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Microeconomic Perspectives on Aggregate Labor Markets

Giuseppe Bertola

BADIA FIESOLANA, SAN DOMENICO (FI)

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European University Institute
Badia Fiesolana
I-50016 San Domenico (FI)
Italy

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Abstract

The Chapter discusses the role played by labor market institutions in shaping the dynamics of wages, employment, and unemployment across European countries and the United States. The first part of the Chapter uses simple, but formal models to show that the greater job security granted to European employees should smooth out aggregate employment dynamics but, for given wage processes, cannot be expected to reduce aggregate employment. Slow employment creation and high, persistent unemployment are associated with high and increasing wages in cross-country evidence, and the Chapter surveys recent work aimed at explaining such differential wage dynamics via insider-outsider interactions and wage bargaining institutions. The following Section discusses the extent to which job security provisions and wage-setting practices can rationalize evidence on cross-sectional job turnover and wage inequality, and reviews the implications of such phenomena for aggregate labor markets' productivity. The chapter is concluded by a discussion of recent perspectives on the possible determinants (rather than the effects) of institutional labor market differences across industrialized countries and over time.

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1 Introduction

Job security provisions and wage-setting institutions constrain microeconomic employment relationships in widely different ways across labor markets and over time. Since the previous volumes of this Handbook were published, theoretical and empirical work has identified meaningful causal linkages between such institutional differences and the equally wide ranges of aggregate labor market outcomes, particularly with respect to the extent and character of unemployment and of wage inequality.

This Chapter offers a critical review of selected theoretical insights on the interaction of labor demand, wage determination, and institutional settings. Blau and Kahn (this volume) discuss in detail a wide range of institutional factors in labor market outcomes; a stylized and streamlined view of institutions is adopted here, and issues central to more empirically-oriented surveys such as those by Bean (1994), Machin and Manning (this volume), and Nickell and Layard (this volume) are discussed in simple formal settings without aiming to assess the empirical relevance of an exhaustive menu of macroeconomic unemployment theories.

It will be helpful, however, to review recent theoretical developments against the background of simple pieces of comparative evidence. Since the contrast of European and U.S. labor markets performance at the aggregate level motivates the work reviewed below and inspires its theoretical perspective, all Figures and Tables of the chapter refer to just five countries—the U.S., and the largest four European countries. Figure 1 plots real wages and total employment: it is quite tempting to view the plot of European real wage and employment trends normalized by their U.S. counterparts (shown in the last panel of Figure 1) as a sample of observations around an aggregate labor demand schedule. More generally, finding that low employment is associated with high real

wages may encourage researchers to adopt the microeconomic perspective of partial-equilibrium labor-demand diagrams as a starting point for an interpretation of aggregate labor market performance.

[Figure 1]

In many respects, of course, it is far from fully appropriate to pursue such a simple microeconomic interpretation of aggregate facts. Part of the stronger U.S. employment performance reflects the considerably faster growth of population and labor force in the U.S. than in European countries. As Figure 2 shows, however, trend differences in employment rates are, if anything, even more pronounced than those displayed by employment indexes (and the same is true of the unemployment rates shown in Figure 5 below). Even when appropriately qualified, the simple message of the Figures remains powerful enough to warrant frequent references to wage flexibility in policy-oriented analyses, such as OECD (1994, p.22), and to motivate an extensive strand of theoretical and empirical work.

[Figure 2]

1.1 Scope of the survey

Evidence of a negative correlation between wage and employment growth across countries begs the question of which institutional differences in the relevant labor markets may be responsible for the joint determination of wages and employment trends. The microeconomic approaches to aggregate phenomena reviewed below aim at explaining how interactions of labor demand fluctuations and wage determination shape labor market outcomes, focusing especially on reasons why the latter may differ widely across labor markets with different institutions. Interest in this wide issue runs across several interrelated strands of literature, which offer a variety of complementary theoretical insights and are typically motivated by pieces of comparative evidence such as that shown by Figure 1, and

by more subtle features exemplified for the same five countries—and in the same simple-minded way—by other Figures and Tables below.

Like all surveys, the present one must be incomplete. Its partial-equilibrium perspective on wage and employment dynamics is narrowly focused on the interaction of labor demand and wage determination, and relies heavily on simplifying assumptions at both the macroeconomic and microeconomic ends of the labor-market-phenomena spectrum.

The time-series behavior of such macroeconomic factors as aggregate demand, energy prices, or productivity dynamics is obviously quite different across countries. In particular, the evidence in Ball (1997) indicates that monetary policy and disinflation have significant explanatory power for comparative unemployment dynamics across European countries. The forcing processes of labor demand, however, are assigned a background role by the theoretical models reviewed in this chapter. This approach makes it easier to obtain intuition and insight from uncluttered theoretical models, and may well entail little loss of information in comparative work if the stochastic properties (as opposed to the realization) of labor demand shocks are similar across the economies considered and general equilibrium effects spill across them through integrated markets for goods and financial instruments. To further simplify exposition, the chapter's simple partial-equilibrium analytical models do not explicitly acknowledge that the costs of labor turnover and worker mobility generally depend not only on labor market institutions but also, endogenously, on aggregate labor market outcomes. Most importantly, mobility costs and wage determination are jointly endogenous in the models surveyed by Mortensen and Pissarides (this volume), where labor mobility entails a slow and costly matching process vacancies to workers.[1]

[1]The models of Acemoglu (1995), Millard and Mortensens (1997), Lijunqvist (1997), and Lijunqvist and Sargent (1995) pay particular attention, in a search and matching context, to some of the institutional features on which the present survey is focused.

The aggregate viewpoint of the literature reviewed below also relies on stylized specifications of microeconomic labor-market interactions. To focus on labor demand as an exogenous determinant of employment and wage dynamics, the theoretical perspective of this Chapter and of the literature it reviews treats labor as an homogeneous factor. In reality, of course, an individual worker's wage and employment status may relate to his own age, experience, education, and other personal characteristics in ways that do depend on institutional differences across countries and labor markets with respect to the responsiveness of wages and employment to individual characteristics rather than to aggregate and disaggregated labor demand dynamics. A fully worked out microeconomic model would allow individual workers' characteristics and effort to bear on their labor market experience, and these aspects could generally be very relevant to aggregate labor market performance.[2]

1.2 Outline

To pinpoint the determinants of differential wage growth and analyze its employment effects, theoretical models use more refined tools than static textbook diagrams. Sections 2 and 3 below focuses on the dynamics of labor demand and wages, each of which is arguably influenced by such institutional differences across labor markets as the stringency of job security provisions on labor demand, and the bargaining strength and coverage of unions in the wage-setting process.

