



THE ECONOMICS OF **Imperfect Labor Markets**

Tito Boeri and Jan van Ours

Third Edition

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Tito Boeri *and* **Jan van Ours**

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To Alan Krueger,

with hopes of conveying a fraction of his joy of research.

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Which labor market institutions work better in containing job losses during the lockdown associated with the Covid-19 pandemic? How is it possible to mitigate the work-safety trade-off? Which lessons did we learn on labor policies during the Great Recession of 2008–2009? Is it good for employment to increase the progressiveness of taxation? Does it make sense to contrast “active” and “passive” labor market policies? Who actually gains and who loses from employment protection legislation? Why are minimum wages generally diversified by age? Is it better to have decentralized or centralized bargaining systems in monetary unions? Should migrants have access to welfare benefits? Should governments regulate working hours? To what extent are social security contributions different from other taxes on labor? Can equal opportunity legislation reduce discrimination against women or minority groups in the labor market?

Current labor economics textbooks neglect these relevant policy questions. In spite of significant progress in analyzing the costs and benefits of labor market institutions, these textbooks have a setup that relegates institutions to the last paragraph of chapters or to a final institutional chapter. Typically a book begins by characterizing labor supply (including human capital theory), labor demand, and the competitive equilibrium at the intersection of the two curves; it subsequently addresses such topics as wage formation and unions, compensating wage differentials, and unemployment without a proper institutional framework. There is little information concerning labor market institutions and labor market policies. Usually labor market policies are mentioned only every now and then, and labor market institutions are often not treated in a systematic way. When attention is given to these institutions, reference is generally made to the US institutional landscape and to competitive labor markets in which, by definition, any type of policy measure is distortionary.

The novelty of our book is that from the start the focus is on labor market institutions operating in *imperfect* labor markets—that is, markets that depart from perfect competition. Unlike competitive markets, imperfect labor markets allow employers and employees to enjoy rents, and hence a job is a big deal. Losing a job or having to replace an employee leaving the firm is costly in such markets, while employees and employers involved in these types of events would not suffer any loss in competitive labor markets. Imperfect markets are also characterized by the presence of many labor market *institutions*—that is, systems of laws and programs that shape the behavior of individual workers and employers. Institutions result from a political process aimed at (1) increasing economic efficiency and (2) achieving some redistributive goal. Efficiency is pursued by remedying market imperfections, such as excessive monopsonistic power, informational asymmetries that give rise to moral hazard and adverse selection problems, and externalities associated with social customs or the job-matching process, as well as transaction costs and frictions that restrict the size of markets. Redistribution provides a rationale for these institutions even when there are no market imperfections. In imperfect markets, redistribution sometimes can be achieved while pursuing efficiency, as in the case of institutions such as minimum wages or employment subsidies that counteract excessive monopsonistic power. In most cases, however, the traditional trade-off between efficiency and equity arises. Actually, the redistribution brought about by these institutions may well not promote a more egalitarian society or represent the interests of the median voter. There are frequent policy failures in the design of labor market institutions that give disproportionate representation to some pressure group pursuing very specific interests.

A problem with much macroeconomic literature is that it is not fair to labor market institutions. It often fails to explain why these institutions are in place to start with. Institutions are described as something that distorts the work of the market mechanism and prevents the attainment of efficient outcomes. This implies that if a government could remove these institutions, it should do so without further ado. It is an offense to the rationality of citizens and of their democratically elected governments that most of these institutions still exist.

This book also takes into account that institutions rarely operate in isolation. Hence, from a positive standpoint, the effects of each institution on the labor market are investigated by considering not only the direct effects on employment, unemployment, and wages but also the indirect effects, mediated by the presence of other institutions. For

example, a change in the generosity of the unemployment benefit system affects unemployment directly by reducing search intensity and increasing the reservation wage of job seekers and indirectly by increasing the bargaining power of unions and the level of the efficiency wage. Incidentally, this interaction provides a third rationale for the presence of some institutions: They are created to counteract or complement the effects of other institutions. Policy failures also may arise in this context because the norms responsible for the distortions are hardly removed. There are at best marginal adjustments, often undone by later counter-reforms. Often the political process creates chains of distortions and clusters of institutions so that some institutions are used to compensate for the undesirable effects of others.

We place much attention on precisely defining institutions and measuring them along their relevant dimensions (e.g., eligibility for unemployment benefits, level of the benefits, and maximum duration for which they can be provided) because we believe that accuracy in describing the way in which an institution operates and the goals it pursues are essential for characterizing its effects on the labor market. Statistical information on the evolution over time of these institutions is also provided, whenever possible, for all member countries in the Organization for Economic Cooperation and Development (OECD). Contrary to common wisdom, there has indeed been considerable variation over time in these institutions. We also discuss policy enforcement issues.

Position of This Book in the Literature

Ehrenberg and Smith (2006), Kaufman and Hotchkiss (2006), McConnell et al. (2008), Borjas (2009), Laing (2011), Sloane et al. (2013), and McLaughlin (2018) are just a few examples of available labor economics textbooks. As mentioned earlier, these textbooks devote one or a few chapters to institutions. Usually the key distortions associated with the presence of labor market institutions are only briefly touched on, and no attempt is made to examine how the institutions operate when labor markets are not competitive.

There are also a few specialized books that analyze labor market institutions. Because they are not conceived as textbooks, they do not provide systematic coverage of the different institutions and do not offer an integrated framework. A partial exception is Layard et al. (1991), which, however, is confined to the analysis of unemployment. Manning (2003)

is another partial exception: It offers a clear overview of monopsony in all its dimensions. However, except for unions and minimum wages, it does not deal with labor market institutions in much detail. Finally, Cahuc et al. (2014) offers wider and in-depth coverage of labor market institutions, but it does not provide a unifying framework, and the book is, in any event, intended for graduate students.

There is a huge literature on the effects of specific labor market institutions on labor market performance. This empirical literature has been enriched in the past two decades by much wider access to microdata. The main advances in labor economics in recent years have been indeed in applied work. We provide in each chapter an account of the main findings of the literature on the effects on the labor market of the institution being investigated in that chapter. This does not mean that we account for *all* works that have been written on the subject. We concentrate on those findings and issues that have, in our view, more relevance in real-world labor markets.

Although we discuss why institutions exist, we do not offer full coverage of the political economy of labor market institutions, which is addressed by other specialized books, including Saint-Paul (2000), Persson and Tabellini (2000), Grossman and Helpman (2001), Drazen (2000), and Galasso (2017).

Audience

Our book targets a composite readership, including undergraduate students taking courses in labor economics (a compulsory requirement for many BAs) as well as graduate students specializing in this field. Professional economists in international organizations and government agencies are another target.

Our book can be taught at the undergraduate level in programs that specialize in economics. It can also be used in business and political science schools where human resource-oriented courses are taught by economists. The description of the institutions and the technical annexes can also be useful references for graduate courses in labor economics. Finally, scholars in the field may find the book a useful reference for their libraries.

Prerequisites and Technical Level

In light of the audience we have in mind, the technical level required by the book is modest. Ideally, readers should have taken an introductory

course in microeconomics, a semester of calculus, and an introductory course in statistics. In practice it will be possible to read the book even when these prerequisites are partially or totally unfulfilled. The viability of the latter option rests on the various numerical examples presented in the book and on the graphical treatment of some key results. In this simpler treatment all the main arguments are presented and the main results are outlined, even though they lack the rigor and the generality that the use of calculus allows. Boxes and, above all, technical annexes provide these features.

The Third Edition

This third edition features two new chapters (chapter 11 and 13) on regulations on self-employment and on health-related labor policies, respectively. We merged the two original chapters on unemployment benefits and active labor market policies as the two sets of institutions operate jointly in most OECD countries and are strictly interrelated in their design. We devoted more attention to incentive schemes. We go inside the firm, dealing with the principal-agent relationship already in the first chapter, where we present the efficiency wage model. The focus of the employment protection chapter is on incentives within firms. This is also justified by the fact that a number of recent developments—including the growth of solo self-employment and unique contractors, the appearance of superstar firms acquiring a strong market power, the unbundling of production—are blurring the borders between internal and external labor markets.

In addition to updating the theoretical and empirical literature, we devoted much more attention to identification and measurement issues. The sections surveying the empirical literature in each chapter now have a similar structure, starting off with some macro facts about the institution and subsequently discussing the microeconomic evidence to explain why results differ across studies. Policy issues have been revised in order to take into account recent developments in the public debate. We added a section in each chapter on the future of any institution. Clearly, we are here looking in the crystal ball, but we thought that this was a useful exercise. This is also consistent with the idea that technological change cannot be a topic for a single chapter (and even less so for a section of a chapter) but is something that encompasses the entire institutional landscape in the labor market. Finally, we harmonized technical

annexes in order to use, as much as possible, the same framework across chapters (cross-references to models used throughout the book are now italicized).

We added new material to each chapter. In particular, chapter 1 now has a section on the measurement of labor market flows and an introduction to the methodology of quasi-experiments with two new boxes and a discussion of incentives within the firm. The revised chapter 2 considers the effects of the minimum wage also within an efficiency wage perspective and looks into applied methods for detecting and measuring monopsony power. In the survey of the empirical literature, more attention is paid to general equilibrium effects, notably to pass-through to consumers of minimum wage hikes. Chapter 3 on unions and collective bargaining provides a new overview of collective bargaining characteristics, with a new section on occupational licensing. Furthermore, there are three new boxes highlighting empirical research on how collective bargaining characteristics and occupational licensing affect labor market outcomes. The renewed chapter 4 on anti-discrimination legislation now has sections on racial profiling, the downside of anonymous applications, and a discussion about introducing minority quotas. Chapter 5 on working-time regulations now features a revised theory section on subsidized short-time work schemes, an institution that was revived under the Great Recession and the Covid-19 pandemic. Chapter 6 on early retirement now analyzes more in-depth demand-driven determinants of early retirement. In the survey of the empirical literature, attention is paid to the growing microeconomic literature on the effects on youth labor demand of reforms reducing (or increasing) the retirement age. Chapter 7 on family policies has a new discussion on paternity leave and the child penalty. Chapter 8 on education and training has a new discussion on returns to college persistence and the labor market returns to the quality of education. Chapter 9 on international migration now presents the perfect labor market case also within a general equilibrium perspective and discusses in detail the identification and specification issues arising when empirically assessing the effects of international migration on wages and employment. The technical annex now contains a simple model for students to derive analytically the results discussed qualitatively and shown geometrically in the main text. In light of the recent importance of refugee migration, a new section deals with the interactions between economic and refugee migration. Chapter 10 on employment protection provides new measures of this institution and

offers a framework to assess the effects not only on labor market stocks and flows but also on productivity. It devotes much more attention to temporary employment, discussing explanations for the long-lasting coexistence of open-ended contracts with strict employment protection and a flexible fringe of temporary contracts. It also discusses (in a rigorous fashion in the technical annex) the political economy of reforms of employment protection and contractual dualism. Chapter 11 is a brand new chapter looking into the black box of self-employment, a labor market status systematically overlooked by labor market textbooks that focus only on dependent employment. The most relevant regulations affecting the size and characteristics of self-employment are analyzed. In particular, taxes on self-employment incomes, business start-up costs, occupational licensing and social protection offered to self-employed workers are considered. The analysis is carried out taking into account the high heterogeneity of self-employment. In particular, the distinction between entrepreneurial self-employment and solo self-employment is emphasized. As indicated before, chapter 12 now combines unemployment benefits and active labor market policies. It contains new empirical evidence on the relationship between potential unemployment benefit duration and the quality of post-unemployment jobs, on the effects of decentralizing public employment services, and on the way mandatory job search periods affect labor market outcomes. Chapter 13 is a brand new chapter on health-related labor policies. This chapter discusses workplace accidents in relation to workplace safety regulations and deals with disability benefits and absenteeism in relation to labor market outcomes. Chapter 14 on payroll taxes has new parts on the effects of payroll tax cuts, the labor market consequences of an earnings test, and the effects of an earnings disregard on the labor market outcomes of single mothers.

