THE ECONOMICS OF
Imperfect Labor Markets

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Minimum Wages

The minimum wage is a labor market institution that sets a wage floor, that is, a lower bound to the wage paid to individual workers. The first minimum wage was introduced in the United States in 1938 and paid 25 cents per hour. In 2007 the federal minimum wage was $5.85, in nominal terms 23 times larger, but, in real terms, only 1.4 times larger than 70 years ago.

Although most countries in the world have some form of minimum wage, the scale, eligibility, and operational details change from country to country, so providing a cross-country-comparable definition and measure of the minimum wage is not an easy task. Some statistics, like the ratio of the minimum wage to the average wage, are, however, commonly used to summarize the relevance of the minimum wage in affecting the distribution of earnings in different countries. A key difference between the minimum wage and the other price-based institutions analyzed in the following chapters (e.g., unions and collective bargaining) is that the minimum wage mostly affects the low end of the wage distribution.

A large body of theoretical and empirical research examines the effects of the minimum wage. Theory offers clear-cut predictions only in the case of a competitive labor market. Empirical results point in both directions—positive and negative effects of the minimum wage on employment—which is possible in a labor market where individual firms face upward-sloping labor supply curves.

In some countries the minimum wage is unilaterally set by the government, while in other countries it is the outcome of negotiations between workers and firm representatives. When it is government legislated, the minimum wage in principle applies to all workers who have a legal contract. When it is the outcome of collective bargaining, the wage floor agreed to by the parties involved in wage negotiations may also cover the workers who are not unionized. In this case it becomes a minimum wage applied to all workers covered by the collective agreements. Overall, it is convenient to classify the different types of minimum wages applied in OECD countries according to their coverage and determination on the basis of the following threefold taxonomy:

1. A national, government-legislated (perhaps after consultations with trade unions and employers' associations) minimum wage

2. A national minimum wage that is the outcome of collective bargaining agreements and is extended to all workers

3. An industry-level minimum wage that results from industry-level collective bargaining and is extended to all workers in that industry

All these minima can be set on an hourly, daily, weekly, or monthly basis. Beyond the single minimum wage, there is often a reduced or subminimum rate for some specific groups of workers, for example, those without work experience and/or youngsters. Often, subminimum rates do not exist de jure but exist de facto, since special employment programs allow employers to pay lower wages to youth workers. In some countries premiums to the minimum wage are allowed to reward specific and time-varying workers' characteristics. For instance, the minimum wage may increase with workers' experience, workers' qualifications, and family status. Legislated minimum wages may or may not be automatically indexed to price inflation; in the latter case they may be discretionally adjusted by governments.

Minimum wages bear a close relationship to other institutions acting over the entire wage distribution. Minimum wages are integrated into union wage plat-forms (chapter 3) when the minimum wage is set and enforced under collective agreements. Active labor market policies (chapter 12), notably employment-conditional incentives, also interact with the minimum wage to reduce its potential disemployment effects.

2.1   Cross-Country Comparisons

Despite the various differences that we have pointed out, one can still try to com-pare minimum wages across countries by measuring their value relative to some central measure of the wage distribution. In particular, the ratio of the minimum wage to the average wage is often used in international comparisons. In principle, using the median rather than the average wage as a denominator would be prefer-able because the average wage may be affected by large values at the upper tail of the distribution, but micro data are not always available to obtain the median wage. This measure is clearly affected by how both the numerator (the minimum wage) and the denominator (the average wage) are measured. Because the minimum wage is generally exempted from income taxes, which are often progressive, it may also be preferable to use net wages (average wages after taxes) as the denom-inator in computing this measure. Particular attention should also be paid to using the appropriate earnings measure, which should possibly exclude any overtime and bonus payments.

The ratio of minimum to average wage ignores potential spillovers associated with the setting of minimum wages. Especially when minimum wages are embed-ded in collective bargaining, an increase of the minimum wage may also induce

pay increases above the minimum, shifting a relevant portion of the wage distribution to the right and hence leading to a significant increase of the average wage. Under these circumstances a change of the minimum wage will hardly be perceived from looking at the ratio of minimum to average wage, because both the numerator and the denominator move in the same direction.

Another drawback of this measure is that it does not take into account the fact that there may be subsets of the workforce, such as informal-sector workers, who are not covered by the minimum wage. In most developing countries and in a number of OECD countries (including formerly planned economies of central and Eastern Europe and southern European countries), alongside a formal (and often urban) job sector where the minimum wage is enforced, there is a large informal labor market in which the minimum wage legislation does not apply. There is no country in the world where there are enough labor inspectors to check every plant. Because of these enforcement issues, an increase of the minimum wage may paradoxically reduce the wage of the lowest-paid workers because low-productivity workers, crowded out from the covered sector by the rise in the minimum wage, could increase labor supply in the uncovered sector, driving down wages therein.[1]

With these caveats in mind, table 2.1 displays the ratios of minimum to average wage for several countries as compiled by the OECD, taking as the denominator the wage of the average production worker (APW) for purposes of international comparison. As shown by the table, there is a wide range of values of the index, which goes from a low of 27 percent in Korea to a high of 52 percent in Ireland and Portugal. Minimum wages are lower in Japan, the United States, and Canada than in many European countries. Notice that the current cross-country asymmetries are the by-product of diverging historical developments: as indicated by figure 2.1, the minimum wage in the United States has been falling since the end of the 1960s relative to the average wage, just when it started steadily increasing in France.

The New Member States of the European Union (Hungary, Czech Republic, and Poland) are at the low end of the European distribution of minimum wages, together with Spain and UK, which introduced the minimum wage in 1999. Nominal values of monthly minimum wages in euros are also offered in the second column of the table, and in the third they are transformed into purchasing power units to make this number comparable across countries. Finally, the fourth and fifth columns provide information on the type of minimum wage (i.e., set by law or outcome of collective bargaining) and on its coverage.