[2]In particular, the extent and character of equilibrium unemployment implied by efficiency-wage considerations is not independent of labor market institutions. On the one hand, the threat of dismissal may much more effectively deter shirking when re-employment probabilities are as low as in rigid labor markets, where unemployment is predominantly long-term. On the other hand, dismissal is likely to be a less effective threat when rules and regulations intended to protect employees from labor-demand fluctuations and wrongful dismissals increase the complexity and cost of firing procedures motivated by worker behavior. Saint-Paul (1995a,1997a) and Fella (1997) discuss interactions between efficiency wages and labor market dynamics.

Since job creation and destruction occur simultaneously within measured aggregates, it is not necessarily appropriate to cast partial-equilibrium models of aggregate employment and wages in terms of "representative" firms and workers. The work reviewed in Section 4 recognizes that idiosyncratic employment fluctuations interact importantly with aggregate labor market developments, and that institutional differences across labor markets can importantly affect aggregate developments though their effects on idiosyncratic employment dynamics. Hiring and firing coexist in reality, and Section 4.1 discusses how turnover costs may determine the intensity of job turnover; wage dynamics are also less than adequately summarized by aggregate series: Section 4.2 discusses empirical evidence on (and institutional explanations for) comparative wage inequality levels and trends across aggregate labor markets, focusing in particular on how centralized contracts, minimum wages, and unemployment insurance bear on the responsiveness of wages and/or employment to labor demand shocks at the level of firms or establishments.

To the extent that the literature reviewed in Sections 2-4 improves our understanding of the economic mechanisms by which institutional details affect aggregate labor market outcomes, it also throws some light on the more difficult question of which deeper economic and political features might in turn determine institutional differences across countries and over time. Such politico-economic aspects are most relevant as European countries undertake reform of their poorly performing labor markets. Section 5 briefly reviews recent contributions on the role of distributional tensions and market imperfections in the endogenous formation of labor markets' institutional structure.

The Chapter's train of thought and tentative conclusions are perhaps better summarized here than at the end. Job security provisions have certainly played an important role in shaping aggregate employment dynamics across countries. Both theory and empirical evidence, however, indicate that high firing costs can explain low employment variability but

cannot, in isolation, rationalize the dismal employment performance of many European countries, which appears to be associated with high wage growth as well as with job security. High and increasing wages, in turn, are explained by the protection afforded to the currently employed "insiders" by wage compression as well as by job security provisions *per se*. These two institutional features are obviously complementary to each other in making it difficult or impossible for the unemployed to bid for jobs—and, since prime-age males are as likely to be employed in European countries as in the U.S., it is not surprising to find that high labor market rigidity has displayed remarkable politico-economic stability through much of the last two decades.

2 Job security and firing costs

The character and stringency of legal provisions regarding dismissal of redundant employees differ widely across European and American labor markets. In general, what is required is that job termination be motivated, and that workers should be given reasonable notice or financial compensation in lieu of notice. In practice, enforcement of such laws is based on the workers' right to appeal against termination. Hence, employment reduction entails lengthy negotiations with workers' organizations and/or legal procedures.

The stringency of such job-security provisions does vary across labor markets, and over time as well. Even in the relatively unregulated U.S. labor market, experience-rated unemployment insurance contributions make it costly at the margin for firms to reduce employment (Card and Levine, 1994; Anderson, 1993), and redundancy costs also arise from the Worker Adjustment and Retraining Notification Act (WARN) of 1988 requiring covered firms to provide employees with 60 days' advance notice of plant closures and large-scale layoffs.[3] Most European countries

[3] Also, rules regarding dismissal of individual employees can interfere with firms'

feature similar, but more stringent regulation of individual and collective dismissals. Some aspects of job-security provisions, such as the number of months' notice required for individual and collective redundancies, are readily quantified; Grubb and Wells (1993) compile and discuss the relevant institutional information for a cross-section of industrial countries, and Lazear (1990), Addison and Grosso (1996), and others also consider such simple indicators' time-series behavior. Other important aspects of job-security provisions, such as the willingness of labor courts to entertain appeals by fired workers and the interpretation placed by judges on the rather vague notion of "just cause" for termination, are more difficult to quantify precisely. While this makes it hard to measure precisely the stringency of firing constraints in each labor market, available indicators of job security provisions—such as the length of notice periods, the percentage of dismissals brought before labor courts, and the size of redundancy payments—are positively correlated with each other. This makes it possible to assess unambiguously (if only qualitatively) the relative stringency of job security constraints, and to correlate aspects of labor market performance to the resulting overall "rigidity rank" rather than to specific quantitative measures of rigidity or to their dynamic behavior.

In this Chapter's figures and tables, country-specific information is displayed or listed in the order of labor market regulation ranking compiled from such qualitative classifications. Unsurprisingly, Italy and the U.S. are placed at the extreme ends of the rankings proposed, among others, by Bertola (1990) and Grubb and Wells (1993).[4]

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decisions to adjust overall employment levels. In unionized firms, contractual provisions for inverse seniority makes it difficult to calibrate employment reduction (Piore, 1996); and there is empirical evidence that legal provisions meant to protect individual employees become more binding during cyclical downturns (Donohue and Siegelman, 1995).

[4]A qualitatively clear pattern can also be discerned along the time dimension. In most European countries, job security provisions were tightened in the 1968-74

2.1 Hiring and firing

To formalize a labor-demand approach to employment determination, let the marginal productivity of labor employed by a typical firm be a function $\pi(l_t, Z_t)$ which is decreasing on the amount l_t of (homogeneous) labor employed at time t, and also depends on an exogenous shifter Z representing all possible determinants of labor demand.

As is well known from the contributions reviewed by Nickell (1986), when hiring and/or firing is costly the firm's employment policy should take into account labor's marginal contribution to expected present discounted profits,

$$V(l_t, Z_t, ...) = E_t \left[\sum_{\tau=t}^{T} \left(\frac{1}{1+r} \right)^{\tau-t} \left(\frac{1}{1+\delta} \right)^{\tau-t} (\pi(l_\tau, Z_\tau) - w_\tau) \right], \quad (1)$$

rather than on current conditions only. The shadow value $V(\cdot)$ evaluates the expected change in future profits caused by a feasible marginal variation of the current and all future employment levels, leaving all future hiring and firing decisions unchanged (as is appropriate since, if such decisions are optimal, infinitesimal variations would have no effect on profits by the envelope theorem). In equation (1), r represents the discount rate applied to future cash flows, and δ represents the spontaneous (and costless) attrition of additional employment through quits and retirements; both are supposed constant for simplicity but, of course, may

period of union militancy. The timing of such reforms coincided with increasing unemployment but, of course, other simultaneous developments in, e.g., the price of oil, union militancy, and fiscal and monetary policy make it difficult to formulate causal interpretations. In fact, empirical work by Lazear (1990) and Addison and Grosso (1996) offers a contradictory and weak pattern of results. Over the late 1980s and 1990s, tentative steps towards labor market deregulation were taken by many of the same countries. Section 5.3 below briefly discusses such time-series developments. With the notable exception of the British labor market reform in the 1980s, however, dynamic developments were not such as to alter the relative rankings of European countries' labor market rigidity, and always kept their job security provisions much more stringent than in the U.S.

well vary over time in more realistic models. The expectation of current and future marginal profits depends on the current employment level l_t if $\pi(\cdot)$ is downward-sloping in employment, and on the current realization of exogenous factors Z_t if the process describing them is persistent. Past realizations of Z and/or of other variables may also be arguments of $V(\cdot)$, depending on the processes followed by Z_t and w_t.