When we delivered the final version of this book we were still in the middle of the Covid-19 recession. A key feature of this recession is that it occurred in the labor market without any lag with respect to the fall in output as the measures taken to reduce the contagion stopped all of a sudden a very large fraction of the economy and related employment. Figure P.1 indicates that in countries that did not activate short-time work or partial unemployment insurance schemes, such as the United States, the rise in the number of unemployment benefit claimants was sudden and historically unprecedented. It was therefore a major stress test for labor market institutions. It will take some time before we draw

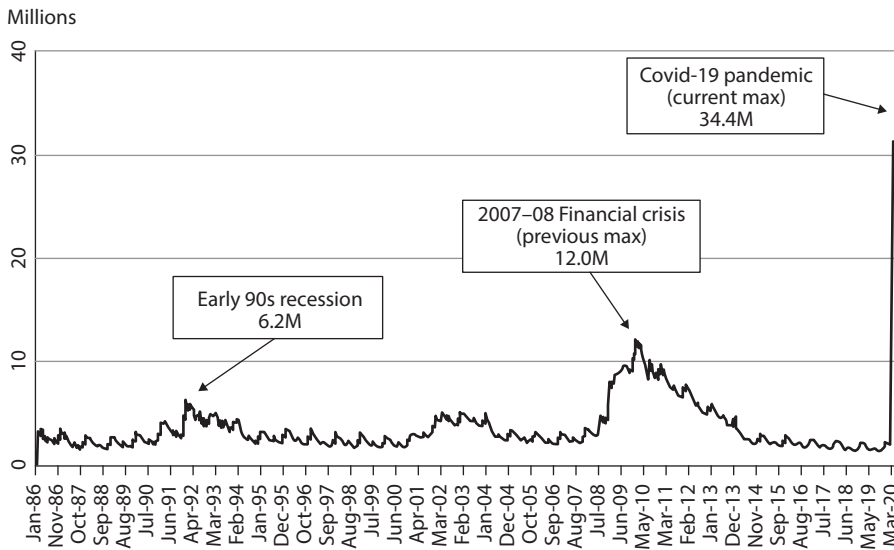


FIGURE P.1. Total continuing claims for unemployment insurance, US (Jan 1986–Jul 2020, Non-seasonally adjusted)

Source: US Department of Labor

lessons on the effectiveness of the unprecedented labor market policy measures taken by governments to cushion the cost of this shock. Yet already at this stage, we can identify the most relevant labor issues brought to the attention of policymakers by the pandemic. Such issues are discussed in each chapter.

While teaching from the previous edition, we used various numerical examples that are quite useful in better understanding some of the results of the literature. These numerical examples are now included in this edition. We expanded the section with exercises at the end of each chapter. The solutions of these exercises are available for lecturers. Finally, thanks to hundreds of students and a few careful readers who worked hard in editing the translations of our book, we were able to identify most of the typos and statements lacking clarity present in the second edition and address them.

Plan and Guidelines for Instructors

This third edition of the book consists of 13 chapters plus an overview chapter. Each chapter except the first focuses on a different institution. The overview chapter sets out the unifying line of reasoning and the structure of the book. Then the institutions are discussed separately in 13 chapters:

2. Minimum wages
3. Unions and collective bargaining
4. Anti-discrimination legislation
5. Regulation of working hours
6. Early retirement plans
7. Family policies
8. Education and training
9. Migration policies
10. Employment protection legislation
11. Regulations on self-employment
12. Unemployment benefits and active labor market policies
13. Health-related labor policies
14. Payroll taxes

Each chapter can be dealt with separately. The theoretical framework is formally presented in the technical annexes to the chapters.

This organization of the book allows the instructor to choose particular sequences of institutions. For instance, a basic course (not requiring dynamic frameworks) on *price-based institutions* could cover chapters 2, 3, 4, and 14; a basic course on *quantity-based institutions* could use chapters 5–9. Shorter courses can also be organized by topics—for example, a course on *flexicurity* (chapters 10 and 11), a course on *wage-compressing institutions* (chapters 2 and 3), one on *human capital investment* (chapters 8 and 9), or on *gender issues* (chapters 4, 5, and 7).

In all chapters except chapter 7, where we concentrate on family labor supply decisions, the analytical unit is the individual. We also treat labor supply decisions along extensive margins (participation) in all chapters except chapter 5 (and to some extent chapters 7 and 11), where we also consider adjustment along the intensive margin (hours of work).

Each of the chapters that concerns a separate institution is set up in the same way and is organized as follows:

1. Definition of the institution, including the way in which it is enforced, measurement issues, and stylized facts about the institution (cross-country variation and time-series evolution)
2. Theories (the plural is used here because for each institution several theories may apply)

3. Empirical evidence (macro and micro evidence)
4. Policy issues (relevant trade-offs and design features)
5. Interactions with other institutions
6. Overall assessment, rationale for the presence of the institution, likely future developments
7. Suggestions for further reading
8. Review questions and exercises
9. Technical annex

Distinguishing Features

Three distinguishing features of our approach are (1) a thorough discussion of measurement issues that tries, where possible, to complement institutional indicators with information on the actual enforcement of these norms; (2) an attempt to highlight the rationale behind each institution, its efficiency and distributional properties, and to identify those who benefit and those who lose from its presence; (3) the absence of a rigid distinction between inside and outside the firm, as technological progress is blurring the borders of firms.

The nature of the empirical research very much depends on the nature of the institution. For many institutions, elements of change can be exploited to establish an effect on labor market outcomes. However, some institutions, like unions, change relatively slowly over time. For anti-discrimination legislation, the empirical research is not on how legislation affects behavior but on the nature and the magnitude of discrimination. This fundamental question needs to be addressed before the effects of legislation can be established. To establish causal effects between labor market institutions and the functioning of labor markets is not easy. In our book we favor reporting on studies that use a difference-in-differences approach and occasionally a regression discontinuity design. These studies employ a quasi-experimental setup that makes the identifying assumptions rather mild. In a difference-in-differences approach a policy change that affects some groups but not others is exploited. Such a policy change allows for a before-after comparison: the first difference. Then, there is the difference between a *treatment group* that is affected and a *control group* that is not affected: the second difference. The difference of these two differences gives the treatment effect of the policy change. A regression discontinuity

methodology exploits one or more discontinuities in the relationship between a labor market institution and a variable that is exogenous for the individual—for example, age. The assumption is that individuals on either side of the discontinuity only differ slightly, except for their different exposures to an institution. The difference in behavior of individuals close to either side of the discontinuity then reveals how this difference in exposure to the institution affects behavior.

In the review of the empirical evidence, a few studies are selected and discussed in greater detail in boxes in each chapter. The suggestions for further reading in each chapter complement this enrichment with a few seminal publications. Detailed references are provided at the end of this book.

Acknowledgments

This third edition benefits from very valuable comments and suggestions received from anonymous referees as well as from Massimo Anelli, Anne Boring, Alex Bryson, Agar Brugiavini, Giorgio Brunello, Michael Burda, Marco Caliendo, Serena Canaan, Francesco Fasani, Pietro Garibaldi, Pieter Gautier, Simon Goerlach, Marike Knoef, Pierre Koning, Thomas Le Barbanchon, Claudio Lucifora, Olivier Marie, Pedro Martins, Espen R. Moen, Matteo Sandi, Fabiano Schivardi, Mara Squicciarini, Konstantinos Tatsiramos, and Bas van der Klaauw. We are extremely grateful to them.

We are particularly indebted to the colleagues who agreed to supply the data that enabled us to re-create graphs from their papers for illustrative purposes in the boxes in which we highlight their empirical research. In particular, we warmly thank Carl Bjuggren, Jonneke Bolhaar, Lex Borghans, Serena Canaan, Dakshina De Silva, Oliver Denk, Peter Dolton, Christian Dustmann, Lídia Farré, Andrea Garnero, Anne Gielen, Giulia Giupponi, Libertad González, Peter Harasztosi, Jörg Heining, Alexander Hijzen, Simon Jäger, Andrew Johnston, Matthew Johnston, Nadine Ketel, Henrik Kleven, Daniel Kopp, Claus T. Kreiner, Camille Landais, Edwin Leuven, Ling Li, Attila Lindner, Erzo Luttmer, Steve Machin, Pedro Martens, Alexandre Mas, Robert P. McComb, Lukas Mergele, Young-Kyu Moh, Pierre Mouganie, Arah Nekoei, Hessel Oosterbeek, Ben Ost, Weixiang Pan, Daniel Reck, Emmanuel Saez, Matteo Sandi, Julien Sauvagnat, Anita R. Schiller, Fabiano Schivardi, Benjamin Schoefer, Uta Schönberg, David Seim, Perry Singleton, Michael Siegenthaler, Peer E. Skov, Jakob Egholt

Søgaard, Jan Stuhler, Andres J. Vargas, Bas van der Klaauw, Milan Vodopivec, Douglas Webber, Andrea Weber, and Michael Weber.

While working on this third edition, we spent time together in “neutral fields” (neither in Milan, nor in Rotterdam) to develop the different chapters without being interrupted by the very many events happening when you are at your home institutions. We are very much indebted to Konstantinos Tatsiramos for having kindly hosted us at Luxembourg Institute for Socio-Economic Research (LISER) at the University of Luxembourg, Giacomo De Giorgi and Michele Pellizzari for their invitation to the University of Geneva, and Ana Lamo for having given us the possibility to spend some time at the European Central Bank (ECB) headquarters in Frankfurt after a conference.

Roberta Marcaletti skillfully assisted us in preparing the references. She hates us by now, but it is much easier for our students to find the references mentioned in the book. We are also grateful to Hannah Paul, economics editor at Princeton University Press, for having supported us in our work on this third edition.

Finally, we are indebted to Alessandro Caiumi and Sanne Lin, who provided us with unflagging research assistance and picked up many mistakes (thanks also to the contributions of our students). All remaining errors are ours.

Symbols and Acronyms

Some symbols have multiple meanings, but the correct interpretation should be clear from the context. For example, β in theoretical parts represents bargaining power of the unions, while in empirical sections it could be a vector of parameters.

A	parameter of production function, parameter of matching function
a	age of retirement
B	pension benefits, bond holdings
b	benefit level, flow value of nonemployment
BA	benefit accrual
c	consumption, recruitment cost
C	total labor cost
c_c	variable childcare cost
c_d	consumption of goods and services generated domestically without monetary transaction
c_m	consumption of marketed goods
C_0	upfront costs of migration
C_S	costs related to S years of schooling
D	duration of unemployment, duration of a job, dummy variable
DB	defined benefit pension system
DC	defined contribution pension system
e	employment rate, effort level, date of early retirement
E	expectation operator
F	fixed cost of working, foreign country, entry cost, firing cost, financial friction
F_c	fixed cost of childcare
f	cost of writing a contract (conversion of fixed-term into open-ended contract)

$g(w^r)$	density function of reservation wages
$G(w)$	labor supply, cumulative density function of reservation wages
H	home country
h	hours of work
h_d	amount of time devoted to home production
h_{ft}	hours of full-time work
h_m	hours of market work
h_{pt}	hours of part-time work
$\bar{h}$	standard workweek
i	market interest rate
I_f	indicator of whether there is discrimination among coworkers or customers, immigrants
J	asset value of a job to an employer, Jacobian matrix
j^f	asset value of a flexible job for an employer
K	capital stock
k_t	fraction of working time devoted to training
l	leisure
l_0	maximum available leisure hours (time endowment)
L	employment
L_f	number of female workers hired
L^d	labor demand
L^s	labor supply
L_m^d	labor demand of a monopsonist
LF	labor force
m	nonlabor income, matching function
M	number of hirings
MLC	marginal labor costs
MRS	marginal rate of substitution
$MRTS$	marginal rate of technical substitution
MU	marginal utility
N	sample size, population of working age, natives
NDC	notionally defined contribution pension system
NPV	net present value
O	inactivity (out of the labor force) status
OV	option value
p	probability parameter, participation rate, penalty
P	private wealth
PW	pension wealth
q	perceived productivity, probability of filling a vacancy

r	rate of return to contributions (pensions) or to additional year of schooling
R	threshold value of match productivity, private wealth of the entrepreneur invested in the firm, revenues
s	probability of being sanctioned, continuum of labor markets, search intensity, skill level of education
S	years of schooling
T	age of death, taxes, test score
TR	severance payment
t	tax on wages, wedge introduced by institutions, calendar year
t_e	payroll taxes paid by workers
t_f	payroll taxes paid by firms
U	number of unemployed workers, utility
u	unemployment rate, utility of individual union members
U_c	marginal utility of consumption
U_l	marginal utility of leisure
U_{ft}	maximum utility attainable working full-time at the current wage rate
U_{pt}	maximum utility attainable working part-time at the current wage rate
U_{np}	utility of nonparticipation (at endowment point)
V	number of vacancies, asset value of vacancy to an employer
v	vacancy rate, productivity, unobserved characteristics
v_E	value of a job to a worker without a workplace accident
v_S	value of a job to a worker with a workplace accident
V_{un}	value of unemployment for those who are not entitled to benefits
V_e	asset value of employment
V_e^f	asset value of employment with a flexible contract
V_t	potential earnings at age t
V_u	asset value of unemployment
W	social welfare
w	wage rate, marginal wage cost
w_{ft}	full-time wage rate
$\underline{w}$	minimum wage
w_f	wages for female workers
w^e	efficiency wage
w_F	wage in the destination (foreign) country
w_H	wage in the origin country
w^r	reservation wage

w^m	monopsony wage
w_t	annual earnings
w^u	monopoly union wage, wage of union member
w^n	wage of nonunion member
X	net present value of nonpledgeable income
x	vector of characteristics
y	value of job, marginal value of production
Y	outcome, value of production
Z	amount of finance available at the entry of a firm