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[1] The *Kaitz index* (Kaitz 1970) was developed with the idea of taking into account the actual coverage of the minimum wage. It is defined as the ratio of the minimum wage to the average wage adjusted for the industry-level coverage of the legislation, but the eligible population is not always well defined.

Table 2.1 Minimum Wages in OECD Countries (2005)

	Minimum wage to average wage ratio[1] (%)	Minimum wage (€ per hour)	Minimum wage[2] (€ per month) PPP	Determination[3] Setting	Level	Coverage[4]
Australia		7.25	1277	–	–	80
Austria				CB-L	P	95
Belgium	43	6.93	1220	CB	N	90
Canada	35	4.75	836	L	F-P	100
Czech Republic	39	1.58	278	L	N	100
Denmark				CB	–	80
Finland				CB	N	90
France	52	7.51	1322	L	N	100
Germany				CB	–	68
Greece		3.29	578	L	N	100
Hungary	38	1.28	225	L	N	100
Iceland				CB	–	–
Ireland	53	7.43	1308	CB	N	100
Italy				CB	N	80
Japan	40	4.15	731	L	P	100[a]
Korea	27	2.64	464	–	–	10
Luxembourg				L	N	100[b]
Netherlands	39	7.30	1284	L	N	100[c]
New Zealand	48	4.98	877	L	N	25
Poland	40	1.35	237	L	N	100
Portugal	53	2.08	366	L	N	100
Slovak Republic				L	N	100
Spain	40	3.40	599	L	N	100
Turkey		2.78	489	L	–	100
United Kingdom	39	6.40	1127	L	N	100[d]
United States	31	3.48	613	L	N	100

Sources: OECD, LFS Database; ILO Minimum Wage Database.

Notes: [1] Minimum wage as percentage of the wage of an average production worker (APW).

[2] Real hourly minimum wage in Purchasing Power Parity times monthly number of hours.

[3] Indicates whether wage floors are set by statutory rules defined by law or by collective negotiation and the levels of this agreement. CB = collective bargaining; L = set by law; P = provincial; F = federal; N = national.

[4] Coverage is equal to 100 if the minimum wage is set by law, or where the coverage of collective agreements is extended to all workers; otherwise it measures the fraction of workers covered by the collective agreements defining contractual minima.

[a] At the end of the 1990s.

[b] For workers over 18 years old.

[c] For workers over 23 years old.
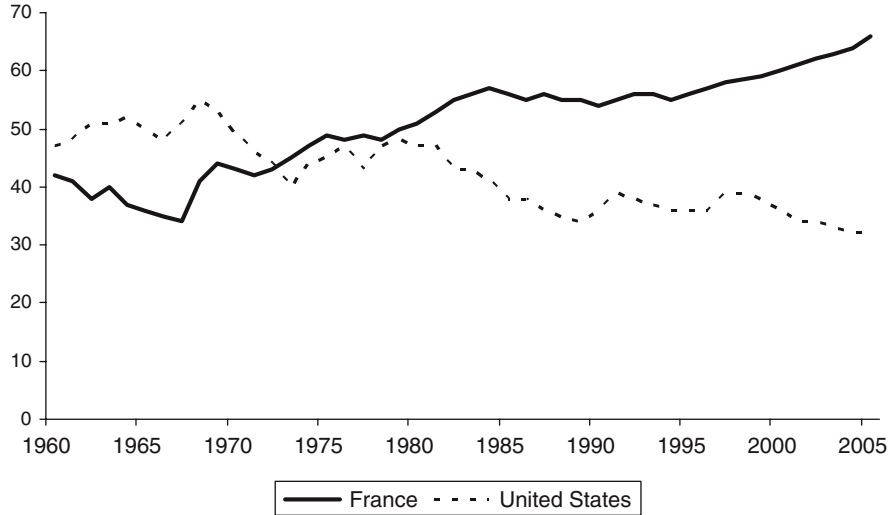
[d] For workers over 22 years old.

Figure 2.1 Ratio of Minimum to Median Wage
Source: OECD Minimum Wage Database.

2.2 Theory

2.2.1 A Competitive Labor Market

Economic theory offers unambiguous predictions about the effects of a minimum wage in a competitive labor market. A minimum wage set above the market-clearing level tends to reduce employment and increase the equilibrium wage level. Because the wage actually paid by employers is higher and employment is lower, some workers who were previously working at a lower wage are displaced by the introduction of the minimum wage, while other workers who were not supplying labor at the market-clearing level are now willing to work at the minimum wage. As a result of these two effects—displacement of some workers and higher participation—the introduction of a minimum wage above the market-clearing level involves some unemployment. As shown by figure 2.2, the minimum wage, $\underline{w}$, changes the slope of the labor supply schedule, preventing employer-firms from hiring workers at a lower wage than $\underline{w}$ even when their reservation wage is lower than the minimum wage. The presence of a minimum wage flattens the effective labor supply faced by employers, which becomes horizontal to the left of the locus $L^s(\underline{w})$. Notice further that the segment $L^s(\underline{w}) - L^d(\underline{w})$ denotes *unemployed* individuals, that is, persons who are not working, but who would be willing to supply labor at the minimum wage. Insofar as their reservation wage is lower than $\underline{w}$, these individuals will not be indifferent between working and not working: there is strictly a welfare loss associated with unemployment.