When turnover is costly, employers should compare the shadow value $V(\cdot)$ of labor to hiring and firing costs. If $H(\cdot)$ denotes the marginal hiring cost, hiring additional employees increases the firm's value if $V(\cdot) \geq H(\cdot)$, while firing would be optimal if $V(\cdot) < -F(\cdot)$ for $F(\cdot)$ the unit marginal cost of redundancy payments and other costs entailed by dismissals. Both hiring and firing costs may depend on the size of the relevant employment variation. In empirical specifications, it is convenient to let marginal turnover costs be linear, with possibly different slopes in the hiring and firing region (Pfann and Palm, 1993); Hamermesh (1993) and Hamermesh and Pfann (1996) offer a synopsis of empirical approaches and findings. While increasing unit costs of hiring and firing should induce employers to smooth out over time any desired employment variation, the infrequent and lumpy nature of employment changes suggests that lump-sum turnover costs are also relevant in reality: if total turnover costs feature a fixed component besides the integral of the marginal functions $H(\cdot)$, $F(\cdot)$, then the employment decisions should consider finitely-sized employment variations, which will indeed be optimal over the region where per-unit average turnover costs are declining in turnover.

Since theoretical considerations might lead one to specify unit adjustment costs as an increasing or decreasing function of total turnover, a linear specification offers a useful baseline case of some generality. For theoretical purposes, it is often simplest and insightful to let unit turnover costs be constant, i.e., to assume that employers pay a constant amount H per worker hired, and a firing cost F per unit of employment re-

duction relative to the previous period, so that adjustment costs are a piecewise linear function of total turnover. Different job-security institutions across labor markets may be represented by different cost slopes for positive and negative employment changes ($H \neq F$). Then, varying F while keeping H constant offers useful insights into the theoretical effects of different job-security provisions across economies whose technological requirements are similar enough to let the same cost H represent non-institutional costs of hiring workers and setting up jobs.

The dynamic behavior of the labor demand shifter Z can also be specified in a variety of ways, striving for a balance of quantitative realism and analytical tractability. Bentolila and Bertola (1990) let Z be described by a persistent process in continuous time (Brownian motion). Like other work on real choices under uncertainty reviewed by Dixit and Pindyck (1994), the resulting model of labor demand can exploit technical tools and option-pricing analogies from the financial literature. If firing and hiring entail first-order unit costs, the firm should allow the ratio of wages to labor's marginal product to fluctuate within an "inaction range" whose width importantly depends on the degree of uncertainty about the future. The same intuitive and arguably realistic characterization of employment dynamics obtains in different formalizations. Montias (1991) explores the implications of prohibitive firing costs in the presence of stationary price uncertainty, and Bentolila and Saint-Paul (1994) model uncertainty in terms of uniformly and independently distributed random variables; among others, Bertola (1990), Bentolila and Saint-Paul (1992), Cabrales and Hopenhayn (1997), study discrete- and continuous-time models where forcing variables are described by persistent Markov chains.

Each of these contributions makes these and other formal assumptions in order to address specific institutional and economic issues. Here, it will be useful to outline briefly but formally the basic insights afforded by such models, letting the labor-demand forcing process follow simple

Markov chains and taking the wage w_t to be constant in the face of labor demand fluctuations.

The latter assumption may not be inappropriate if the model's firm is viewed as an aggregate labor market's representative employer.

[Figure 3]

As shown in Figure 3, in fact, the cyclical behavior of wages and employment is not nearly as consistent with a textbook labor demand relationship as in the long-run, cross-country evidence displayed in Figure 1. In all countries considered, wages and employment are uncorrelated at cyclical frequencies, consistently with evidence on the cyclical behavior of wages, recently surveyed by Abraham and Haltiwanger (1995) and by Brandolini (1995), which is at best inconclusive in all countries.[5] A roughly acyclical real wage can be consistent with a variety of model, including dynamic variants of the textbook competitive market clearing scheme. It is also, and most relevantly to the narrow theoretical perspective of this Section, consistent with institutional arrangements that prevent wages from responding to cyclical developments.

2.1.1 Inaction and endogenous employment persistence.

Consider first optimal labor demand policies when the shifter Z_t is independently drawn each period from a three-point distribution $\{Z^B, Z^M, Z^G\}$, with $Z^B < Z^M < Z^G$. For concreteness, let $\pi(\cdot)$ be increasing in Z, so that the profit-maximizing employment level at given wages is higher when Z is. In the absence of turnover costs, the optimal employment levels $\{L^B, L^M, L^G\}$ should be such as to equate labor's marginal pro-

[5] For more extensive analyses of cyclical and trend relationships between wages, employment, and unemployment, see Elmeskov and Pichelmann (1993), who find evidence of cyclical covariation among these series in Japanese and Swiss data. This can be rationalized by institutional peculiarities of these labor markets, neglected here for reasons of space.

ductivity to the (constant) wage in each state,

$$\pi(L^i, Z^i) = \bar{w}, \qquad i = B, M, G, \tag{2}$$

hence would also follow a stochastic process with independent and identically distributed realizations. This is the simplest among models where, like in the more sophisticated and realistic ones cited above, turnover costs may imply that the firm should *not* react to certain labor demand shocks.

In this and other models where the current realizations of Z_t and L_t are sufficient statistics for the conditional expectations featured in (1), the definition the shadow value of labor implies the recursive relationship

$$V(l_t, Z_t) = \pi(l_t, Z_t) - \bar{w} + E_t\left[V(l_{t+1}, Z_{t+1})\right]. \tag{3}$$

In general, inaction is optimal if the marginal productivity fluctuations associated with transitions between two values of Z_t *at unchanged employment* are not so large as to result in a shadow value of labor smaller than $-F$, or larger than H.