Greek Alphabet

α	state of the labor market, parameter in matching function, shape parameter in baseline hazard, parameter in utility function, per worker lump-sum tax or employment subsidy, vectors of parameters in regression equations, damage caused by a workplace accident
α^ϵ	entrepreneurial ability
α^λ	ability in dependent employment
α^h	high innate ability
α^l	low innate ability
β	bargaining power of the unions, distributional weight of labor in social welfare maximization by government, vector of parameters
β^G	importance attached to employees by the government in welfare maximization
γ	inverse of conversion (annuitization) coefficient
Γ	utility of “getting away with it,” fraction of vacancies not filled, search cost function
δ	imputed indexation rate, job separation rate, layoff probability
Δ	difference
ε	inverse elasticity of labor supply (between 0 and infinity)
η	inverse labor demand elasticity (between 0 and 1)
θ	labor market tightness, distributional weight (in constant elasticity of substitution [CES] production function)
κ	cost of posting a vacancy (flow cost of unfilled vacancy)
λ	frequency of productivity shocks, job offer arrival rate
$\lambda(t)$	hazard function
$\lambda_0(t)$	baseline hazard

μ^G	post-government legislation markup
μ	job offer rate, markup imposed by the institution over the competitive wage
ξ	change in annuitization in pensions
π	profit
π^m	monopoly (or monopsony) profit
ρ_t	return to training
ρ	replacement rate, discount rate
ρ_w	discounting of employee taxes by employees
ρ_e	valuation of employer taxes by employees relative to cash income
σ	elasticity of substitution
τ	amount of general training, contribution rate on labor earnings
$\phi(x)$	systematic part of hazard rate
ϕ	monitoring rate, probability to experience a workplace accident
ω	overtime premium, individual-specific coefficient of discrimination for employers, customers, or coworkers
Ω	coefficient of market discrimination

Acronyms

AFP	Norwegian early retirement system
ALMP	active labor market policy
DB	defined benefit
DC	defined contribution
ECHP	European Community Household Panel
ECI	employment-conditional incentives
EITC	earned income tax credit
EPL	employment protection legislation
EU	European Union
FTE	full-time equivalent
GDP	gross domestic product
IALS	International Adult Literacy Survey
ILO	International Labour Organization
ISCED	International Standard Classification of Education
ISSP	International Social Survey Program
MGI	minimum guaranteed income

NDC	notional defined contribution
NMW	National Minimum Wage
OECD	Organization for Economic Cooperation and Development
PAYG	pay-as-you-go
PISA	Program for International Student Assessment
STW	short-time work
UB	unemployment benefit
UI	unemployment insurance
UNESCO	United Nations Educational, Scientific, and Cultural Organization
VAT	value-added tax
WFTC	Working Families Tax Credit

The Economics of Imperfect Labor Markets

CHAPTER ONE **Overview**

1.1 Why Study Labor Economics?

The labor market is a core concern of billions of people every day. Finding a job (possibly a good one), getting the best out of it, obtaining a pay rise, keeping your post in bad times, being reinstated after a maternity leave, and being insured against unemployment and its consequences on retirement savings and health coverage are just some of the preoccupations of persons of working age. Even during the years of compulsory schooling, it is the parents of the students, if not the students themselves, who are worried about their future in the labor market.

Throughout the Great Recession of 2008–2009, brought on by the global financial crisis, internet users googled the term “jobs” more than “housing,” “credit,” and “terrorism.” Figure 1.1 plots the number of searches as a percentage of the peak value reached in October 2011, when unemployment had skyrocketed to its highest levels in the United States. Notice also the marked seasonality of job searches: They increase at the beginning of the budget year in January, when firms do most hirings, and in June, at the end of the school year, when students look for short-term jobs.

According to the October 2019 Eurobarometer survey, European citizens ranked migration and youth unemployment as the two priority issues for the new European Parliament that was elected in the following weeks. Terrorism, environmental protection, and human rights were listed as lesser priorities.

The labor market is so relevant for individuals’ well-being that people form opinions, often strong ones, about the way it works. Actually

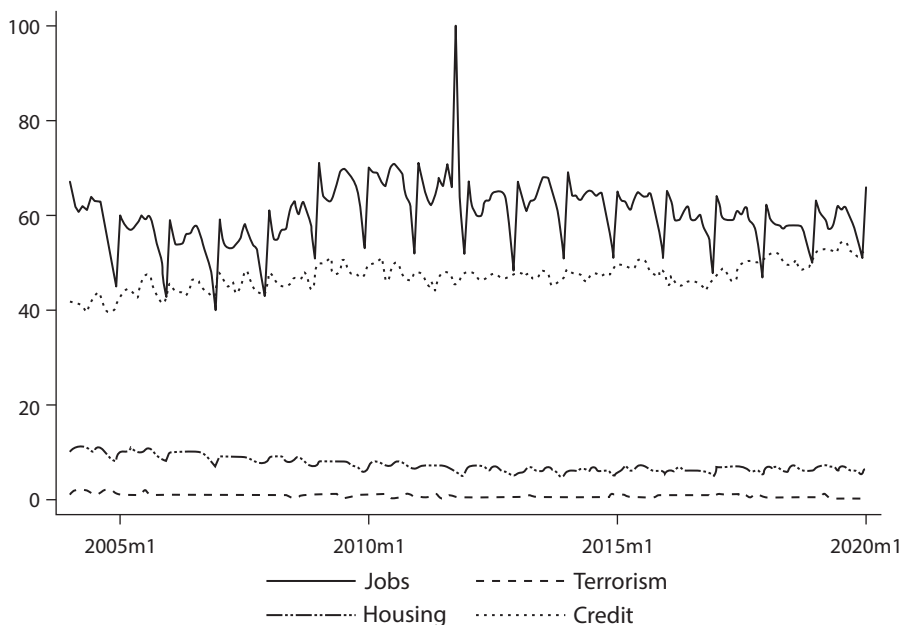


FIGURE 1.1. Google trends

they typically hold beliefs, in several cases rather misleading ones, as to how labor markets operate. To give a few examples, the layperson often believes that

1. there is a fixed number of jobs so that early retirement or a reduction in working hours generates new employment opportunities for the unemployed,
2. wages can be arbitrarily set by policymakers independently of the law of demand and supply, and
3. stronger job protection increases employment.

It is sufficient to look at some aggregate statistics to grasp how these perceptions can be misleading.

Is the Number of Jobs Fixed?

According to common wisdom, labor markets are like a bus in rush hour: Someone must get out first to let someone else get in. However, there is no reason the number of jobs should be fixed over time. This is clear from figure 1.2, which displays employment rates (i.e., the number of persons working as a percentage of the working-age population) in the European Union, Japan, and the United States in the last 20 years. Employment rates have been on an upward trend everywhere. When they have not

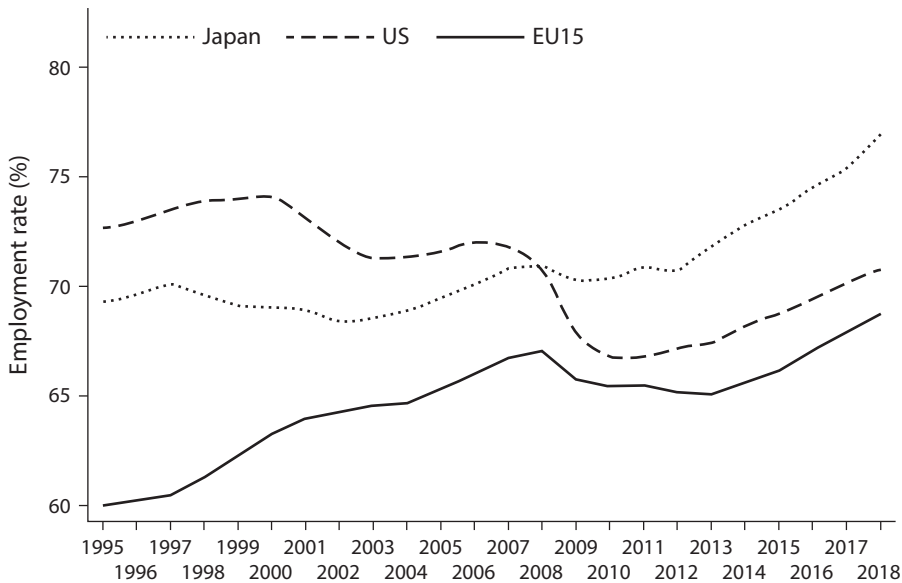


FIGURE 1.2. Employment rates: EU, Japan, and the US

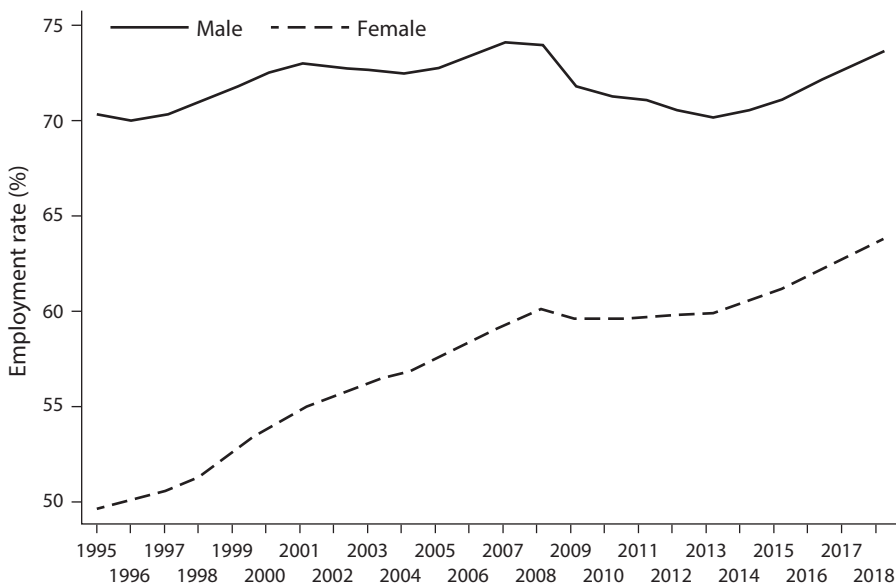


FIGURE 1.3. Employment rates by gender: EU15

been growing, they have been declining, as during the Great Recession. There is no evidence of a constant number of jobs over time.

If the number of jobs were fixed, then we should expect employment rates of men and women to move in opposite directions over time. Once more, there is no indication that this is happening (figure 1.3). Female

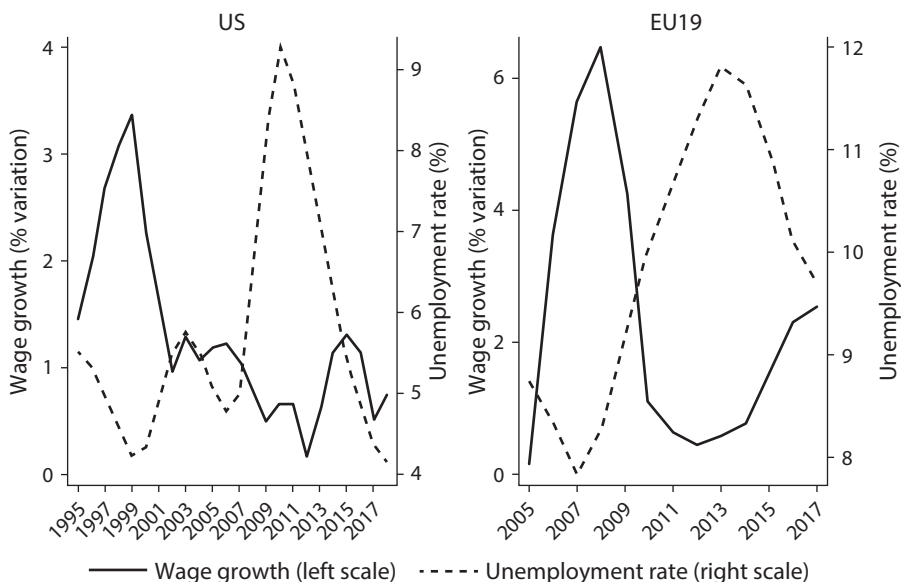


FIGURE 1.4. Unemployment rate and wage growth

employment rates have been increasing at a faster pace than employment rates of men in the European Union, but there is no evidence that women have taken away jobs from men: In the years in which the employment rate of women was increasing, so did the employment rate of men.

Can Governments Set Wages?