2.2.2   A Noncompetitive Labor Market

The effects of the introduction of a minimum wage in a labor market with distortions are much harder to predict. In some circumstances, for example, when employers have monopsony power in wage setting, notably when there are matching frictions and externalities associated with job search, the introduction of a minimum wage may actually end up increasing employment.
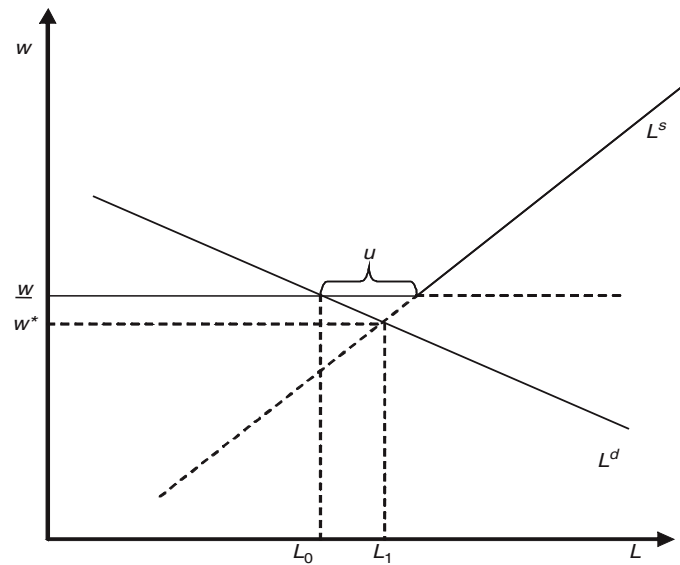

Figure 2.2   The Minimum Wage in a Competitive Labor Market

When employers can unilaterally set wages, their profit-maximizing choice involves lower employment and wage levels than in a competitive economy. As first pointed out by Stigler (1946) and Lester (1947), there is a theoretical possibility that a minimum wage set above the equilibrium wage could increase employment. The reason why this happens can be readily grasped by turning upside down the well-known case of a pure monopoly. As a pure monopolist (in the product market) faces a downward-sloping *demand* curve for its products, a pure monopsonist (in the labor market) faces an upward-sloping labor *supply* curve. This means that the marginal cost of hiring a worker for this unique employer is higher than the reservation wage of any additional worker, because the pay increase necessary to induce the individual to supply labor has to be granted not only to the marginal worker, but also to the entire workforce (just as an increase in the supply of a monopolist involves a decline in the price of all goods being sold, not just of the last unit of output). The marginal hiring cost (mhc) of a monopsonist is depicted in figure 2.3: it is above the $L^s(w)$ curve and deviates more and more from the latter
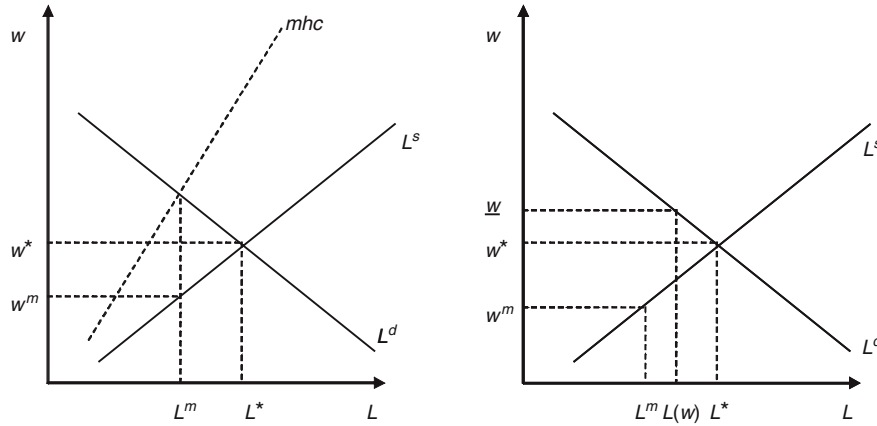
Figure 2.3 Monopsony and the Minimum Wage

as hiring an additional workers implies a wage increase to a larger and larger work-force. The profit-maximizing employment choice of a monopsonist then equals the marginal hiring cost to the marginal revenues from labor, $L^d(w)$ (the price of the good multiplied by the marginal productivity of labor). Graphically, this optimal choice lies at the intersection of the marginal hiring cost and labor demand curves. The monopsonist hires L_m workers, compared with L^* in a competitive economy. It also pays a lower wage (w^m) than any firm in a competitive equilibrium (w^*) because a monopsonist pays at the equilibrium less than the marginal productivity of labor. The degree of *monopsonistic power* of a firm is measured by this wedge between labor demand and supply, $y(L_m) - w^m$. This wedge is larger the steeper the labor supply schedule. More precisely, it is decreasing with the responsiveness of labor supply to wages, as shown analytically in box 2.1.

Box 2.1   The Degree of Monopsonistic Power

The results in figure 2.3 clearly have an analytical counterpart. Denote, as usual, by $y(L)$ the value of the marginal product of labor and by $G(w)$ the aggregate labor supply faced by the monopolist. At the monopsony equilibrium the value of the marginal product of labor must equal the marginal cost of labor:

$$y(L_m) = w^m(1+\varepsilon), \tag{2.1}$$

where ε denotes the inverse wage elasticity of labor supply. The wedge between labor demand (the value of the marginal product of labor for the firm) and supply (the way in which labor is rewarded) expressed as a fraction of the latter measures the degree of monopsonistic power of the firm. By rearranging (2.1) it is easy to

Box 2.1   (*continued*)

derive an expression for the degree of monopsonistic power,

$$\frac{y(L_m) - w^m}{w^m} = \varepsilon,$$

which tends to zero as the wage elasticity of labor supply tends to infinity (as ε tends to zero).

   Thus monopsonistic power is decreasing with the wage elasticity of labor supply: the less elastic the labor supply, the larger the difference between the equilibrium value of a job for the monopsonist and the wage that the monopsonist pays to workers. Conversely, when labor supply is infinitely elastic (the employer is a price-taker in the labor market), monopsonistic power is zero.

In the presence of a monopsony, a minimum wage set at an intermediate level between the monopsony and the competitive economy levels increases both wages *and* employment. However, if the minimum wage happens to be above w^*, as depicted in figure 2.3, then the minimum wage involves instead a lower employment level than at the competitive economy equilibrium. For even higher values of the minimum wage, employment falls below the level attained in the pure monopsony equilibrium. In the presence of a monopsony, there is therefore a nonmonotonic relationship between the minimum wage and employment: for sufficiently low levels of the minimum wage, an increase in the minimum wage is accompanied by an increase in employment, while above some threshold the traditional negative relationship exists.