To formalize the notion of optimal inaction in the simplest possible dynamic setting, let the three possible values be realized with equal probability in each period, let the labor attrition rate δ be equal to zero, and suppose parameters are such that the firm chooses to leave employment unchanged when Z_t fluctuates between the two smallest or the two largest values of Z_t, but does act when it experiences larger fluctuations between Z_B and Z_G.[6] The process driving employment then takes not three, but only two values, i.e., the employment levels resulting from optimal hiring and firing upon extreme labor-demand fluctuations. Denoting

[6] If not even the largest possible demand fluctuations induced hiring or firing by the firm, then employment would forever be constant at a level determined by initial conditions. Such *hysteresis* would prevent a fully endogenous characterization of employment dynamics. Also, perpetual inaction in the face of exogenous shocks could never be optimal if the employment attrition rate were positive ($\delta > 0$).

these employment levels with L_B and L_G, the firm's dynamic optimality condition has the form

$$H = \pi(L_G, Z_G) - \bar{w} + \frac{1}{1+r}\frac{H - F + V_{(M,G)}}{3}$$

at times when $Z_t = Z_G$ and the firm equates the marginal cost H of hiring an additional unit of labor to its shadow value; optimality similarly requires that

$$-F = \pi(L_B, Z_B) - \bar{w} + \frac{1}{1+r}\frac{H - F + V_{(M,B)}}{3}$$

at times when $Z_t = Z_B$, and the marginal value change entailed by decreasing employment below the optimal level L^B compares unfavorably to the marginal firing cost F. In each case, the shadow value of labor 1 is written as the current marginal cash flow, $\pi(L_i, Z_i) - \bar{w}$ $(i = G, B)$, plus the expected discounted value of the next period's shadow value, which is again given by H or by $-F$ in the two cases out of three in which Z_{t+1} again corresponds to the highest or the lowest of the three possible values. When $Z_{t+1} = Z_M$ and inaction is optimal, then the shadow value of labor is $V_{(M,G)}$ and obeys the relationship

$$V_{(M,G)} = \pi(L_G, Z_M) - \bar{w} + \frac{1}{1+r}\frac{H - F + V_{(M,G)}}{3}$$

if the last action by the firm was an upward employment adjustment, and

$$V_{(M,B)} = \pi(L_B, Z_M) - \bar{w} + \frac{1}{1+r}\frac{H - F + V_{(M,B)}}{3}$$

if it was a downward one. The dynamic optimality conditions form a system of four equations in the four unknowns $L_G, L_B, V_{(M,G)}, V_{(M,B)}$; inaction is indeed optimal if the solution is such that

$$-F < V_{(M,B)} < H, \qquad -F < V_{(M,G)} < H.$$

The resulting system of linear equations readily yields a closed-form solution if labor's marginal product takes (or is approximated by) the simple

form

$$\pi(L, Z) = Z - \beta L.$$

In the simple example considered, the independently distributed forcing variable Z_t has no persistence across its three possible states. Yet, if turnover costs are large enough to induce inaction (but not so large as to prevent all action), then employment only takes the two values

$$L_B = \frac{1}{\beta}\left(Z_B - \bar{w} + F + \frac{1}{1+r}\frac{Z_M - Z_B + H - 2F}{3}\right),$$

$$L_G = \frac{1}{\beta}\left(Z_G - \bar{w} - H + \frac{1}{1+r}\frac{Z_M - Z_G + 2H - F}{3}\right),$$

and remains constant across two thirds of all pairs of consecutive periods. Hence, employment follows a more persistent process than its forcing variables. Similarly, but perhaps not as clearly, in the more sophisticated models where Z_t follows a Brownian motion with infinite variation turnover costs and optimal inaction yield an employment process of finite variation.

2.1.2 The size of employment fluctuations

Employment fluctuations are not only less frequent, but also less pronounced on average in the simple model above. This and other relevant insights into the employment dynamics effects of adjustment costs can be more immediately illustrated by an even simpler model where Z features symmetric transition probabilities p across only two states Z_B and $Z_G > Z_B$. As long as $p < 1/2$, the process driving labor demand has positive persistence, and the frequency of employment fluctuations coincides with that of exogenous shocks if turnover costs are not such as to make perpetual inaction optimal.

Let the employment levels corresponding to $Z_t = Z_G$ and $Z_t = Z_B$ be l_G and l_B, respectively. If the interest rate is kept fixed and labor attrition is again disregarded for simplicity, then the expected present

value of marginal revenue product minus the wage also follows a two-state Markov process. Its values V_G and V_B at a good and a bad firm satisfy the recursive relationships

$$V_G = \pi(l_G, Z_G) - \bar{w} + \frac{1}{1+r}\left[(1-p)V_G + pV_B\right] \tag{4}$$

$$V_B = \pi(l_B, Z_B) - \bar{w} + \frac{1}{1+r}\left[pV_G + (1-p)V_B\right]. \tag{5}$$

The expressions V_G and V_B for the shadow value of labor are a sufficient statistic for a risk neutral employer's labor demand policy. At the margin, a dynamic value-maximizing employment process again requires that the shadow loss of net revenues from dismissing workers should equal the actual cost of firing them ($V_B = -F$), and that V_G should equal the unit hiring cost. To highlight the implications of job security provisions in the simplest possible setting—and with little loss of insight if institutional differences across labor markets pertain to legal job security regulations rather than to technological and contractual features affecting firms' hiring costs—it is useful to disregard hiring costs: with $V_G = 0$, the equations in (5) can be solved to yield

$$\pi(l_G, Z_G) = \bar{w} + \frac{p}{1+r}F, \tag{6}$$

$$\pi(l_B, Z_B) = \bar{w} - \frac{r+p}{1+r}F. \tag{7}$$

Quite intuitively, concern about future firing costs induces the firm to employ fewer units of labor when demand is strong. Labor's marginal productivity should be equated not to the (constant) wage, but to the wage plus the expected discounted value of unit firing costs to be paid next period—i.e., the probability p of a downward fluctuation of labor demand, times the unit firing cost F discounted back from the following period. Firing costs have an even more intuitive effect on firing decisions, which are obviously less attractive when they entail immediate turnover costs: if the probability p of an improvement in labor's marginal productivity were zero, the firm would simply subtract the annuity value of

turnover costs saved, $rF/(1+r)$, to the flow cost w of continued employment of the marginal worker; and labor hoarding behavior is all the more attractive if $p > 0$, i.e., if there is a chance that the marginal worker may contribute more than w to the firm's revenues in the following period.

The difference of the two optimal marginal productivity levels from (7),

$$\pi(l_G, Z_G) - \pi(l_B, Z_B) = \frac{r + 2p}{1 + r} F, \tag{8}$$

is an increasing function of p: since wider fluctuations of labor's marginal productivity are associated with narrower employment fluctuations, as in Figure 4, employment fluctuations are less pronounced—for given turnover costs—when fluctuations of labor demand are more frequent.