Union leaders often argue that wages in the private sector are “an independent variable”—that is, something that can be altered at will by governments. This view is functional to union platforms and captures a rather common belief: the idea that the labor market operates as if there were a unique employer whom laborers (or the government representing all citizens) could ask for a pay rise, just like a worker can do with her boss. However, there is not such a thing like a single employer in the private sector and wages result from market interactions of thousands (if not millions) of employers and workers. Wages are the outcome of these interactions; they react to the demand for labor of employers and to the labor supply of workers. Figure 1.4 shows wage growth and unemployment in the European Union and the United States. Unemployment and wage growth move in opposite directions: When unemployment goes down, wages increase, and the opposite happens during recessions, when

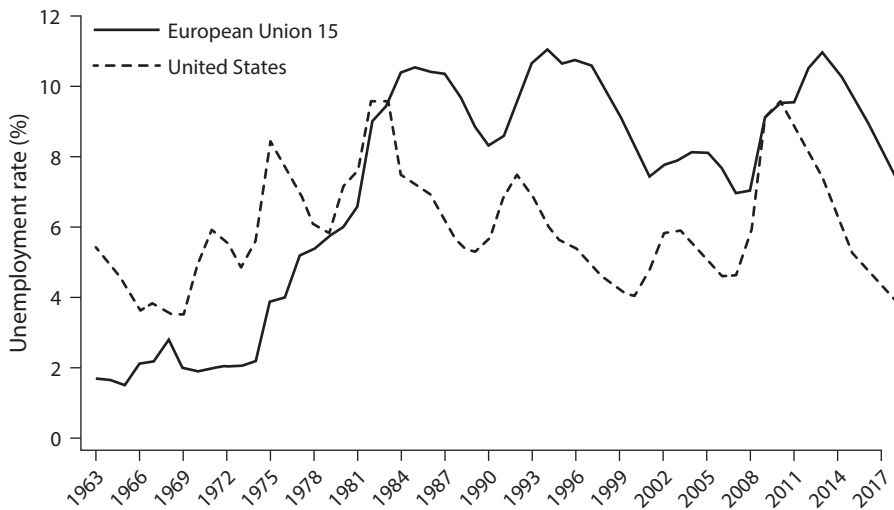


FIGURE 1.5. Unemployment rates on two sides of the Atlantic

unemployment goes up. The dynamics of wages do not look exogenous at all.¹

True, governments can introduce and adjust the minimum wage, as discussed in chapter 2, but this is only a wage floor, preventing hourly pay from falling below a certain level. The wage distribution is not an independent variable.

Does Job Protection Increase Employment?

Another popular view is that making it more costly for employers to fire workers increases employment. The reasoning behind this belief is deeper and captures a real feature of labor markets. It is indeed true that higher costs of dismissals discourage layoffs. However, higher firing costs may also discourage hiring by employers who realize that it will be very costly for them to reduce the workforce in case things go wrong. Thus, it is not clear a priori which one of the two effects (less dismissals hence more employment or less hiring hence less employment) will dominate. Historically we have seen both effects or no effects at the aggregate.

Consider figure 1.5 depicting unemployment rates on the two sides of the Atlantic. When unemployment was lower in Europe than in the United States, influential US policymaker Robert Myers wrote in a 1964

1. Notice that wages appear to respond less to unemployment in the most recent period. This may have to do with monopsony power, as further discussed in chapter 2.

report² that the United States should be “looking enviously at our European friends to see how they do it” and invited everybody to take a look at institutions on the other side of the Atlantic: “It would be short-sighted indeed to ignore Europe’s recent success in holding down unemployment.” In the mid-1990s, when unemployment was higher in Europe than in the United States, the G7 (the intergovernmental group of—at the time—the seven largest economies in the world: Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States) commissioned a report to the Organization for Economic Cooperation and Development (OECD 1994) explaining the dismal employment/unemployment performance of Europe vis-à-vis the US “jobs miracle.” The key message provided by the OECD Jobs Study report was that there are institutional “rigidities” imposed by too strict employment protection in Europe that prevent the labor market from creating as many jobs in the private sector as it does in the United States. It took another 15 years and the Great Recession, which brought US unemployment above the EU level, to have a new celebration in the United States about Europe’s rigid labor market institutions. This time it was Nobel Prize winner Paul Krugman writing in the widely read *New York Times* on November 12, 2009: “Germany’s jobs miracle hasn’t received much attention in this country—but it’s real, it’s striking. Germany came into the Great Recession with strong employment protection legislation. This has been supplemented with a ‘short-time work scheme,’ which provides subsidies to employers who reduce workers’ hours rather than laying them off. These measures didn’t prevent a nasty recession, but Germany got through the recession with remarkably few job losses.”

Thus, the very same institutions that bore the brunt of blame for the poor employment performance of the United States versus Europe in the 1960s were, some 30 years later, considered responsible for the dismal unemployment performance of Europe with respect to the United States in the 1990s and were again celebrated during the Great Recession for holding down unemployment in Europe compared to the United States. How is this possible? The issue is that dismissal costs act on both job destruction and job creation, and depending on which one of the two effects dominate, they can increase, reduce, or even leave employment unaltered.

As labor issues are so important for everyday life, individuals with no background in economics tend quite naturally to find their own

2. See Myers (1964) for a complete reference.

representation of how labor markets operate. The problem is that these representations can be rather misleading because labor markets are extremely complex, and what labor economists have discovered both theoretically and empirically about the effects of labor market institutions is quite often not intuitive and can be hardly grasped without proper training. Better knowledge of how labor markets operate is needed to achieve better policy outcomes. Gross mistakes in the design of some programs can be avoided and measures potentially improving the welfare of millions of people can be devised.

Another reason to study labor economics is that a wealth of data is nowadays available on labor markets. In addition to the surveys used so far by most studies, administrative data collected by public administrations as part of their institutional activities (e.g., data on unemployment benefit recipients or on job seekers registered at labor offices) are becoming increasingly available to researchers. Such high-frequency data can be a very useful complement to surveys and cover the universe not constrained by sample size in representing relatively small areas and groups of individuals. Such data can be very informative if there is some theoretical guidance. One should have some framework to put those restrictions on the potential interactions between different variables which make it possible to draw causal inferences. One should also know statistical and econometric methods in order to test the robustness of the results.

In addition to benefiting from more data, scholars of labor markets have access to a very rich history of reforms of labor market institutions. As discussed in section 1.6, the institutions described in this book have undergone regular changes. These reforms offer very valuable material to understand the effects of labor market institutions as they provide the best environment for a social scientist interested in knowing their effects on labor markets. Indeed, reforms represent quasi-experiments making it possible to compare the behavior of labor markets before and after the policy change as well as with and without the reform. The techniques exploiting these reforms are also discussed in the final section of this chapter.

1.2 The Two Key Decisions

By *labor market* we mean a market where a quantity of labor services L , corresponding to tasks specified in an *unfilled* assignment or job description (*vacant job*), is offered in exchange for a price or remuneration,

called *wage* w . Not all labor services offered by an individual are paid. For instance, the time we devote to cleaning our own apartment is not paid. It becomes market work only if we hire a house cleaner. To be in the labor market, there must be an exchange of a labor service for a wage.

There are two key decisions individuals of working age make with respect to the labor market:

1. Should I work (for someone else)?
2. Should I hire someone?

Many individuals are at the same time workers and employers—that is, they have a job and hire someone to take care of their children. However, for the sake of simplicity we will assume that these two decisions—the labor supply and the labor demand decisions—are made by two different types of individuals. They can be either potential employers-entrepreneurs, in which case they decide whether or not to buy labor services, or they are potential employees, in which case they decide whether or not to supply labor. Later on (in chapter 11 on self-employment) we will allow individuals to choose among being a salaried worker or a self-employed worker.

1.2.1 The Labor Supply Decision

Consider an individual who has to decide whether or not to participate in the labor market and supply labor services. She will do so if she can improve her condition with respect to her nonworking status. Working absorbs time that could otherwise be devoted to leisure activities. At the same time, supplying labor earns a wage that conveys purchasing power to the individual. Thus, there will be a trade-off between what labor can buy and what labor can take away in terms of less time available for leisure. We assume that both leisure and consumption are *normal goods*—that is, higher incomes do not reduce an individual's demand for leisure time and for the consumption of goods.

As usual in microeconomics, we can represent this trade-off as a set of *indifference curves* mapping all combinations of purchasing power and leisure that provide the same net benefits to the individual. Each indifference curve provides the same net benefit or utility to the individual. The individual is indifferent to movements along the same indifference curve, while movements across indifference curves increase or decrease the utility to the individual. Higher indifference curves

represent combinations of leisure and income providing higher net benefits to the individual. Clearly, not all these indifference curves can be attained. It will depend on the wages offered in the market and on whether the individual has other (nonlabor) sources of income. In other words, it will depend on the constraints to the choice of the individual.

The decision rule is that the individual will work if, by doing so, she can reach a higher indifference curve than she reaches while not working. She will be indifferent between working or not working if she, by working, attains the same indifference curve reached if not working. The wage that makes the individual indifferent between working or not working is the *reservation wage*. In other words, the reservation wage is the lowest wage at which the individual will decide to work.

We can express these concepts in an analytical fashion. Consider an individual whose utility function is defined over consumption c and leisure l , which are both normal goods: $U(c, l)$, whose partial derivatives are $U_c, U_l > 0$. The individual allocates the endowment of time, l_0 , alternatively to work h hours earning at the hourly wage w or to leisure (clearly, $h = l_0 - l$). Define nonlabor income (the income when working zero hours) as m and take the price of the consumption good as the numeraire (the price of c is 1 euro).

Constraints to choice are imposed by the *budget constraint* given by

$$c \leq m + wh.$$

In the consumption/leisure space this constraint has a kink that corresponds to the level of nonlabor income, as depicted in figure 1.6. To the left of the kink at point E , income grows at rate w , because each additional hour of work yields an extra hourly wage. Point E is sometimes referred to as the *endowment point*—that is, the situation that one can obtain without working. When $m = 0$, the budget constraint is a straight line crossing the horizontal axis at l_0 , where no hours of work are supplied and hence income to buy consumption goods is zero.

By fixing any arbitrary level of utility, we can solve the utility function for the combinations of consumption and leisure that yield the same level of utility to the worker. These level curves are the analytical counterpart of the indifference curves. Because utility is increasing in both arguments, the indifference or level curves are negatively sloped: more consumption is needed to compensate the worker for the loss of an hour of leisure, and vice versa. The degree of convexity of these curves is decreasing with the degree of substitutability between consumption and

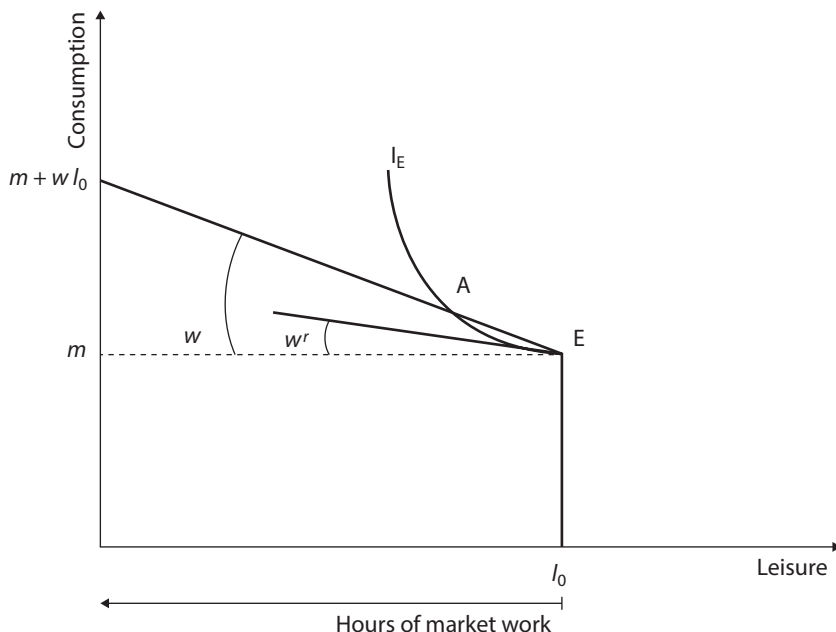


FIGURE 1.6. Reservation wage

leisure. Because of our assumptions, indifference curves do not intersect and utility is increasing farther away from the origin.

The reservation wage w^r is given by the slope of the indifference curve crossing the endowment point (the kink of the budget constraint) at E , evaluated precisely at the point where the individual allocates m euros to the purchase of consumption goods and works zero hours.³ Any wage w lower than the reservation wage will not be accepted by the individual because the marginal value of leisure (the reservation wage) exceeds its opportunity cost (the market wage). Conversely, when $w > w^r$, as in figure 1.6, the individual who is maximizing utility will work some hours and devote the remaining time to leisure.⁴ At point A the budget constraint crosses the indifference curve I_E through the endowment point E . Clearly, if the individual chooses any point on the budget constraint between A and E , the utility is higher than along the indifference curve through E .