The case of a minimum wage in the presence of a pure monopsony is often neglected because it is considered of limited practical relevance. Labor markets with only one employer are rarely observed. The standard example is the one-company towns in Russia, a legacy of central planning. Like mountain gorillas, these monopsonies are a sort of endangered species. A case like that described by figure 2.3, however, may also arise when there is more than one employer in a labor market, but these employers collude in wage setting. Collusion among employers may be favored by collective bargaining institutions, but collective bargaining means that also the worker side is organized, and hence employers cannot unilaterally set wages. There are in such cases *bilateral monopoly* conditions that reduce the power of employers in setting wages.

Even labor markets in which each individual employer is infinitesimally small relative to the market as a whole, however, may confer on employers some degree of monopsony power. This happens when there are search frictions and mobility costs, making it costly for workers to change jobs. These costs prevent the labor market from arbitraging away any difference in the way in which different employers pay for (homogeneous) labor services. Job creation and hiring costs

also attribute to employers some degree of monopsony power. When it is costly to establish a new job or hiring is highly regulated, there are fewer vacancies, and hence for workers it is harder to find openings to apply for. All these modern monopsony cases are rather frequent in practice (Manning 2003) and arise even when there are many employers, but many fewer vacancies to apply for.

Can a minimum wage increase employment also in the presence of these modern monopsonies? Yes, if the minimum wage is not too large and workers' search efforts and participation decisions are sufficiently responsive to the wage that they can earn if they find a vacancy. The intuition is straightforward. In a labor market without frictions, a minimum wage, on the one hand, reduces labor demand (we move up and to the left along the L^d schedule in figure 2.2), but, on the other hand, it also increases labor supply (we move up and to the right along the L^s schedule). In a labor market with frictions and where individuals can choose whether or not to search, as well as the level of search intensity, a higher wage paid to those who succeed in finding a job induces more people to participate in the labor market and put effort into job search. At the same time, the minimum wage reduces the surplus that employers can earn over and above the marginal productivity of workers once a vacancy is filled. However, the presence of more jobseekers and the fact that each of them is seeking jobs more intensively increases the probability that a vacancy is filled. To the extent that this second, labor supply effect dominates the negative labor demand effect associated with the reduction in the surplus of employers, there will be both more jobseekers and more vacancies at the equilibrium with the minimum wage than at the equilibrium without the minimum wage. Because the labor market is larger, equilibrium employment will also be larger, even if each individual worker now faces a lower job-finding rate per any given level of search effort. Minimum wages can also have positive effects on employment when employers imperfectly monitor the productivity of workers in large firms. A minimum wage, in this context, may force firms to grow larger (Rebitzer and Taylor 1995). The intuition is that firms pay higher wages but also obtain higher productivity in return, as the penalty associated with disciplinary layoffs is larger.

Minimum wages may not have negative effects on employment in *dual labor markets* where the minimum wage does not apply to the secondary or informal labor market. Under these conditions there are important spillover effects between the two sectors. As pointed out by Gramlich (1976), Mincer (1976) and, Welch (1976), after a minimum wage increase, workers displaced in the formal sector move to the uncovered sector. Hence, as depicted in figure 2.4, wages in the informal sector fall (from w_o^I to w_1^I), and labor supply in the formal sector declines (shifting the L^s curve to the left). The minimum wage then reallocates jobs from the formal to the informal sector, increasing the difference between formal and informal wages. This adjustment mechanism prevents employment losses only insofar as there is perfect labor mobility between the two sectors.
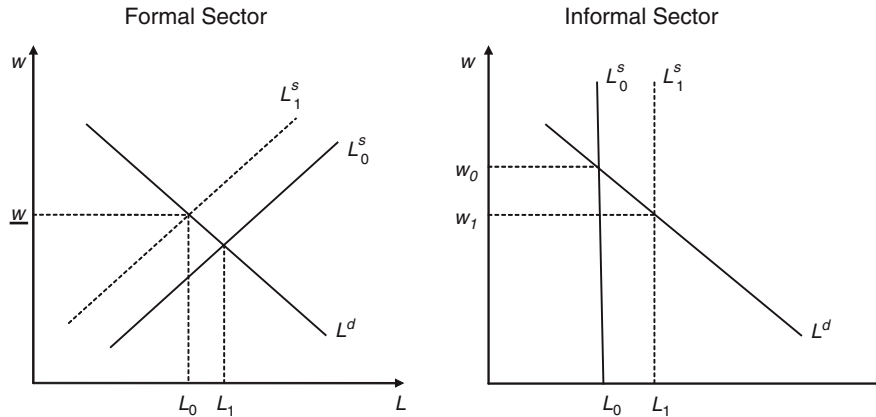
Formal Sector   Informal Sector

Figure 2.4 A Dual Labor Market and the Minimum Wage

Finally, positive effects of the minimum wage on welfare, although not necessarily on employment, can be generated when the productivity of a job depends on the investment in education and training by the employee (Cahuc and Michel 1996; Acemoglu and Pischke 1999). Under these conditions a binding minimum wage induces workers to raise their productivity by acquiring education in order not to be crowded out by the minimum wage. Hence, at the equilibrium with the minimum wage, there are more high-productivity jobs. The same type of effect may be induced on the demand side (Acemoglu 2001) because the minimum wage increases the number of vacancies for high-productivity jobs issued by employers.

Overall, although the standard prediction from economic theory is that a minimum wage should reduce employment, a number of market imperfections may allow the introduction of a minimum wage, set at relatively low levels, to be consistent with the attainment of higher levels of employment and welfare.