[Figure 4]

2.2 Dynamics and averages

As Figure 4 illustrates, firing costs stabilize employment in downturns but also lead employers to refrain from hiring in upturns for a constant (and any other given) cyclical wage pattern. As noted by Lazear (1990), wages could potentially adjust to labor demand fluctuations in such a way as to offset the effects of (mandatory) redundancy payments. Side payments and contractual agreements could also prevent deadweight regulations and payments to third parties from having any effect on wages and employment. As shown in Figure 3, however, aggregate wages are ambiguously related to employment fluctuations in all countries considered, yet the cyclical volatility of employment is much more pronounced in the United States and the United Kingdom than in Germany, Italy, and especially France. Since the volatility of aggregate production is rather similar across these and other industralized countries (see, e.g., Bertola and Ichino, 1995a), the stringency of job security provisions and the resulting labor-hoarding are relevant to the evidence in Figures 1 and

5: cyclical employment and unemployment fluctuations are much wider in the relatively less regulated labor markets of the U.S. (and of the U.K. since Mrs Thatcher's reforms) than in the continental European countries, and especially in France.

Other evidence also supports the relevance of job-security provisions. To the extent that hiring and firing are inhibited by institutions, employers have incentives to exploit other sources of (costly) flexibility, such as overtime: indeed, aggregate employment fluctuations are relatively subdued in Europe, but hours per worker are more variable there (Abraham and Houseman, 1994). Also, unemployment is qualitatively different in the U.S. and Europe. In European labor markets, a larger percentage of the unemployed experiences long-term spells of joblessness, many of the unemployed are young labor market entrants, and relatively few are job losers. Dynamic labor demand models such as that outlined above readily rationalize such cross-country patterns of evidence. To the extent that firing costs prevent dissolution of existing employment relationships, sharply rising unemployment is less likely in countries with stringent job security provisions. As firing costs also reduce forward-looking hiring decisions and job creation, employment increases are similarly smoothed, and individuals who—like new entrants to the labor market—happen to be unemployed at any given point in time are less likely to exit into employment and more likely to experience long-term unemployment.[7]

If firing costs do have effects on aggregate employment's dynamic behavior in real-life labor markets, the question arises of whether their contrasting effects on hiring and firing work out to positive or negative net effects on longer-run relationships between wage and employment levels. The relevant predictions of dynamic labor demand models are

[7]As argued by Davis and Henrekson (1997) with reference to Swedish and American evidence, labor market institutions and other forms of regulation appear relevant to a host of other empirical features in cross-country comparisons.

simple: since higher turnover costs reduce both hiring and firing, their effect on average employment levels over periods when both hiring and firing occur is a order of magnitude lower than that on hiring and firing separately.

The sign of the net employment effect of subdued hiring and firing depends on such subtle features of formal models as the functional form of labor demand functions, the persistence of labor demand fluctuations, and the size of discount and attrition rates.[8] The simple model introduced above disregards labor attrition, but can usefully highlight the other qualitative determinants of average-employment effects. Since transitions from low to high labor demand and back have the same probability, in the long run the two states have equal probability; hence, the average employment effect of turnover costs depends on the relative size of the two horizontal arrows in Figure 4. In turn, the upward and downward biases of labor demand at given wages reflects the wedge placed by F between w and $\pi(\cdot)$, on the vertical axis: the long-run average of such wedges simply weights them equally and, from (7), amounts to

$$\frac{\pi(l_G, Z_G) + \pi(l_B, Z_B)}{2} - \bar{w} = -\frac{r}{1+r}F. \tag{9}$$

As long as $r > 0$, labor's marginal productivity is biased above the wage by firing costs in the long run. When choosing to refrain from firing, in fact, employers contemplate the full, undiscounted firing cost F, while reduced hiring only takes into account the present *discounted* value of F. Hence, average employment is chosen as if wages were lower by the annuity equivalent of the unit firing cost F.[9] The extent to which a

[8] Such issues are studied in some detail by Bentolila and Bertola (1990) and Bertola (1990, 1992), who find that average employment effects are indeed small and of ambiguous sign in reasonable parameterizations of dynamic labor-demand problems.

[9] The effects of hiring costs are quite intuitively symmetric to those of firing costs. In more complex modeling frameworks, labor demand shifters and employment take a continuum of values and employment's endogenous and exogenous dynamics are influenced by labor attrition (Bentolila and Bertola, 1990; Bertola, 1992; Saint-Paul,

downward bias in labor's marginal productivity is reflected in an upward employment bias, however, depends on the form of labor demand as a function of employment and exogenous shifters. Referring again to Figure 4, the relative size of the vertical arrows is reflected back into the horizontal axis according to the slopes of the two labor demand functions, which in turn depend on the degree of convexity of labor demand with respect to employment and on the effect of Z on the steepness of labor demand. Hence, the net employment effect of F is generally small, and is almost exactly zero if labor demand has constant slope and discount factors over hiring/firing cycles are negligible.

In reality, rigid markets do tend to feature more stable employment and unemployment around levels which, in the long run, are not as clearly correlated to the stringency of job security provisions as might be expected. In Figure 5, European unemployment series are closely related to increasing wage trends, but their average long-run level is much less clearly related to their ranking in job-security terms.[10]

However, only the low unemployment rates of the 1960s makes European countries' long-run average unemployment comparable to U.S. ones, and the extent and character of labor market rigidity is empirically related to increasing unemployment and wages during the 1970s and 1980s (see Scarpetta, 1996, for a careful attempt at disentangling the effects of various labor market institutions on unemployment rates), as well as to the fluctuations of wage and profit shares studied by Blanchard

1995b). The strength of discounting effects is then jointly determined by the width of the inaction range, the speed of labor attrition, and the persistence of labor demand's driving processes.

[10]British data are also consistent with the evidence reviewed above and its dynamic-labor-demand interpretation if the time series is split in two: before 1980, relatively high (and rising) labour market regulation was associated with relatively stable unemployment, at levels comparable to that obtaining in other European countries. In the more recent period of reduced regulation and greater flexibility, unemployment rates are again on average comparable to those of other European nations but much more volatile.

(1997) and Caballero and Hammour (1998).

In fact, while the cyclical behavior of wages is muddled in all countries (see Figure 3), longer-run autonomous fluctuations of wages are predicted to interact with labor demand dynamics and turnover costs so as to bias the wage share of labor upwards when wages increase and employment decreases, because the marginal product of labor is lower than the wage in such contingencies; Caballero and Hammour (1998) embed this insight in a matching model of the type surveyed by Mortensen and Pissarides in this Handbook. The work reviewed in the next Section focuses on how specific institutional features of European labor markets may be relevant to dynamic wage developments.