3. This is not necessarily the case for more complex budget constraints.

4. This definition of the reservation wage separates employment from nonemployment. When the reservation wage is higher than the market wage, the individual is simply not working. In the dynamic search model setting of chapters 10–13, the reservation wage separates employment from unemployment: Individuals having a reservation wage higher than the wage offered to them will not accept the job offer and will search for alternative employment. In other words, they will be unemployed.

This definition of the reservation wage applies to conditions in which the individual can choose freely how many hours to work and how many hours to devote to leisure. In real life individuals rarely have an unconstrained choice of h . They have, at best, some leverage in deciding among a subset of possible hours of work—for example, between working full-time or part-time. This is because there is an institution (mandatory working-time legislation or collective-bargaining agreements regulating working hours) that imposes, via a collective choice mechanism, constraints on individual decisions.⁵

The reservation wage with restrictions on hours no longer coincides with the slope of the indifference curve at the endowment point (see box 1.1). The reservation wage with restrictions on hours can be graphically represented as the slope of the segment going from the kink of the budget constraint (point A) to the locus where the indifference curve through the (m, l_0) pair crosses the vertical hours constraint, as depicted by point B in figure 1.7. This hours-constrained choice yields a lower level of utility than the unconstrained choice, provided that the latter, at the market wage, involves some positive number of hours of work; otherwise the hours constraint is not binding.

The Reservation Wage with and without Constraints on Hours

BOX 1.1

When there are no constraints on the choice of hours, the reservation wage is given by the condition

$$\left(\frac{U_l}{U_c} \right)_A = w^r,$$

where U_l and U_c denote the marginal utility of leisure and consumption, respectively, and their ratio is the marginal rate of substitution between consumption and leisure. The rate is evaluated at the locus of zero hours of work (A in figure 1.7), where the individual is buying consumption goods by drawing only on nonlabor income.

An individual free to choose how many hours to work equates the marginal rate of substitution to the market wage. Hence, when $w^r = w$, the individual is indifferent between working and not working. When $w^r \leq w$, the optimal choice of hours h^* is greater than zero. When $w^r \geq w$, $h^* = 0$.

5. The reasons hours are regulated, although such institutions apparently reduce the well-being of an individual, are discussed in chapter 5.

Consider now a constrained choice. Suppose for simplicity that individuals actually have no choice over working hours and can only work h_{ft} hours, corresponding to a full-time job. The reservation wage will now be implicitly defined as the wage that would make the individual indifferent between not working at all and working exactly h_{ft} hours, that is,

$$U[m + w_{ft}^r h_{ft}, l_0 - h_{ft}] = U(m, l_0).$$

The interpretation of this condition is that when $w = w_{ft}^r$, the constrained choice is on the same indifference curve that intersects the zero-hours locus. In other words, the individual is indifferent between working h_{ft} hours and not working at all.

More important, the reservation wage of an individual who is constrained in terms of hours of work (w_{ft}^r) is higher than that of an individual free to choose hours of work (w^r). Because of the concavity of the utility function, the slope of the indifference curve increases as we move to the northwest along the same indifference curve. The labor supply decision of the individual will now obey a simple rule: supply h_{ft} hours if $w \geq w_{ft}^r$, otherwise do not offer labor services (supply zero hours).

If the wage increases, more individuals will be tempted to enter the labor market. Hence, in terms of the number of individuals, a wage increase will always lead to an increase in labor supply. Once an individual has entered the labor market, the effect of a wage increase is ambiguous, as there are two mutually offsetting effects at work:

1. *Income effect*: If the wage goes up with the same hours of work, income goes up. If leisure is a normal good, individuals will buy more leisure, thereby reducing their hours of work.
2. *Substitution effect*: If the wage goes up, the price (opportunity cost) of leisure goes up, causing consumption of leisure to go down and working hours to increase.

With leisure as a normal good, the income effect negatively affects labor supply. The substitution effect is always positive on the hours worked. The overall effect depends on the relative magnitudes of income and substitution effects. Generally, the substitution effect dominates for low-wage earners while the income effect is most important for

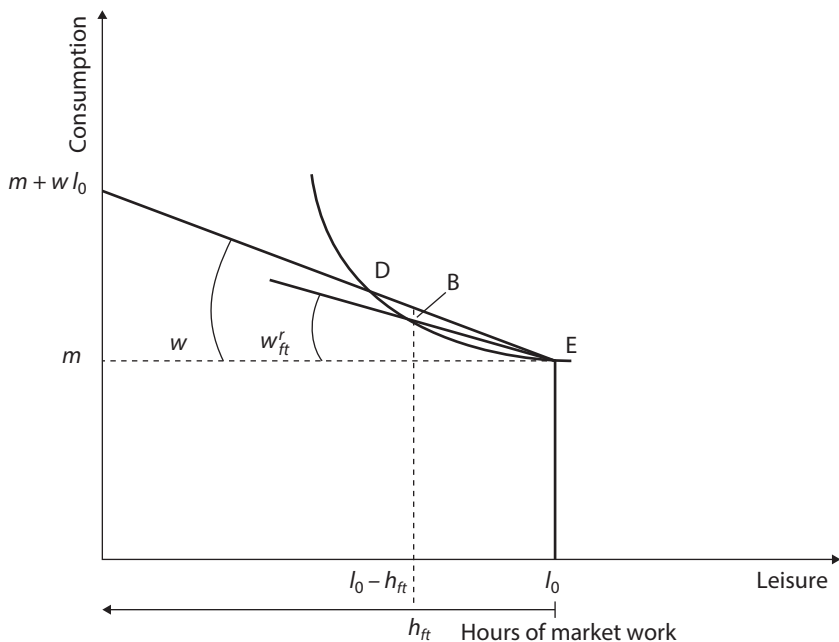


FIGURE 1.7. Reservation wage with a constraint on hours

high-wage earners. Only if leisure is an inferior good will the income and substitution effects reinforce each other. Then a wage increase always leads to an increase in working hours. At the participation margin, the income effect is irrelevant. Since the substitution effect is positive, an increase in the wage will always lead to an increase in the probability that an individual enters the labor market.

Figure 1.8 displays income and substitution effects of a wage rise. In the left-hand diagram, the wage-rise effect on the labor income to leisure trade-off is displayed. Initially the worker is very close to the participation margin, the point where he devotes a large fraction of his time to leisure. As the wage increases from w_0 to w_1 , the worker decides to supply more hours of work moving from A to C. This change in labor supply is also displayed in the right-hand diagram, showing hours supplied per different hourly wages, and is the by-product of a positive substitution (from A to B along the initial indifference curve) and a negative income effect (from B to C). Thus the initial wage rise induces an increase in labor supply of the individual. A further wage rise, however, may have the opposite effect on labor supply. At longer hours and higher incomes, the income effect becomes more important and eventually dominates the substitution effect. This happens in our case where labor supply declines as hourly wages increase from w_1 to w_2 . This geometric analysis

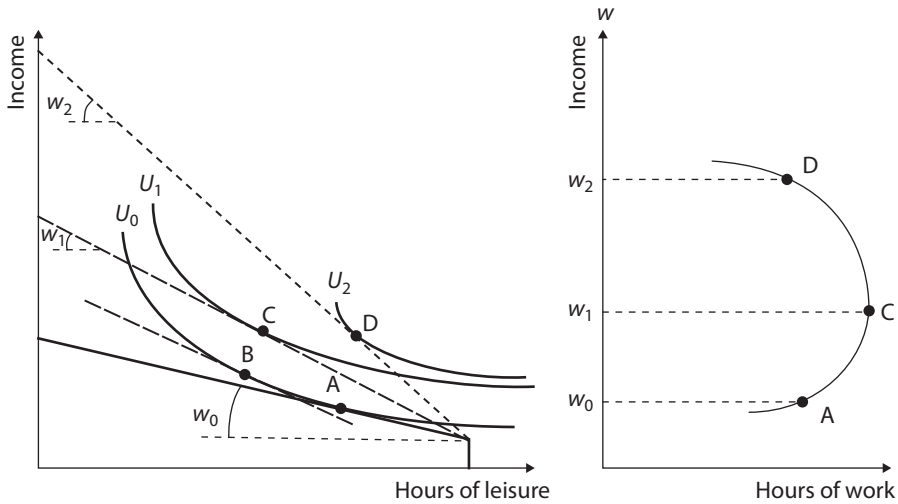


FIGURE 1.8. Income and substitution effects of wage rises

indicates that it is of paramount importance to obtain good estimates of the income effect in order to make predictions about the effects on labor supply of policies altering take-home wages.

From Individual to Aggregate Labor Supply

Consider now a plurality of individuals who may well have different preferences about consumption and leisure and varying endowments of nonlabor income. The reservation wage will then vary across individuals, depending on their nonlabor income as well as on their preferences about leisure and work. As discussed in chapter 7, time spent outside work can also be devoted to (unpaid) activities, such as household tasks generating goods and services that increase the welfare of the household. For instance, some workers may have childcare responsibilities, which increase their reservation wage.

Denote by $G(w)$ the fraction of individuals of working age with a reservation wage equal to or lower than w . By multiplying this fraction by the number of persons of working age, we obtain the *aggregate labor supply* schedule. Insofar as work involves some effort, the percentage of individuals willing to work will be increasing with the wage offered to them. Thus, we expect $G(w)$ to be monotonically increasing with w . By construction, $G(w)$ also takes values only in the interval bounded from below by 0 (nobody is willing to take the job at a wage lower than the lowest reservation wage) and above by 1 (when nobody of working age has a higher reservation wage). It is certainly possible that more than one

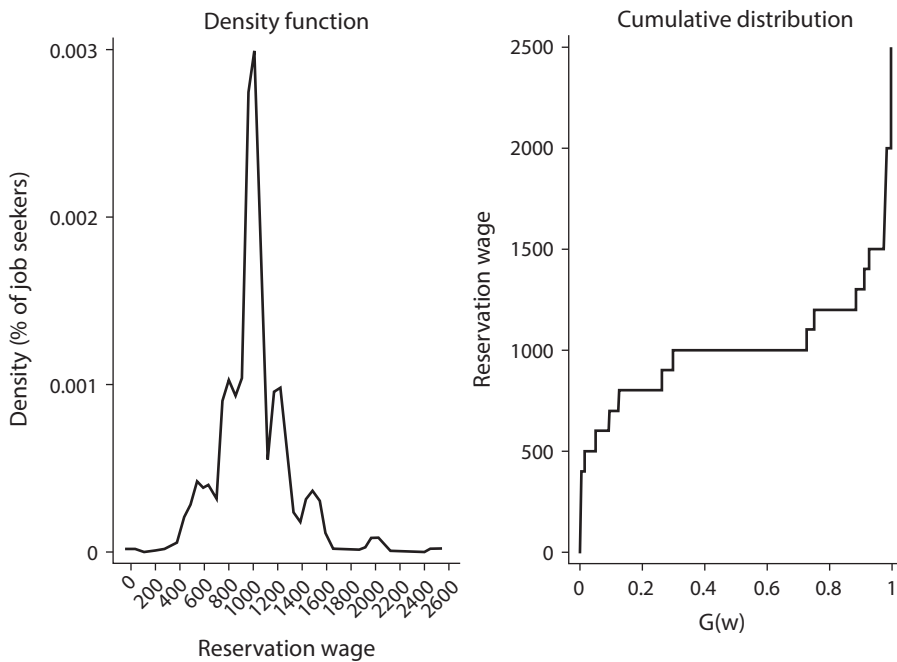


FIGURE 1.9. Labor supply in Italy
Source: Italian Statistical Office (ISTAT), Labor Force Survey (LFS).

individual has the same reservation wage, in which case aggregate labor supply will involve some flat segments. It is also plausible that some individuals, for example, a rich heiress, would not work whatever the wage offered to them.

Many surveys, such as labor force surveys, in several OECD countries ask respondents about the lowest wage at which they would be willing to take a full-time job offer. This self-reported reservation wage is a subjective measure of w^r . Longitudinal data (observations of the same individuals at different times) suggest that respondents take this question quite seriously. For instance, individuals observed to be unemployed at a given date and employed at the time of the next interview generally work at a wage that is not lower than the reservation wage stated in the first place. Thus, individuals appear to follow consistently the decision rule described at the beginning of this section—that is, a reservation wage policy in their labor supply decisions (they accept only jobs offering $w \geq w^r$). Figure 1.9 displays, in the left-hand panel, the distribution of unemployed job seekers by stated monthly reservation wage as elicited from the 2012 Italian Labor Force Survey. The spike at 1,000 euros (as well as the peaks at 500, 800, and 1,200 euros) is the result of rounding. The right-hand diagram displays, on the horizontal axis, the cumulative

of this distribution function $G(w^r)$ —that is, the fraction of job seekers having a reservation wage lower than or equal to the wage levels displayed on the vertical axis. This is the aggregate labor supply. There are some flat segments denoting workers having the same reservation wage.