2.3   Empirical Evidence

2.3.1   Studies Based on Firm-Level Data

Many studies of the effects of the minimum wage are based on firm-level data and estimate the impact of minimum wages on labor demand. The impact of the minimum wage is clearly dependent on the characteristics of the bottom end of the wage distribution and on the actual enforcement of minimum wages. Earlier studies used the Kaitz index, to control for limited enforcement of the minimum wage. More recent empirical work typically measures the proportion of people earning a wage between the old and the new minimum wages (Card 1992; Card and Krueger 1995; Brown 1999), or the *fraction affected* by the minimum wage

increase. An increasingly used measure of enforcement is the *spike*, defined as the proportion of people earning exactly one minimum wage (Dolado et al. 1996). If the minimum wage is properly enforced, we generally expect the spike to increase after a minimum wage is raised as lower wages are aligned to the new minimum.

Dolado et al. (1996) provide an overview of studies of the effects of the minimum wage on employment in several OECD countries. The minimum wage is generally found to affect employment negatively, although the magnitude of the effects varies from country to country and depending on the category affected (e.g., minimum wages for youngsters generally have stronger negative effects on employment). OECD (1998, 2006c) more recently reviewed the empirical literature on the effects of the minimum wage and found some, albeit small, negative effects on employment of the minimum wage, notably for young workers.

Although most of these studies use data on the formal sector, where minimum wage legislation is enforced, a few studies apply the same methodology to data on the informal sector. These studies are mostly concentrated on developing countries (Lemos 2004 for Brazil, Gindling and Terrell 2004 for Costa Rica, and Jones 1997 for Ghana), where the informal sector is larger. Notwithstanding problems in measuring informal-sector employment, a few studies surprisingly found an increase in wages also in the informal sector after a minimum wage hike. The interpretation provided by this literature is that the minimum wage of the formal sector serves as a reference throughout the economy. If firms have monopsonistic power in the informal sector, and fair remuneration considerations are relevant, it is possible that changes in the minimum wage in the formal (and covered) sector lead to corresponding increases in the average wage of the informal sector. The term *lighthouse effect* has been used to denote this phenomenon.

2.3.2 Studies Based on Natural Experiments

Most of the studies just reviewed compare employment and wage outcomes of workers whose wage has to be raised to comply with the minimum wage with employment and wage outcomes of workers higher up the wage distribution, presumably unaffected by changes in the minimum wage. The problem with this approach is that persons receiving the minimum wage are not representative of the entire population. Thus we may end up attributing to the minimum wage effects that are related to different characteristics of workers (e.g., lower labor market attachment) located at varying portions of the wage distribution.

The empirical methodology of a natural experiment in economics (Meyer 1995; Angrist and Krueger 1999; Blundell and Dias 2000) takes these selection problems into account and makes it possible to better identify the effects of the minimum wage. It consists of exploiting exogenous changes in the economic environment

of certain agents in order to compare their reactions to those of other (a priori identical) agents who have not undergone these changes. In practice this means finding a counterfactual or *another difference* that makes it possible to control for the difference in the composition of those affected by the minimum wage and those not affected by it. For this reason, the estimators obtained by applying this methodology are also called *difference-in-differences* or double-difference estimators.

Difference-in-differences estimators have been used, for instance, by Stewart (2004) to investigate the effects of the introduction of the National Minimum Wage in Britain in 1999 (with the adult rate set at 3.6 pounds per hour) and of the subsequent increases in 2000 (3.7) and 2001 (4.1). As documented by table 2.1, Britain has a ratio of minimum wage to median wage located roughly in the middle of the distribution of European countries. Stewart compared employment outcomes of individuals just above the minimum wage and higher up the wage distribution before and after the introduction of the minimum wage. He repeated this exercise for different demographic groups (males and females at different age groups) and controlled for cyclical conditions. Stewart found no adverse effect of the introduction of the minimum wage in Britain for any of the demographic groups considered.

Difference-in-differences estimators have also been extensively used in the United States, exploiting cross-state variation in setting minimum wages above the federal level. Card and Krueger (1994, 1995), in particular, investigated the impact of increases in the minimum wage in New Jersey in 1992 from $4.25 to $5.05. They used as the control group Pennsylvania, where the minimum wage remained at $4.25 throughout this period. New Jersey and Pennsylvania are bordering states and have similar economic structures. Because this study has been widely debated, it is discussed in some detail in box 2.2.

Box 2.2   Effects of Minimum Wage Hikes in the U.S. Fast-Food Industry

David Card and Alan Krueger collected data on employment in 410 fast-food restaurants in New Jersey and Pennsylvania, two bordering states of the United States with similar economic structures. The minimum wage was initially the same ($4.25 per hour) in both states and was raised in 1992, only in New Jersey, to $5.05 per hour. The data were collected in March 1992 (when both states had the same minimum wage) and in December 1992 (after the increase of the minimum wage in New Jersey). The changes in the wage distribution in the two U.S. states are totally characterized in figure 2.5: there is a visible shift of the distribution in New Jersey, with a spike corresponding to the new level of the minimum wage, while the wage distribution in Pennsylvania remains roughly unchanged.

(continued)

Box 2.2 (*continued*)

The effects of the minimum wage increase on employment were estimated by Card and Krueger by simply taking the difference between the December 1992 and March 1992 employment variations in the two states. The rationale for this method is as follows. Suppose that employment (L) in any state is determined by an equation of the type (we omit error terms for simplicity)

$$L_i = \alpha w_i + X_i \gamma,$$

where w_i is the level of the minimum wage (the policy) in state i and X_i contains all the other variables that influence L_i. If we have two observations that refer to dates before and after the policy reform for the state changing the minimum wage (New Jersey), we can obtain

$$\Delta L_i = L_{i2} - L_{i1} = \alpha(w_{i2} - w_{i1}) + (X_{i2} - X_{i1})\gamma,$$

where the second subscript indicates dates before (1) and after (2) the change of the minimum wage. In words, the total variation in employment in the treatment state is the sum of two components: (1) the effect of the policy change itself (the increase in the minimum wage), and (2) the effect of changes in the other variables affecting employment. In order to isolate the effect of the policy (in order to estimate α), we need to find another difference, for example, get time-series data for another state j that is identical to i in each characteristic except that it has not carried out the reform (that is, $w_{j2} - w_{j1} = 0$). This is the role played by Pennsylvania in Card and Krueger's study. The variation of employment in state j is given by

$$\Delta L_j = L_{j2} - L_{j1} = \alpha(w_{j2} - w_{j1}) + (X_{j2} - X_{j1})\gamma = (X_{j2} - X_{j1})\gamma.$$