[Figure 5]

3 Wage setting

Job security provisions can explain why, in certain countries and historical periods, similar labor demand or wage shocks cause more or less pronounced employment fluctuations, and why the composition of unemployment is biased towards young labor market entrants and long durations. By themselves, however, firing costs cannot explain the equally pronounced differences in longer-term employment dynamics and unemployment trends. When averaged over time, in fact, optimal dynamic labor demand policies conform to the familiar downward-sloping relationship between wages and employment of static models. Microeconomic interpretation of aggregate labor market outcomes must therefore address wage determination issues. More specifically, what is called for are theoretical explanations of empirical associations between stricter labor-market regulation on the one hand, and real-wage growth and unemployment on the other.

In European labor markets, contracts signed by large unions and employer confederations are often legally binding for all employment re-

lationships in the sectors and periods concerned. Such institutional features give aggregate relevance to the basic partial-equilibrium insight that lower employment can be accepted by workers' representatives as a byproduct of higher wages. The simplest among the partial-equilibrium model of union wage bargaining reviewed by Farber (1986) studies how a rational union should set the wage level that its employer counterpart will take as given when choosing its profit-maximizing employment and production levels. Whenever labor demand is downward-sloping, the wage and the marginal productivity of labor are lower than its average productivity; thus, like all monopolists, a wagesetting union will have incentives to capture part of such rents, while reducing their total amounts, by choosing a higher wage. Formally, if the union is indifferent to the identity of its employed members the wagesetting problem is

$$\max_{w} \Big\{ wL(w) + (M - L(w))\, u \Big\}, \tag{10}$$

where $L(w)$ is the direct labor demand function, M is the labor force represented by the union, and u is the benefit flow (measured in the same units as the wage) accruing to those among the workers represented who end up not being employed by the firm considered.

The optimal wage choice is

$$w^* = \mu u, \tag{11}$$

for μ the mark-up ratio over the alternative income flow denoted by u:[11]

$$\mu = \left(1 + \frac{1}{L'(w)} \frac{L(w)}{w}\right)^{-1} = \left(1 + \frac{\partial \pi(\cdot)}{L} \frac{L}{w}\right)^{-1}. \tag{12}$$

In this simple model of monopoly wage setting, the extent to which the markup exceeds the unitary competitive benchmark depends on the

[11]The alternative labor income to which the monopolistic union applies its mark-up depends in obvious and important ways on such institutional features of regulated labor markets as the generosity and coverage unemployment benefits, as well as on the character of unemployment experiences and other realistic features outside of this chapter's narrow focus.

(negative) slope of the marginal revenue product of labor, $\pi(\cdot)$, and of its labor-demand inverse $L(\cdot)$. In more complex and realistic models, the wagesetting power of unions is not that of a pure monopolist, as union members must contend with substitution possibilities and with the bargaining power of employers. What follows reviews two relatively subtle theoretical mechanisms through which union behavior may have aggregate implications in European institutional contexts.

3.1 Insiders and outsiders

Figure 6 plots time series of total wage outlays for the same five countries considered by the previous Figures.

[Figure 6]

The dynamics of employers' wage bills are certainly influenced by the wage-share fluctuations mentioned at the end of Section 2, and their trend growth since 1974 is noticeably slower in France and Italy than in the other three countries. Still, the overall picture emerging from the Figure is sufficiently similar across countries which, as illustrated in Figure 1, experienced very different wage and employment dynamics. This is at least superficially consistent with common technological long-run trends across the five economies considered, and with the idea that stronger union bargaining power moved European countries towards higher wages and lower employment along the near-unit-elastic labor demand schedules implied by roughly Cobb-Douglas aggregate production functions. It is somewhat more difficult, however, to explain why monopolistic wage-setting practices should not only be more relevant to European labor markets at any given moment in time, but also become more important in each European country over time.

Since the first two volumes of the Handbook were published, work on "insider-outsider" models has addressed this issue by exploring the dynamic implications of monopolistic wagesetting behavior. The basic

modeling assumptions and insights of the dynamic models proposed by Blanchard and Summers (1986), Gottfries and Horn (1987), and others are simple. The size M of union membership appears in (10) and (15), but only as a multiplicative constant with no impact on the optimal wage; as in the standard union models reviewed by Farber (1986), the optimal monopolistic wage depends only on the elasticity of labor demand and on the outside option u, not on the size of the union's membership. To let membership play a role in wage determination, however, one could simply let its size M be smaller than the wage-bill-maximizing level of employment: then, the alternative income u becomes irrelevant to all union members and to wage determination, and the union should solve the simple problem

$$\max_{w} \quad wM \text{ s.t. } L(w) \leq M \tag{13}$$

instead of (10). Recalling that $N(w)$ is the inverse of the marginal product schedule $\pi(\cdot)$, 13 has (corner) solution

$$w^I(M) = \pi(M, Z) : \tag{14}$$

to protect its members' jobs while maximizing their income, the union should choose the highest wage compatible with employment of its M members and with Z, the exogenous determinant of labor demand.[12] Hence, a smaller union membership *ceteris paribus* implies a higher wage rate.

A second crucial assumption of dynamic insider-outsider models is that the wage rate be set before all the other determinants of employ-

[12] Similar implications would follow from replacing the union objective function (10), where all members of the union are equally likely to be employed, with one where employment probabilities are heterogeneous across members. In the extreme case where hires and layoffs are assumed to follow a precise order of seniority, each worker would choose the highest wage consistent with his or her own employment, and the contractual wage rate would depend on the precise voting rule adopted. See Layard (1990) for a discussion of the long-run properties of such wage-determination mechanisms.

ment levels are known with certainty. Under standard "right-to-manage" assumptions, firms are entitled to employ as many units of labor as is *ex post* optimal for them given the wage rate set *ex ante* by a monopoly union (or, more generally, bargained between the union and the employer). Exogenous fluctuations of labor demand can then cause employment to fluctuate while wages remain relatively stable.[13] The preset level of wages, of course, should now take into account the fact that not all of the union's members can be assured of continued employment. This induces wage moderation, and lets the alternative income flow (denoted u above) have a role in wage determination. As long as the job-finding prospects of non-members are disregarded by the union's objective function, however, the outside factors indexed by u have an asymmetric effect on wage determination. Outside factors only matter in the "bad news" case where some of the union's members lose their jobs. Positive labor demand shocks, conversely, do not benefit union members, who are certainly all employed if labor demand is higher than expected. In expected terms, accordingly, the overall weight of outside factors in wage determination is smaller.

The third key assumption of models aimed at explaining the divergent dynamics of wages and employment in Europe is an explicit linkage between union membership and employment levels. As long as the employed "insiders" have more of a say in wage determination than the unemployed "outsiders," the asymmetric nature of the wage and employment process outlined above can explain endogenously why such labor demand fluctuations as might be generated by productivity shocks and macroeconomic policies, though similar in the U.S. and Europe, had more persistent wage and unemployment effects in the latter.