1.2.2 The Labor Demand Decision

Consider now the labor demand decision of potential employers. Their income is of the residual claimant type—that is, they earn total revenues minus the wage bill and the rental costs of capital. They would hire as many workers, if any, as required to maximize these net revenues (or profits) of the activity or firm that they are carrying out. Production takes place by combining labor (L) with capital (K) according to best technologies available, summarized by the production function $f(L, K)$. Income of the employers is therefore given by $pf(K, L) - wL - rK$, where p is the price at which goods or services generated are sold and r denotes the rental cost of capital.

BOX 1.2

Labor Demand of a Monopolist

If firms have some monopoly power in product markets, the value of the marginal product of labor will include an additional term that captures the change in price associated with the extra output produced by the additional job, multiplied by total output. Formally, for a competitive firm (superscript c), the value of the marginal product of labor, y is

$$y^c = pf_L,$$

where p , the (given) price at which output can be sold, is independent of the production level (of the number of workers hired) and f_L is the marginal product of labor. For a firm operating in a noncompetitive product market, we have instead

$$y = pf_L + p_L f(L, K),$$

where p_L is the marginal effect on prices of the increase in the quantity produced by the firm associated with the use of an additional unit of labor. From the above it follows that $y = y^c$ when $p_L = 0$; that is, the firm is a price-taker also in product markets. Because p_L is negative, labor

demand of a monopolist will always be to the left of the demand curve of a competitive firm: For any given wage, fewer workers are hired by an employer with monopolistic power. Notice further that the difference between y^c and the value of a marginal product for a monopolist is increasing in $f(L, K)$, hence in the amount of labor being used. This indicates the labor demand of a monopolist is steeper, less responsive to wage changes than that of a competitive firm.

Intuitively, when a firm faces a downward-sloping product demand curve, increasing production lowers prices of all units being sold. The less competitive the product market is, the stronger will be the decline in prices associated with an increase in the quantity of jobs and output. By the same token, more competition in product markets involves a flatter labor demand curve.

To summarize, independent of the product market structure, labor demand L^d will be declining with wages, or the inverse labor demand, $y(L)$, will be declining with L . When product markets are noncompetitive, labor demand will be less responsive to wage changes (steeper labor demand). This relationship between product markets and labor demand explains why the latter is often called *derived labor/demand*.

The Short Run

In the short run, capital is fixed, so there is no possibility to substitute labor with capital. Suppose for simplicity that there is only one type of worker from the standpoint of a firm; that is, labor is homogeneous.⁶ A profit-maximizing employer will hire workers up to the point where y , the value of the marginal job, equals the marginal cost of labor, which is the wage. This *value of a job* is the value of the labor product obtained when a firm and a worker engage in production. One can think of it as the revenues from the job—that is, the product of the quantity of output produced by that job and the price of this output. Both the value of a job and the price of the good produced by this job may not be fixed but may vary with the quantity of jobs and output. Thus we typically refer to the value of the *marginal* product of labor—that is, the price of the good multiplied by the increase in output made possible by hiring an additional worker.

6. Notice that we could as well assume that workers differ in terms of productivity but that these differences are fully offset by wage differentials, so that each employer is indifferent between hiring a high-productivity or a low-productivity worker.

In a competitive market all employers will take the wage as given. Hence all firms will also have the same y at the equilibrium and the *aggregate labor demand* will simply add up the number of jobs in each firm, yielding the same y . Put another way, y provides the employers' *marginal willingness to pay* for labor services or their *inverse labor demand* schedule $y(L)$. To obtain labor demand, we simply have to substitute y with w and solve for L . Formally, we set $y(L) = w$ and solve for L , obtaining $L^d(w)$.

Can we say anything about the slope of this labor demand function? By the law of diminishing marginal returns, the marginal product of labor is declining with the number of jobs for each individual firm. If not only the labor market but also the product market is competitive, then each firm will sell the product of labor at a given price, independent of the level of output. In this case the labor demand function will have the same slope as the (declining) marginal productivity of labor; that is, it will be decreasing with L , the quantity of labor being used.

The Long Run

In the long run, the employer can also vary the amount of capital used in production. The responsiveness of labor demand to wage changes will then also embody the degree of substitutability between labor and capital allowed by production technologies. Intuitively, the higher the substitutability, the more responsive labor demand to wage changes.

In particular, there are two effects at work in the long run:

1. a *substitution effect*, capturing the substitutability between labor and capital, and
2. a *scale effect*, capturing the effects of wage changes on the amount produced.

These two effects are akin to the substitution and income effects involved by labor supply decisions. However, in this case they operate in the same direction: a higher wage involves a negative substitution effect as well as a negative scale effect, as depicted in figure 1.10. The substitutability between labor and capital can be geometrically represented by the convexity toward the origin of the isoquants (the level curve for production, denoting all combinations of labor and capital generating the same level of output).

Starting from any initial combination of capital and labor—say, L_0 and K_0 in figure 1.10—a wage increase will involve a shift along the initial

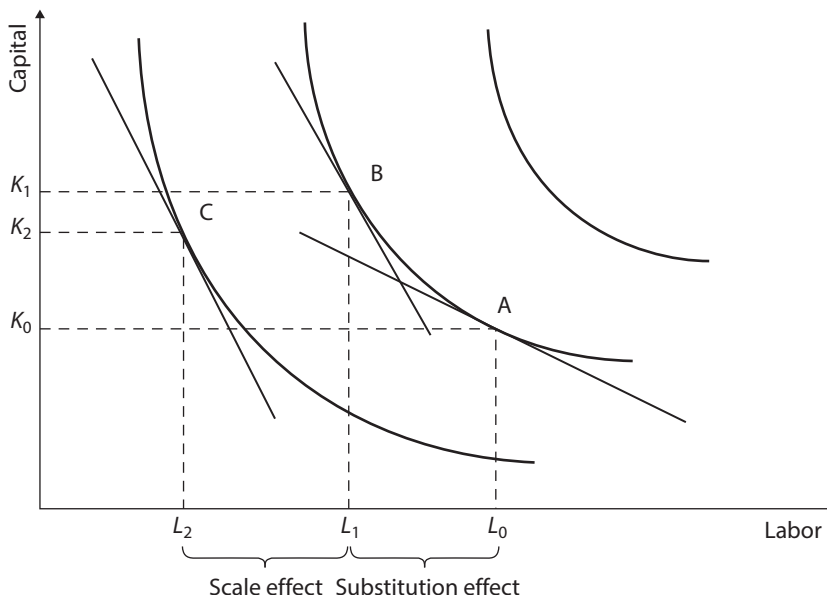


FIGURE 1.10. Long-run scale and substitution effects

isoquant changing the capital-labor mix to preserve the initial level of output. This is the substitution effect, involving a reduction of labor demand from L_0 to L_1 . In addition to this effect, the wage rise will also involve a reduction of the quantity produced, a shift toward an isoquant closer to the origin. This is the scale effect, represented in figure 1.10 by a reduction of labor demand from L_1 to L_2 .

1.3 Labor Market Equilibrium

1.3.1 A Perfect Labor Market

The study of the decision rules of workers and employers indicates that, under general circumstances, the aggregate labor supply will be increasing in wages while labor demand will be decreasing in wages. Figure 1.11 depicts a downward-sloping labor demand together with an upward-sloping aggregate labor supply. In a *perfect labor market* the equilibrium wage level w^* will lie at the intersection of the two curves. If any of the two curves shifts up or down, wages adjust to clear the market. All workers supply labor at the same wage and all employers pay labor at this very same wage.

It is important to notice that there is only one wage level being determined at the equilibrium in this context. Thus, workers with a reservation wage strictly lower than w^* will obtain net benefits from

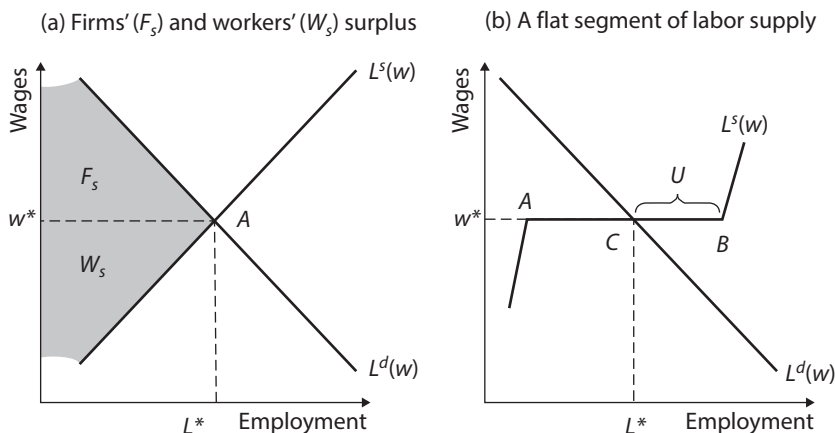


FIGURE 1.11. Equilibrium in a competitive labor market

participating in the labor market. This *worker's surplus* is given by the difference between the wage actually earned by the worker and that worker's *reservation wage* w^r —that is, the lowest wage at which the worker is willing to accept a job offer or the wage that makes the worker indifferent between working and not working. Any wage earned above this level represents a net gain over the option of not working, or a *surplus* from the standpoint of the worker. Formally, the worker's surplus is given by $(w - w^r)$.

The total worker's surplus is the sum of all these individual surpluses and is graphically depicted in figure 1.11 as the shaded area (W_s) below the equilibrium and above the labor supply curve.

Employers may also realize some surplus or profits. The *surplus of the employer* is the difference between the value of a job (the revenues from the job) and its costs, notably the wage paid to the worker engaged in that job—that is, $(y - w)$. All this surplus can be added up among all employers and, in figure 1.11, is given by the shaded area (F_s) above the wage rate and below the labor demand.

The *total surplus* of workers and employers from a job is the sum of the employer's and the worker's surplus: $(y - w) + (w - w^r) = y - w^r$. Notice that the wage, the value of a job, and the reservation wage can all be expressed in monetary terms—for instance, in euros. Hence, given y , w , and w^r , one can readily obtain the worker's surplus, the firm's surplus, and the total surplus. Notice further that the wage cancels out in the total surplus.

Workers with a reservation wage larger than w^* will decide not to work. In other words, $L^* = G(w^*)$ will be the *employment rate* (the

fraction of the working-age population holding a job), while $1 - G(w^*)$ will be the equilibrium *nonemployment rate* (defined in section 1.5).

Notice that the equilibrium wage level may well be in a flat segment of the labor supply curve. In this case there will be individuals with $w^r = w^*$ who are not working, even if they are willing to work at the equilibrium wage. These individuals are, strictly speaking, *unemployed*, as denoted by the segment U in the right-hand panel of figure 1.11, although they do not suffer any welfare loss from not working ($w^r = w^*$ as they are just indifferent between working and not working). All other nonemployed individuals are *inactive*, according to the internationally accepted definitions of labor market status reviewed in section 1.5.

In a perfect labor market there is no total surplus associated with the marginal job. Neither the worker nor the employer enjoys any rent with respect to their outside options. In other words, it is a market where $y = w$ and $w = w^r$, so that also $y = w^r$; that is, wages are ultimately immaterial at the equilibrium: They simply align the value of the job to the employer to the reservation wage of the worker. Put another way, employers and workers are indifferent between continuing or terminating any job relationship. Losing a worker for an employer or losing a job for an employee is not a big deal. Another worker or job can be found instantaneously without suffering any loss in profits or reduction in well-being. The market is transparent, workers and firms are perfectly informed about wages and labor services offered by other workers-firms, and there are no *frictions* or costs (e.g., no time related to job search and no transportation costs when going to job interviews) involved in the matching of workers and vacancies—that is, of labor supply and demand.

1.3.2 An Imperfect Labor Market

An *imperfect labor market* is one where there are rents associated with any given job so that the total surplus of the marginal job is positive. Rents may arise, for instance, because of frictions in the labor market, preventing workers from costlessly changing jobs. Wages are, in this context, a rent-splitting device. They decide which fraction, if any, of the surplus goes to the employer and which fraction, if any, goes to the worker. In an imperfect labor market wage setting is therefore of paramount importance. Depending on the market power of employers or workers, wages can bring either one of the two surpluses to zero while allowing the other party to enjoy a rent. The above implies that at

least for one of the parties involved in the employment relationship, job destruction is a big deal—it involves a loss.