As long as the two states are sufficiently similar ($X_i = X_j$ at both dates, 1 and 2), we can obtain an estimate of α by simply calculating the difference of the difference:

$$\Delta L_i - \Delta L_j = \alpha(w_{i2} - w_{i1}).$$

In the case of Card and Krueger, the variation of the minimum wage ($w_{i2} - w_{i1}$) in New Jersey was 80 cents. They found the difference of the differences to be

$$\Delta L_i - \Delta L_j = 0.29 - (-2.01) = 2.30;$$

hence they obtained

$$\hat{\alpha} = \frac{\Delta L_i - \Delta L_j}{(w_{i2} - w_{i1})} = \frac{2.30}{.8} = 2.875,$$

which implies that an increase of the minimum wage by one dollar has the potential to create 2.875 more employees.

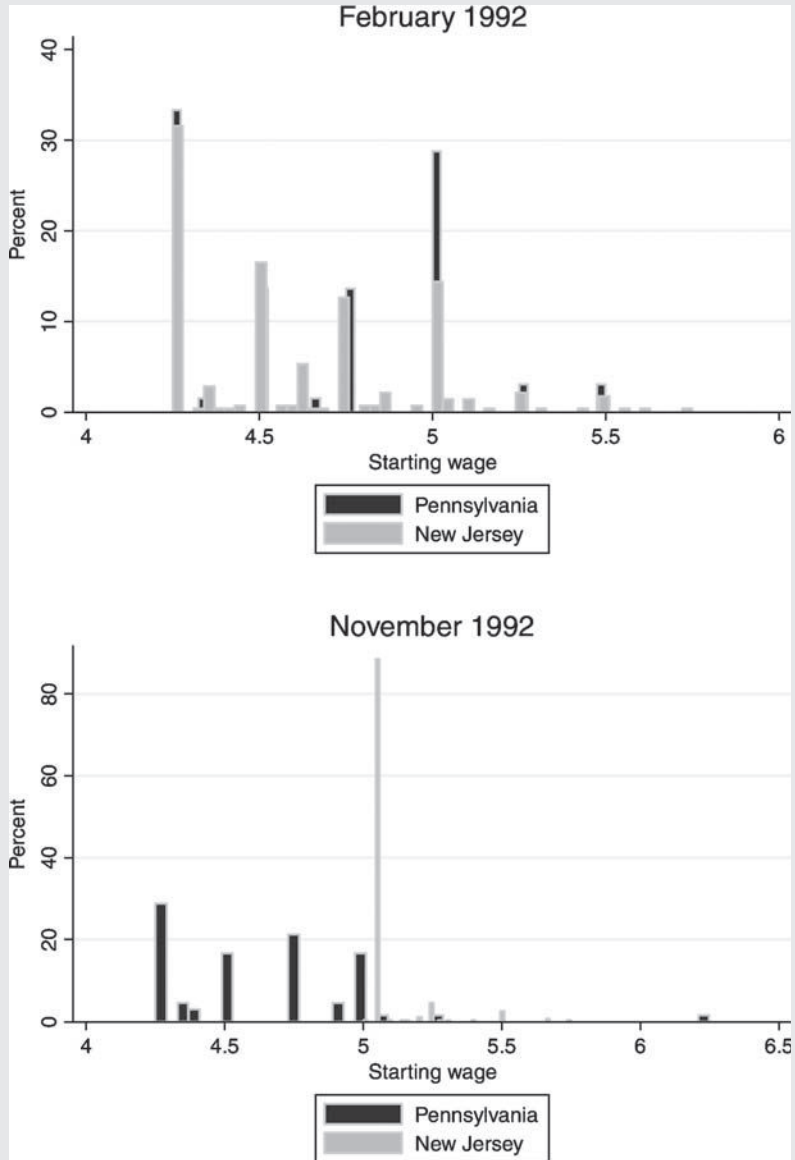(*continued*)

Box 2.2 (*continued*)

Figure 2.5   The Wage Distribution before and after the Increase
in the Minimum Wage

> **Box 2.2** (*continued*)
>
> Hence Card and Krueger found that after the minimum wage was increased, the level of employment in fast-food establishments in New Jersey rose faster than in Pennsylvania. Their conclusion was that therefore an increase in the minimum wage can lead to an increase in employment when this wage is sufficiently low to start with.
>
> The research by Card and Krueger generated a large and very informative debate along two dimensions. The first debate focused on the interpretation of the results and on whether consumers of fast food can be taken to be representative of the population at large, since it may well be that persons earning minimum wages represent the typical consumers of fast food. The second debate concerned the quality of the data and the fact that the original Card and Krueger study was based on a survey that used telephone interviews and was not the result of administrative data. Despite the large debate between Neumark and Wascher (2000) and Card and Krueger (1994), the results of the early study seem to be confirmed. A Stata data file with the Card and Krueger dataset and a do file and a log file are available on our webpage (see link at http://press.princeton.edu.titles/8771.html).
>
> Sources: Card and Krueger (1994); Neumark and Wascher (2000).

2.3.3 Studies Based on Workers' Histories

Two problems with this literature are that (1) it typically focuses on specific industries in analyzing the effects of the minimum wage, while the standard predictions of the competitive model apply to the labor market as a whole, and (2) it neglects potential effects of the minimum wage on hours rather than on persons employed.