[13] Right-to-manage contractual arrangements generally yield *ex post* Pareto-inefficient employment levels. Booth (1997) points out that when not only the wage, but also redundancy payments are set *ex ante* then the right-to-manage employment outcome can be brought closer to that of efficient bargaining by contractual firing costs, and can coincide with it if the structure of uncertainty is sufficiently simple.

These arguments rest on the assumption that wages are be set by unions rather than by individual worker-employer bargains or by a competitive market process. While monopolistic wage-bill maximization can rationalize less than full employment, individuals workers who are not employed *ex-post* have obvious incentives to try and underbid the contracted wage unless part of the maximized wage bill is somehow transferred to them. If such atomistic underbidding were allowed, wage and employment would of course unravel to the competitive solution (or to binding lower bounds on wages deriving from unemployment benefits and other social transfers, or from minimum-wage laws). An important source of union bargaining power, therefore, arises by closed-shop contracts and, in the European context, by administrative extension to all employment of contracts signed by sector-level unions, which simply make it illegal for firms to employ workers at wages lower than the ex-ante agreed floor; Section 4.2 discusses the implications of such limited wage-bidding institutions in some more detail.

Insider-outsider models propose and study a variety of more subtle features of labor market institutions and worker behavior which may isolate currently employed workers from underbidding by the unemployed outsiders (see Lindbeck and Snower, 1988, and the review by Ball, 1990). In the insider-outsider literature—recently surveyed in more detail by Bean (1994) and Sanfey (1995)—formal models are often specified in the essentially static terms of the simple derivations above, and an explicit optimizing analysis is rarely extended to a multi-period setting (see Drazen and Gottfries, 1994). This makes it difficult to ascertain the extent to which the phenomena described depend on the institutional structure of the model and bear on long-run systematic effects; further, the relatively robust results of insider-outsider models are not as distinctive as might be desirable, and rely in turn on somewhat *ad hoc* theoretical assumptions.

A basic implications of insider-outsider interactions in dynamic

models is that insider power should be associated to persistent unemployment and wage processes. As long as wages are predetermined or otherwise insensitive to contemporaneous labor demand, however, labor demand fluctuations can have persistent effects in models that do not specifically focus on insider-outsider interactions. As Sanfey (1995) points out, real wage rigidity can be generated by many other theoretical mechanisms (which may of course interact with insider-outsider relationships, as in Gottfries, 1992). The simplest reason why employment and wages react sluggishly to each other could be the role played by turnover costs in dynamic labor demand, along the lines of Section 2 above—though, as discussed in more detail at the beginning of Section 4 below, aggregate labor demand fluctuations are not so pronounced as to let turnover costs introduce the degree of persistence required to interpret European labor market experiences. Qualitatively similar, but more structural persistence mechanisms are proposed by Saint-Paul (1995a), who studies a model where the "efficiency" wage predetermined by employers is persistently endogenous to labor market conditions, and higher when likely job loss makes imperfectly monitored workers reluctant to supply effort. Unemployment persistence can also be explained by models where prolonged joblessness causes human capital depreciation and involuntary unemployment results from loss of skills, rather than of union membership status. The theoretical perspective of such models is in many respects similar to that of the union-based ones reviewed here and in Sanfey (1995) and, like the latter, it is subject to theoretical qualifications: to the extent that skill loss is endogenous (or is taken into account by endogenous wages), information asymmetries or other contractual imperfections are needed to explain unemployment persistence and inefficient use of labor (see Acemoglu, 1995 and his references).

Sanfey's (1995) critical review of the theoretical literature finds that a common and robust implication of insider-outsider models pertains to the weight of firm- or industry-specific factors in wage determination. As

pointed out by Bean (1994), however, it is somewhat surprising to find that "inside" variables are most relevant in U.S. wage determination, while they are least relevant in Nordic countries. For the purpose of interpreting such evidence, theoretical models which explicitly consider worker mobility costs and institutional wage compression across heterogeneous employment opportunities (reviewed in Section 4 below) may be more relevant than a pure insider-bargaining perspective.

On the theoretical side, it is not a trivial task to specify and model reasons why outsiders should be unwilling or unable to compete with insiders. It is relatively easy to focus on contingencies where insider behavior intuitively keeps wages rigid in the face of negative labor demand shocks, and prevents the resulting unemployment from being reabsorbed. Modeling how insiders become entrenched and what prevents outsiders from successfully bidding for employment, however, requires more attention to institutional detail and contractual imperfections.

Most immediately relevant to the present survey's train of thought is the idea that firing costs may protect workers not only from job loss due to exogenous labor demand fluctuations, but also from replacement by "outsiders" willing to work at less than the wage rate set by insiders. Whenever it is costly for employers to replace expensive insider employees with unemployed outsiders, any of the latter who are involuntarily unemployed should compete with the former by offering to work at low wages. In a single-period model, the whole cost of replacing insiders with outsiders—whether due to hiring costs or to job-security provisions—drives a wedge between the two groups' contributions to the firm's operating profits. In a dynamic version of such models, however, outsiders could and should bid down the whole wage process (rather than just a single-period wage), or even post a bond upfront so as to "buy" themselves a job. If contractual arrangements make it possible to do so, competitive pressure on equilibrium wage and employment patterns should make turnover costs next to irrelevant in wage determination in

a dynamic labor demand model with ongoing fluctuations. As in Section 2 above, only the annuity vale of turnover costs should bear on average employment and wages: higher turnover costs should be associated with smoother employment dynamics, but have small and ambiguous average effects.[14]

Of course, realistic contractual imperfections are more likely to be binding when turnover costs require dynamic contracting than in standard spot markets. Even when financial market imperfections prevent the outsiders from "buying" the insiders' jobs, however, insiders have incentives to preserve efficiency and behave as discriminating monopolists so as to capture rents from enlarged employment: insiders and outsiders could in principle both benefit from a finer differentiation of wages and employment opportunities than is allowed by the model outlined above and by more detailed similar models in the literature (see Fehr, 1990). The insight may indeed be relevant to recent institutional developments. As Saint-Paul (1993,1996) points out, high unemployment due to strong insider bargaining power may, from a politico-economic point of view, rationalize labor market reforms based on temporary contracts and more general restructuring of industrial relations on a two-tier basis.

3.2 Centralized bargaining

In the 1970s and 1980s, small "corporatist" countries such as Sweden and Austria featured both a relatively low unemployment rate, and stringent labor market regulations. As noted by Calmfors and Driffill (1988), what distinguishes these countries from both the unregulated U.S. and

[14]Bertola (1990) develops this argument in some detail in the context of a persistent Markov chain model similar to that outlined in section 2. Vetter and Andersen (1994) make a similar point in a two-period model with hiring costs. Andersen and Vetter (1995) show that outsiders have less of an incentive to underbid insiders if, as in their overlapping-generations model of the labor market, insider status is age-related and all young outsiders can look forward to insider rents in their old age.

the highly regulated larger European countries is centralization of wage bargaining. In a decentralized bargaining situation, unions take employment opportunities in other sectors as given but uncoordinated wage demands by sector-level unions endowed with market power generally lead to inefficiently low levels of employment in the economy as a whole. Conversely, when trade unions play the political role of "social partners" they can be expected to take into account the effects of wage settlements on all workers (indeed, all citizens) rather than only those of the subset of workers who happen to be represented by sector-level unions in heavily unionized countries with decentralized wage bargains.