Imperfect labor markets are associated with frictions, informational asymmetries, or market power at least on one of the two sides of the market. These imperfections are often interrelated. For instance, as discussed in chapter 2, it is mainly labor market frictions that convey monopsony power to employers, allowing them to pay wages lower than the value of the marginal productivity of labor, as these frictions prevent workers from costlessly changing jobs. Informational asymmetries also prevent the attainment of labor market equilibria in which the total surplus is maximized. Informational asymmetries are frequent within a firm, in the actual work relationship between the employer and the employer's workers, as the effort put in production by the employees can only be imperfectly monitored. Under these circumstances, incentive schemes need to be devised by the employer—that is, a system of rewards and punishments aimed at aligning the objectives of workers to those of the firm.

Not only will there be a welfare loss associated to losing a job in such imperfect labor markets, but this loss can also be used as a disciplining device. Take once more the case where employers cannot perfectly monitor the effort of their workers. This is the situation considered by *efficiency wage models*. Workers can either put effort in production or shirk, in which case there is some positive probability (but strictly smaller than one) that they can be detected and laid off for disciplinary reasons (see the technical annex; that is, section 1.8). If wages equal the reservation wage of workers and there is no unemployment, this probability of being laid off is not a deterrent for shirkers. In order to deter workers from shirking, employers must pay workers above their reservation wage so that firing involves a punishment, a welfare loss for the shirkers. In the labor market, equilibrium wages are therefore above the market clearing level because rational employers maximize profits by setting wages above the market clearing level. Hence, there will be unemployment at the equilibrium and this unemployment acts as a disciplining device (see box 1.3).

BOX 1.3

Welfare Loss from Unemployment and Work Incentives

An employer, especially in large organizations, has to choose not only production technologies but also monitoring technologies to observe the actual effort of employees in production. Suppose that perfect

monitoring is unboundedly expensive, so the employer has to rely on imperfect monitoring technology to detect shirkers with a probability $0 < d < 1$. If a worker is found shirking, then he is laid off and does not earn the wage. Is there a way for the employer to align goals of the workers with profit maximization goals without using the prohibitively expensive monitoring technologies? This is the case investigated by Carl Shapiro and Joseph Stiglitz (1984) in their shirking model.

Suppose that workers' utility is given by

$$U(e) = c + (1 - e)\Gamma, \quad (1.1)$$

where e is effort that can take only two values: 1 if the worker puts in effort and 0 otherwise. Γ is the utility of shirkers if they can “get away with it”—that is, if they are not detected in their opportunistic behavior by the imperfect monitoring technology—and c is consumption constrained by the purchasing power of the wage (the only source of income of the worker). A nonshirker would therefore enjoy $U(1) = w$ while the expected utility of a shirker will be $U(0) = (1 - d)(w + \Gamma) + dw^r$. All workers are alike. To discourage the workers from shirking, the employer should offer them a wage sufficiently high as to make them better off by working rather than not working. That is, using

$$w \geq (1 - d)(w + \Gamma) + dw^r \quad (1.2)$$

solving for the wage rate, one obtains

$$w \geq \frac{1 - d}{d}\Gamma + w^r. \quad (1.3)$$

Notice that this efficiency wage is higher than the reservation utility of the worker. Thus, there is a welfare loss associated with being detected as shirking and losing a job. As the wage is higher than at the market clearing level, there is unemployment. This unemployment is the punishment by which the loss of the job acts as a disciplining device.

Wages eliciting effort are also discussed in technical annex 2.9.3 and boxes 10.3 and 12.3.

Source: Shapiro and Stiglitz (1984).

The case of efficiency wages provides a good description of the key difference between perfect and imperfect labor markets. In a perfect

labor market there is no unemployment except of the type not hurting individuals (the equilibrium is in a flat segment of the labor supply). In an imperfect labor market, there can well be *involuntary unemployment* with people in this condition suffering a welfare loss because their reservation wage is lower than the market wage. In the efficiency wage case discussed above, a jobless person cannot convince an employer that she works at a wage lower than the equilibrium wage because the employer worries that shirking occurs after the person is hired.

As shown by figure 1.11 (and formally proved in section 1.8, the technical annex), a perfect labor market maximizes the total surplus of workers and employers. There is no way to increase the total surplus from a perfect labor market equilibrium. It is possible to redistribute (e.g., allow the workers to increase their surplus at the expense of the employers or vice versa), but in this redistribution a part of the total surplus is lost. From an imperfect labor market equilibrium it is instead possible in principle to increase the total surplus, making the equilibrium more efficient in generating net benefits for the individuals supplying or demanding labor services.

1.4 Labor Market Institutions

As discussed when presenting the labor supply decision, workers have limited choice over the number of hours of work because collective choices such as regulation on working time and collective agreements limit their possibility to decide freely how many hours to work. Real-world labor markets are crowded by these and other *labor market institutions*—that is, systems of laws, norms, or conventions resulting from a collective choice and providing constraints or incentives that alter individual choices over labor and pay. Single individuals and firms consider the institutions as given when making their own individual decisions. Going back to the working hours example, regulations of working hours (chapter 5) are an institution aimed, inter alia, at coordinating the allocation of time or for work, leisure, or home activities across and within households.

Because of their foundations in collective choices, institutions are the by-product of a political process. Often, institutions are established by laws, but this does not need to be the case. For instance, collective bargaining institutions (chapter 3) are most frequently regulated by social

norms and conventions rather than by formal legislation. What matters is that they constrain individual choice of workers and employers. Labor market institutions operate by introducing a *wedge* between the value of the job for the employer and the reservation wage of the individual. In other words, they can create rents even in perfect labor markets. At the same time, in imperfect labor markets, they can also be a rent-reducing device. As rents are already there, they can be diminished by a proper set of institutions. Clearly, jobs can be created only if both workers and employers obtain from them some non-negative surplus. Institutions can therefore destroy or create jobs, depending on whether they raise the reservation wage of workers above the value of a job for the employer. If $y < w^r$ in all jobs, then a labor market cannot operate.

Summarizing, labor market institutions are outcomes of collective choice mechanisms that interfere with the exchange of labor services for pay. They do so by introducing a wedge between the reservation wage of workers and the value of a job—that is, between the labor supply and labor demand schedules. This wedge creates rents or redistributes rents between workers and employers.

1.4.1 Why Do Labor Market Institutions Exist?

Because all labor market institutions introduce a wedge between labor demand and supply, they reduce the size of labor markets. If the labor market is competitive, there will be an efficiency loss because in principle, by increasing the size of the labor market and redistributing the surplus, it should be possible to make everybody better off. The obvious question is then why these institutions are so developed in modern labor markets. They are certainly not imposed by heaven. They are introduced by democratically elected governments. If voters did not like these institutions, they would sooner or later be removed. If these institutions reduce the size of the economic pie, then it should be possible to make everybody happier (or at least as happy) without them.

We offer three arguments for the existence of labor market institutions:

1. *Efficiency*. Perfect labor markets do not exist. Because a (first-best) competitive labor market outcome maximizing the total surplus is unattainable, there are (second-best) arguments justifying the presence of these institutions.

2. *Equity*. In the absence of nondistortionary taxes and transfers that could change the way the total surplus is shared between workers and employers without reducing the total surplus, these institutions are best suited to achieve some redistribution that reduces the total surplus but is supported by voters.
3. *Policy failures*. There are failures in the political process that make it possible for minority interest groups to succeed in imposing their preferred institutions on majorities who would be better off without them.

Often these three reasons coexist, but we discuss them separately for the sake of simplicity. We confine ourselves here to a few illustrations of how these mechanisms operate. Later chapters contain a thorough discussion of the rationale for each institution.

Efficiency

Labor market institutions exist because there are *market imperfections* that prevent the institution-free equilibrium from attaining the competitive equilibrium outcome. In practice, a perfect labor market does not exist. Labor markets are far from competitive because there are important informational asymmetries between employers and employees as well as externalities (i.e., goods produced and consumed that are not subject to market interactions). In both cases—asymmetric information and externalities—labor markets violate the transparency and complete market properties of a perfect labor market. Well-designed labor market institutions, in this context, may remedy these failures of markets and increase the size of the pie compared with the *laissez-faire* outcome.

Equity

Even when institutions reduce the size of the economic pie, they may make one side of the market (those supplying labor services or those purchasing them) strictly better off than it would be without the institutions. In principle, redistribution could also be achieved by taking the *laissez-faire* outcome and then taxing employers or employees and transferring the proceeds to the other side of the market. In practice, however, redistribution through *lump-sum taxes and transfers* is not possible because redistributive policies can only rely on information—on signals, which can be altered at will by individuals. Thus, any type of

redistribution is unavoidably distortionary, and labor market institutions, such as distortionary labor taxes and transfers, can be the most efficient way to redistribute.

Policy Failures

Because of these redistributive properties of institutions, there are also instances in which some powerful minorities succeed in imposing a set of institutions on a majority of citizens. This happens particularly when the benefits of an institution are concentrated in a small segment of the population while the costs are spread over a very large crowd of individuals. Under these conditions, groups organized as a lobby may succeed in influencing political decisions disproportionately.

A Few Examples

In practice, labor market institutions perform several functions at once: They remedy market failures but, at the same time, affect the income distribution or meet the requests of specific interest groups. For example, in the absence of perfect capital markets, the welfare of risk-averse individuals can be increased by offering insurance against the risk of income fluctuations. Job loss is one of the occurrences against which workers could be protected. However, no private insurer will ever want to provide insurance against unemployment because *moral hazard* and *adverse selection* stand in the way of these potential contractual arrangements. Workers would not try as hard to avoid unemployment and find new jobs if they were covered against the negative consequences of the event by purchasing insurance at a given market price (moral hazard), and workers who know that their unemployment risk is particularly high would make the scheme unprofitable for insurance providers and unattractive to workers with average risk (adverse selection). This explains why collective action (institutions) tries to remedy the inequitable or unfair labor market treatment of workers who, lacking insurance, become or remain unemployed despite their best efforts. Unemployment benefits (chapter 12) and employment protection legislation (chapter 10) are remedies for this failure of markets. By supplying insurance, however, they involve some trade-offs. For instance, provision of insurance in the presence of asymmetric information unavoidably decreases productive efficiency. Workers have no less incentive to decrease their job-seeking effort when they are covered by social rather than private insurance, and protection

from supposedly unfair developments unavoidably decreases the labor market's speed of adjustment.

While remedying a market failure, employment protection legislation and unemployment benefits transfer resources from employers to employees, creating a vertical redistribution of income. Most of the institutions analyzed in this book address distributional tensions by attributing a larger share of the economic pie to workers or to nonworking individuals and extracting surplus from employers. Minimum wages (chapter 2), restrictions on hours of work (chapter 5), and collective bargaining institutions and unions (chapter 3) respond to distributional concerns by assigning a larger share of the pie to workers even at the cost of generating overall a smaller pie. At the same time, these institutions remedy market imperfections, such as the presence of monopsonistic power of firms and externalities in the wage-setting process and in bargaining over hours. Migration restrictions (chapter 9) also have a well-defined distributional objective: They insulate native workers from competition from foreign workers. Their presence can also be explained in terms of market failures associated with interactions with other institutions. In the presence of minimum wages, migrants may crowd out native workers, or migrants who do not find a job may exert a negative fiscal externality on the native population by drawing nonemployment benefits without perhaps having contributed to their financing (just like native new entrants in the labor market displaced by a minimum wage). Taxes on labor (chapter 14) are often progressive, which suggests that they pursue vertical redistribution. At the same time, however, they can be rationalized by interactions with other institutions: Someone has to pay for early retirement (chapter 6), family policies (chapter 7), education (chapter 8), unemployment benefits and active labor market policies (chapter 12), and health-related labor policies (chapter 13).

Institutional interactions are quite complex, and there can be many of them, given that there are several possible combinations of institutions in place. At the end of each chapter, we discuss the interactions that appear most relevant to us. Unavoidably the list is not exhaustive. The important thing to remember at this stage is that one should never confine the analysis to the simple direct effect of one institution on the labor market. We live in labor markets in which institutions never operate in isolation.