These issues can be tackled by using longitudinal data on representative samples of workers, tracking labor market histories of persons whose wages are at the minimum wage or close to it. Recent studies in this category found that changes in the minimum wage have a significant impact on employment among this group of workers. Nevertheless, there is no agreement about the directions of these changes. Abowd et al. (1999) found that in France an increase of 1 percent in the minimum wage reduces the probability that men receiving the minimum wage keep their previous jobs by 1.3 percent, while for women this figure is 1 percent. In the United States a reduction by 1 percent in the minimum wage increases the probability that workers paid at this level will keep their jobs by 0.4 percent for men and by 1.6 percent for women. Portugal and Cardoso (2001) found different results using the same type of methodology. They exploited changes made in 1987 to Portuguese legislation regarding the minimum wage of young people aged 19 and under. The minimum wage was raised by 50 percent for youths aged 17 and by 33 percent for youths aged 18 and 19. They found that these minimum wage hikes reduced hiring, but also that workers had a greater tendency to keep their jobs. In other words,

Portugal and Cardoso observed fewer separations, which partly offset the fall in hires. Note that this result is consistent with the predictions of the monopsony model, since it reveals greater attachment of youth to their jobs when wages improve. Neumark et al. (2004) found negative effects of minimum wage hikes in the United States on both employment and hours of workers initially earning the minimum wage or slightly more, contrary to Zavodny (2000), who found that an increase in the minimum wage reduced the probability that an affected worker remained employed, but for those who kept their job, there was a positive effect on hours.

Overall, this large body of empirical research shows that the minimum wage can have significant effects on both job-finding and job loss probabilities. However, it does not invariably find a positive effect on the probability of job loss among the affected population.

2.4   Policy Issues

Thus recent empirical evidence fails to provide unambiguous results on the effects of the minimum wage on employment.[2] In particular, only two-thirds of the studies reviewed by Neumark and Wascher (2007) found negative employment effects of minimum wages, and these effects were not always statistically significant. This explains why some researchers advocate an increase of the minimum wage, while others argue in favor of marked reductions of the minimum wage.

2.4.1   Should the Minimum Wage Be Reduced or Increased?

Models of the minimum wage under realistic conditions, that is, allowing for some degree of monopsony power by individual firms, suggest that the setting of the minimum wage is a matter of fine-tuning: if it is too low, it is not binding; if it is too high, it can do worse than the market failure that it was supposed to address, where "worse" here means that the total surplus is lower than without the minimum wage.

The main rationale for advocating a reduction in the minimum wage is that the labor market is ill functioning, and some low-productivity workers (e.g., young-sters and the unskilled) inflate the ranks of unemployment. This argument is clearly stronger in the presence of double-digit unemployment rates for these groups, notably when these rates are not paralleled by adverse labor market conditions for other workers.

An increase in the minimum wage is often advocated on the grounds that some groups of workers have a particularly weak position at the bargaining table, and

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[2] As Flinn (2007) puts it, "Recent studies indicate that the 'textbook-competitive' model of the labor market ... may have serious deficiencies in accounting for minimum wage effects on labor market outcomes."

levels of earnings inequality are deemed to be too large. In this context the minimum wage is seen as an instrument to reduce the number of working poor, that is, individuals who hold a full-time job but nevertheless appear to live close to the poverty line. The natural supporters of this view are those who are likely to enjoy a wage increase in the presence of a wage floor.

2.4.2 Is the Minimum Wage Effective in Reducing Earnings Inequality and Poverty?

As is apparent from the preceding, the strongest arguments in favor of an increase in the minimum wage rely on equity considerations. However, economic theory also does not provide firm guidance on the impact of the minimum wage on poverty. A working poor person employed at the minimum wage may experience an increase in income if that person's job is not destroyed, reducing the poverty rate (the percentage of individuals having incomes below the poverty line), but if the minimum wage hike destroys jobs, some individuals will experience a drop in their incomes, increasing the incidence of poverty (the distance between the average incomes of those above and below the poverty line), if not the poverty rate itself (Brown 1999). In dual labor markets an increase in the minimum wage could quite paradoxically end up increasing earnings inequality. Some of the adverse effects of minimum wages on unemployment among low-productivity workers can be mitigated when the minimum wage is combined with in-work benefits (chapter 4). Actually, the combination of minimum wages and in-work benefits is often advocated as a rather effective antipoverty device (Gregg 2000; OECD 2006c), providing *wage insurance* to those with low earnings.

Moreover, a substantial portion of minimum wage earners may not be poor because other family members have earnings. Thus the minimum wage may have a low *target efficiency*, helping many workers in nonpoor families and providing only limited earnings support to the truly needy.

Because economic theory does not offer unambiguous results about the effects of the minimum wage on poverty, it is always important to examine this issue empirically. Applied studies typically look at the distributional impact of the minimum wage by analyzing wage distributions in a neighborhood of the minimum wage level. If crowding-out effects are important, then we should observe a spike in the wage distribution close to the legally imposed minimum. If there is no spike or the spike lies to the right of the minimum, the data indicate that the minimum wage has little effective "bite." Most studies (including Card and Krueger 1994; see figure 2.5 in box 2.2) actually found a spike in the wage distribution corresponding to the minimum wage. There is also less ambiguity in the empirical literature on the employment effects of minimum wages when the focus is on teenage and unskilled workers: in this case the evidence

of disemployment effects is particularly strong. Concerning the effect of the minimum wage specifically on poverty, the study of Addison and Blackburn (1999) suggests that the increases in the minimum wage that occurred in the United States in the 1990s contributed to reducing the poverty rate among youth aged 24 and under and workers over 24, but only among school dropouts. Finally, Flinn (2002) found positive effects on welfare of young Americans for the 1997 minimum wage increase (from \$4.75 to \$5.15), but no evidence of a positive effect on welfare of the minimum wage increase that occurred in 1996 (from \$4.25 to \$4.75), which seems not to have exerted significant spillovers on the wage distribution.

