensation?
Recall that there are a myriad of other factors that also serve to shift the demand for, and supply of, workers in a dynamic economy. Since expanded international transactions are but one force causing worker displacement, it is difficult to justify a set of compensation programs targeted only to trade-related displacement. Very few workers receive the benefits of the TAA program because it takes time and resources to verify that it was international trade or product sharing that caused displacement of a particular set of workers.

Figure 16.3 Comparing the Outcomes of Equal Vertical Shifts of Inelastic and Elastic Labor Demand Curves

\[ D_0 \] and \[ D_1 \] depict relatively inelastic and relatively elastic demand curves, respectively, and with the given supply curve, equilibrium wage and employment are \( W^* \) and \( L^* \).

Equal vertical (all) shift in both demand curves will lead to \( W \) and \( L \) equilibria at point \( x \) (with the inelastic demand curve) and at point \( y \) (with the elastic demand curve).

The employment and wage losses created by the fall in labor demand curve are much larger when the demand curve is more elastic.

Summary
Reduction in the barriers to international transactions has reinforced the labor-market effects caused by other forces. Given the rising returns to educational investment, and as workers are put at greater risk of having to adjust to changes in labor demand over their careers, the case for governments to extend and improve schooling has been strengthened. Providing youth greater access to a high-quality education is perhaps the single most important program a government can undertake to help its workers cope with the changes in labor demand associated with an expansion in international transactions.