In the technical annex in section 1.8, we provide a simple formalization of the redistributive role of labor market institutions. We model a competitive market with a government caring about income distribution or agents bargaining over wages, not always optimally sized, because

specific interests prevail. Strict employment protection, for instance, involves large implicit transfers from the unemployed to employees or to some categories of employees who are de facto insulated from competition from *outsiders*. More broadly, the combination of price and quantity institutions that is present in many labor markets is successful in protecting *insiders* from negative labor market developments: Not only are wages compressed and stable, but also tenure lengths of regular workers are clearly much longer in more rigid labor markets. Unsurprisingly, it is the insiders who oppose reforms of these institutions, even when they are a minority and when the optimal size of the wedge (operating the desired amount of vertical income distribution) would be lower. Often labor market institutions tend to privilege minority subsets of the market's labor force. Such policy failures can emerge over time as economies are hit by shocks (Blanchard and Wolfers 2000) or the economic environment is altered (Ljungqvist and Sargent 2004). The model in technical annex 1.8 suggests that the redistributive properties of institutions should be adjusted to the economic environment in which they operate. If product markets become more competitive, then redistribution involves higher costs in terms of forgone efficiency (Bertola and Boeri 2002). Under these conditions, it is better to pursue the same distributional objectives by imposing a smaller wedge between labor demand and labor supply. But policy failures may make this adjustment more difficult or altogether prevent it.

1.4.2 Institutions Matter

The above provides a number of reasons why labor market institutions are a salient feature of modern labor markets. Still, before spending more time in understanding how these institutions operate, one would like to be reassured that they are indeed very important in affecting labor market outcomes. In each chapter of this book we survey the empirical literature on the effects of any specific institution.

A major example of the relevance of labor market institutions in affecting labor market outcomes is provided by the Great Recession of 2008–2009. It was, no doubt, a crisis that developed outside the labor market, and yet it heavily impacted the markets where labor services are exchanged for pay. The job death toll was on the order of 30 million. Youth unemployment was still on the rise worldwide five years down the road. In the United States, unemployment almost doubled from peak to

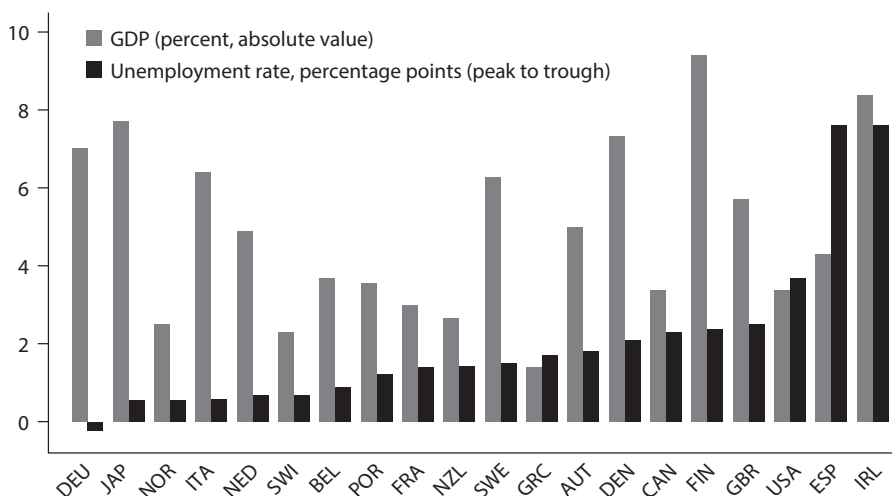


FIGURE 1.12. Changes in unemployment rates and GDP decline, 2008–2009 peak to trough

trough within one and a half years: Every quarter about one million jobs had disappeared. There were, at the same time, very important cross-country differences in the responsiveness of unemployment to output falls. In Germany, unemployment actually fell, in spite of a very severe recession, involving a cumulative 7 percent decline in gross domestic product (GDP), almost twice as bad as in the United States.

Since the recession was global, it gave us the opportunity to evaluate differences in how labor markets respond to shocks originating elsewhere. There was a lot to learn: The differences are indeed quite striking, even when accounting for cross-country variation in how much output fell, as shown in figure 1.12. A GDP fall of the same magnitude was accompanied in some countries by a huge rise in unemployment, while in others unemployment hardly changed from peak to trough.

There are two further indications that institutions were important in affecting such different labor market outcomes, at least the component that is not explained by the different size of the output fall in the various countries.

The first indication is that during the Great Recession the cross-country dispersion of unemployment rates increased because of differences in the way entire countries reacted to the shock. In normal times, the cross-country dispersion in unemployment rates is largely driven by within-country differences in the incidence of unemployment. Italy has a high unemployment rate because of its Mezzogiorno. The large number of job seekers in Spain are highly concentrated in its southwest

regions, and in Germany unemployment is significantly higher in eastern than in western states. During the Great Recession, the increased cross-country divergence in unemployment rates was instead driven by national as opposed to regional factors (Boeri and Jimeno 2016). Unemployment increased more in *all* Italian regions than in *all* German regions. As labor market institutions typically vary across countries rather than within countries, this evidence supports the view that labor market institutions deeply affected the different responsiveness of unemployment to declines in output across the OECD countries.

The second indication is more direct. There are several facts pointing to the role of institutions in affecting different national adjustment trajectories to the output shock. Some countries used the intensive margin of labor market adjustment more, allowing employers to reduce hours of work rather than laying off workers, while other countries concentrated their response on the extensive margin of outright dismissals (as recalled in the initial quote of Paul Krugman). Some countries had bargaining structures that allowed for nominal wage cuts preventing mass layoffs, while others could not use wage reductions as an alternative to dismissals. Some countries used early retirement as a shock absorber, increasing inactivity more than unemployment, while in others employment losses translated to unemployment increases (almost one to one). Another important factor in determining the different responsiveness of unemployment to output changes was labor market segmentation between temporary and permanent contracts, concentrating the adjustment on the former.

Thus, there are several indications that the labor market response to the global shock was affected by the country-specific design of labor market institutions. The Great Recession told us that labor market institutions matter. Something similar happened in the aftermath of the lockdown measures taken to prevent the spread of the Covid-19 epidemic. In the US, during the lockdown the number of unemployment benefit claimants skyrocketed to more than 30 million in 6 weeks, while in Germany and Italy the shock was initially almost entirely absorbed by short-time work schemes, such as the *Kurzarbeit* and the *Cassa Integrazione*. In the US no restrictions were imposed on layoffs, which were to a large extent permanent layoffs. In several European countries layoffs were banned throughout the crisis. Institutions are so important that they should be handled with care. It is of fundamental importance to understand how they operate. We need to know the institutional details and identify which of them are most important from an economic

perspective to be able to shed light on their impact on labor market performance. It is also of paramount importance to understand how these institutions operate when the economy is under strain. Do institutions operate symmetrically over the business cycle? How do they interact with shocks coming from the product or the financial market? Who is most affected by them, and who is protected or penalized by these institutions? What type of redistribution do they involve? Answering such questions is largely an empirical matter. In the following chapters we will survey the literature that has addressed these issues, taking as reference each specific labor market institution.

In order to better understand this literature, we need to clarify what are the key measures of labor market outcomes in applied labor economics and the most important econometric methods used to identify the effects of institutions on these outcomes. This is the task set out for the next section of this chapter.

1.5 Measures of Labor Market Outcomes

1.5.1 Stock Measures

According to internationally accepted OECD–International Labour Organization (ILO) definitions, the entire population of working age (15–64 years) can be classified into three main labor market states: employed, unemployed, or inactive:

1. An *employed individual* is someone who has worked for pay (in cash or in kind) for at least one hour during the reference period (a week or a day) or has a formal attachment to a job but is temporarily not at work (e.g., because of an illness, a holiday, or maternity leave).
2. A person of working age is classified as an *unemployed individual* if that individual is willing to work at the going wage. To be classified as unemployed the following four conditions need to be fulfilled:
 - (a) The person is currently *not* working.
 - (b) The person has looked for work in the four weeks before the survey.
 - (c) The person has looked for work actively (e.g., sending applications to employers or contacting a private placement agency or a public employment office).
 - (d) The person is immediately available for work, meaning that the person can start a job within two weeks following the interview.

3. *Inactive individuals* are persons who are neither employed nor unemployed according to these definitions. This residual group consists of a highly heterogeneous population, including people who are voluntarily inactive and individuals who are disabled.

Let U be the number of unemployed workers, L the number of employed workers, and O the measure of inactivity:

- The labor force LF is given by employment plus unemployment: $LF = L + U$.
- The working-age population adds up the three mutually exclusive categories of employed, unemployed, and inactive individuals: $N = LF + O$.

Clearly comparing these numbers across countries with different sizes of the working-age populations is meaningless. In this book we adopt several widely used (but not always well understood) *normalization rules*. Here are the most important:

- unemployment rate $u = \frac{U}{LF}$
- employment rate $e = \frac{L}{N}$
- participation rate $p = \frac{LF}{N}$

These indicators are clearly not independent of each other, as $e = p(1 - u)$.

1.5.2 Flow Measures

The above are stock measures, counting the number of persons in each status at a given point in time. The effects of labor market institutions are generally more visible if we look at labor market flows tracking the movements of individuals across the different labor market conditions.

Using the longitudinal structure of many labor force surveys and of administrative data (providing information on the same individual) or retrospective, subjective information provided by the interviewees on their previous labor market status, it is possible to generate *transition matrices*, tracking all flows across labor market states.

Each cell of a transition matrix counts the number of persons transitioning across labor market states (or remaining in a given status) over time.

TABLE 1.1 Transition matrix, 2015–2016

		2016			
		Inactive	Unemployed	Employed	Total
2015	Inactive	85.63	5.01	9.36	100.0
	Unemployed	14.28	58.35	27.36	100.0
	Employed	3.81	3.86	92.33	100.0

Source: Eurostat (2019), European Union Labor Force Survey.

For instance, the transition matrix in table 1.1 summarizes flows between inactivity, unemployment, and employment in eurozone countries in the period 2015–2016. Transitions are measured over a yearly interval and normalized by the population at origin. In other words, the first term on the left-hand side indicates that 85.63 percent of the persons inactive in 2015 were still inactive in 2016. Unsurprisingly, the fraction of those remaining in the same labor market status one year apart (the so-called stayer coefficients) is higher from employment and inactivity than from unemployment. The latter is a condition undesirable (a disequilibrium status) that individuals are trying to modify over time.

If the labor force is fixed, the unemployment rate will be constant over time if inflows into unemployment equal outflows from unemployment. Let δ be the rate at which workers lose their jobs and μ the rate by which unemployed workers find jobs. Thus, the *steady state* (dynamic) equilibrium unemployment implies that $\delta L = \mu U$. By solving for $u = \frac{U}{LF}$ we obtain the steady state unemployment rate $u = \frac{\delta}{\mu + \delta}$. In other words, the steady state unemployment rate is defined by the job separation rate and the job-finding rate.

1.5.3 Problems with Standard Measures of Labor Market Status

There are a number of problems with the standard OECD-ILO definitions of labor market status provided above. Although it is not always possible to find remedies to these shortcomings, it is important to be aware of them.

The key issue is that being inactive is a residual category and participation borders are rather porous, hence standard measures may exclude from the labor force persons who are in a condition very similar to that of unemployed persons. Among these:

1. Some *potential workers* search for jobs less intensely than required to be classified as unemployed and are therefore classified as

TABLE 1.2 Transition matrix Italy, 2013–2014

		2014				
		Employed	Unemployed	Inactive	Marginally attached	Discouraged
2013	Employed	93.8	2.7	1.4	1.3	0.8
	Unemployed	22.0	41.8	8.3	13.7	14.3
	Inactive	5.3	5.6	71.4	7.6	10.1
	Marginally attached	18.7	22.8	21.7	20.4	16.4
	Discouraged	7.9	18.9	29.5	12.6	31.1

Note: Italian Statistical Office (ISTAT), Labor Force Survey (LFS), longitudinal data. The sample of inactive, discouraged, and marginally attached workers does not include those in school, those who are retired, and disabled individuals.

inactive while they are indeed available to work and looking for jobs.

2. Some *discouraged workers* are without work and willing to work, but they are not searching because they believe there are no opportunities for them in the labor market. They are therefore classified as inactive when in fact they are not much different from the unemployed.

These two categories can be quite relevant. According to the European Labor Force Survey, in 2018 discouraged workers accounted for about 2 percent of the working-age population in EU28 countries. Comparable figures for the United States are on the order of 2.5 percent. A way to assess how different these categories of individuals are from unemployed people is to obtain “augmented” transition matrices displaying transitions also from this subcomponent of the “out of the labor force” status. One such transition matrix, concerning Italy in the period from 2013 to 2014, is displayed in table 1.2.

Interestingly enough, potential workers and discouraged workers display lower transition probabilities in the cells along the main diagonal than the other persons classified as inactive. These *stayer coefficients* offer an estimate of the probability of remaining in the same status from one year to the next. Thus, they offer a measure of persistence in any given status. For the reasons discussed above, we would expect inactive and employed individuals to display higher *stayer coefficients* than the unemployed. The augmented transition matrix suggests that potential and discouraged workers are more similar in this respect to the unemployed than to the remaining inactive individuals. It should be noted that in the presence of discouraged workers the cyclical fluctuations in employment and unemployment are not fully symmetrical.