2.5   Why Does a Minimum Wage Exist?

Minimum wages can achieve both goals typically assigned to labor market institutions:

1. They can increase efficiency by remedying market failures, such as those deriving from excessive monopsonistic power, and informational aymmetries that give rise to moral hazard and adverse selection problems.

2. They can reduce earnings inequality by supporting incomes of low-earning, workers, for example, low-skilled workers.

The setting of the minimum wage requires careful fine-tuning if either of these two goals is to be achieved. When the minimum wage is too low, it is ineffective. When the minimum wage is set at a level that is too high, it reduces welfare and may have perverse effects on income inequality by completely crowding low-skilled workers out of the labor market.

In order to improve the efficiency and distributional properties of a minimum wage, governments have to adjust it over time, but it may prove politically difficult to do so. The political economy literature on the minimum wage (Sobel 1999; Saint-Paul 2000; Bacache-Beauvallet and Lehmann 2005) highlights which institutional features can increase or reduce political support for the minimum wage. The decisive (median) voter is generally an employed worker whose wage is slightly above the minimum wage. The key dimension along which to assess political support for the minimum wage is whether this pivotal group of workers experiences (1) a sufficiently high degree of substitutability with workers who are potentially crowded out by the minimum wage and (2) a positive wage spillover from the introduction of the minimum wage or a high degree of complementarity with capital. When an increase in the minimum wage, eliminating the least skilled, increases the marginal value of the semiskilled and hence their wages, the ruling middle class will support a rather high minimum wage. Conversely, the

ruling middle class will oppose a reduction in the minimum wage when it fears that firms will try to replace them with cheaper workers.

Hence the future of the minimum wage is likely to depend on these cross-skill (and capital-labor) complementarities and on the spillovers that the minimum wage can exert over the entire wage distribution. As discussed in chapter 3, these spillover effects are likely to be more pronounced in the presence of strong unions, setting wage scales from this minimum.

2.6   Suggestions for Further Reading

A good starting point is the book by David Card and Alan Krueger (1995) summarizing also their controversial study, which is described in some detail in box 2.2 and can be replicated with the data provided on the website (http://press.princeton.edu.titles/8771.html). The debate over their seminal article (Card and Krueger 1994) is also particularly instructive: in particular, we recommend David Neumark and William Wascher (2000) and the reply by Card and Krueger (2000) in the same issue of the *American Economic Review*. For a survey of the new minimum wage research, see Neumark and Wascher (2007). The earlier literature, mostly focused on the United States, is surveyed by John Kennan (1995).

A special issue of the *Economic Journal* (114) was devoted in 2004 to the introduction of the minimum wage in Britain. Finally, Juan Dolado et al. (1996) offer a less recent but particularly instructive discussion of the fallacies of the common wisdom on the effects of the minimum wage that draws mainly on the European experience.

2.7   Review Questions

1. What is the Kaitz index? What are the pros and cons of this measure of the minimum wage?

2. Why are there so few workers earning the minimum wage?

3. Why are minimum wages typically age dependent?

4. When does a minimum wage increase employment?

5. Why, in your view, has an increase in the minimum wage been found to increase wages also in the uncovered (informal) sector?

6. When does a minimum wage increase welfare, although not necessarily employment?

7. How does a minimum wage affect poverty?

8. Who supports the presence of the minimum wage?

9. Why did Card and Krueger study the fast-food industry?

2.8   Technical Annex: Fine-Tuning of the Minimum Wage

Specify labor demand and supply as in technical annex 1.4. Suppose that labor demand is originated by just one employer facing the aggregate labor supply. This pure monopsonist (superscript m) chooses the employment level that maximizes profits:

$$\pi^m = \frac{AL^{1-\eta}}{1-\eta} - wL,$$

subject to being on the labor supply curve $L = w^{\frac{1}{\varepsilon}}$. Deriving the first-order condition and solving for wages, one obtains

$$w^m = \left[\frac{A}{1+\varepsilon}\right]^{\frac{\varepsilon}{\varepsilon+\eta}} < A^{\frac{\epsilon}{\epsilon+\eta}} = w^*; \qquad (2.2)$$

hence the equilibrium with a monopsonist involves a lower wage than the equilibrium in a competitive labor market maximizing the total surplus (w^*). Substituting the monopsonist wage in the labor supply, we obtain the equilibrium employment level under a pure monopsony,

$$L^m = \left[\frac{A}{1+\varepsilon}\right]^{\frac{1}{\varepsilon+\eta}} < A^{\frac{1}{\epsilon+\eta}} = L^*.$$

Hence employment is also lower than in a competitive labor market (L^*). Thus there is an efficiency loss associated with the presence of a monopsony because the economy achieves a lower total surplus than in a perfect labor market.

From this equilibrium, a minimum wage can contribute to reducing the deadweight loss associated with the monopsony. In particular, any minimum wage that forces the monopsonist to pay at least $\underline{w}$ will increase employment, provided that the minimum wage is lower than the wage maximizing the total surplus,

$$\left[\frac{A}{1+\varepsilon}\right]^{\frac{\varepsilon}{\varepsilon+\eta}} < \underline{w} < A^{\frac{\epsilon}{\epsilon+\eta}}.$$

A minimum wage set in this range has an efficiency-enhancing role. When the minimum is larger than $A^{\frac{\epsilon}{\epsilon+\eta}}$, it is itself a source of inefficiency potentially leading to an even lower total surplus than under a monopsony. There will be a nonmonotonic relation between the minimum wage and employment: first increasing and then decreasing. Still, distributional considerations may dictate a minimum wage above the perfect labor market case.

Consider the outcome of the normative, social planning problem characterized in technical annex 1.4. We know that the socially optimal wage will deviate from $A^{\frac{\epsilon}{\epsilon+\eta}}$ by a factor μ that is a function of labor demand and supply elasticities, as