To see this in a simple formal setting, let there exist (at least) two firms with downward-sloping labor demand functions of the type introduced above, and consider the optimal wagesetting policy for the union attached to the first of these firms: from

$$\max_{w} \left\{ w_1 L_1(w_1) + (L - L_1(w_1))u_1, \right\} \tag{15}$$

the optimal wage is

$$w^* = \mu_1 u_1 \tag{16}$$

for markup ratio μ_1 which, as in equation 12 above, depends on the elasticity of labor demand at firm 1. To highlight the qualitative role of imperfect coordination across such wage setting choices, it suffices to suppose that the outside earning opportunity for potential employees of firm 1, denoted u_1, depends not only on an economy-wide alternative income flow u, representing unemployment benefits, utility from leisure, or employment in a residual non-unionized sector, but also on the wage set by a similar union operating in the other firm (or sector) indexed by 2. Suppose, in fact, that u_1 is a weighted average of w_2 and u as in

$$u_1 = \tilde{p} w_2 + (1 - \tilde{p})u, \tag{17}$$

where $\tilde{p}$ indexes the likelihood that workers who are not employed by firm 1 will be employed by firm 2. This parameter may be related to the

probability p of labor-demand shocks discussed in the previous Section, but also to the intensity of replacement hiring and to more general features of the economic problem (discussed below). If the other sector's wages are symmetrically set according to

$$w_2 = \mu_2 u_2 \text{ with } u_2 = \tilde{p} w_1 + (1 - \tilde{p}) u, \tag{18}$$

the resulting system of two equations in the two unknown wage levels is readily solved to yield

$$w_1 = \frac{\mu_1 + \mu_2 \tilde{p}}{1 - \mu_1 \mu_2 \tilde{p}^2}(1 - \tilde{p})u, \quad w_2 = \frac{\mu_2 + \mu_1 \tilde{p}}{1 - \mu_2 \mu_1 \tilde{p}^2}(1 - \tilde{p})u. \tag{19}$$

If a single union faced by the aggregate of the two firm's labor demand functions were setting the same wage for all employees, it would choose

$$\bar{w} = \bar{\mu} u \quad \text{for} \quad \bar{\mu} = \left(1 + \frac{1}{L_1'(\bar{w}) + L_2'(\bar{w})} \frac{L_1(\bar{w}) + L_2(\bar{w})}{\bar{w}}\right)^{-1}; \tag{20}$$

it might also be advantageous for the union to behave as a discriminating monopolist and set different wages in the two sectors. Like the average labor demand effects of turnover costs, the relative size of the markup factors μ_1, μ_2, and $\bar{\mu}$ depends ambiguously on the functional form of labor demand functions. But as long as $\tilde{p} \neq 0$ the multiplicative interaction of the two unions' markup factors tends to raise uncoordinated wage demands above (and reduce employment below) the level that would maximize the wage bill accruing to an economy-wide union's membership, and *a fortiori* above the competitive market-clearing wages $w_1 = w_2 = \bar{w} = u$ implied by the expressions above when $\mu_1 = \mu_2 = \bar{\mu} = 1$. Hence, wages are predicted to be lower (and employment higher) not only when they are determined competitively but also when wage demands are coordinated, relatively to situations where each union takes the other's wage as a given component of its membership's alternative income flow and wage demands are indeed *ex post* excessive even from the point of view of employed workers as a whole.

This theoretical insight is qualitatively valid in more general settings, and its quantitative relevance depends on a variety of modeling details. Spillovers across different firms' or sectors' wagesetting problems can be modeled more realistically than in the simple model above, for example taking into account the effect of wages on labor demand and rehiring probabilities, or the effect of labor costs on the prices of workers' consumption baskets (see Rasmussen, 1992, for a general-equilibrium treatment of such interactions).

There is much obvious appeal in the idea that a centralized bargaining process, by taking into account the welfare of all workers rather than that of "insiders" only, should result in better employment performances. At the empirical level, however, the theoretically appealing notion of "centralized" bargaining is difficult to measure so precisely as to obtain reliable statistical results. Soskice (1990) objects to Calmfors and Driffill's classification of various countries' labor market institutions, and finds much less support for the basic theoretical insight in empirical work that classifies bargaining as decentralized in the Japanese and Swiss labor markets, but centralized in the Dutch and German markets, and acknowledges the changing pattern of wage determination in the British labor market. From a more substantive point of view, increasing integration of good and product markets (as modeled by of Danthine and Hunt, 1993) makes it difficult even in theory to define relevant measures of centralization or "corporatism;" and while nationwide coordination may ease adjustment to largely aggregate shocks (such as the oil shocks of the 1970s), recent developments may call for more flexible wage and employment responses across sectors. The OECD (1997) study fails to find evidence of a robust association between unemployment levels and trends on the one hand, and updated corporatism indices on the other. A much stronger association is evident between wagesetting centralization and measures of earnings dispersion across workers. The next Section discusses how this chapter's theoretical perspective may bear on findings

of more or less pronounced cross-sectional wage compression.

4 Idiosyncratic shocks and aggregate labor markets

In the models above, employment was taken to be constant in the absence of labor demand fluctuations. This made it possible to discuss the latters' qualitative implications in the simplest possible setting, because labor attrition (or "natural wastage" in British English) would necessarily increase the dimensionality of the models' state space and their analytic complexity. If labor attrition offered an alternative to costly firing decisions, in fact, the models of the previous Section would feature not just two or three, but a continuum of employment levels: as in Saint-Paul (1995b,1997a), employers would exploit quits to achieve at least part of the employment reduction made optimal by labor-demand shocks, and assuming that the latter follow simple Markovian models would afford only limited simplicity.

Neglect of voluntary quits does have substantive implications, however. In fact, *aggregate* labor demand volatility cannot realistically call for more than a few percentage points of employment reduction in all but the worst recessions. Hence, even if job security provisions were so tight as to make it impossible to terminate existing employment relationships firms' desired labor shedding could easily be accommodated, in models which treat employment as a homogeneous aggregate variable, by retirements and other demographic labor force transitions.

Within aggregate labor markets, however, sector- and firm-specific shocks do entail much more intense "idiosyncratic" employment fluctuations than those observed at the aggregate level (see Davis and Haltiwanger, 1992, and other recent work reviewed by their chapter in this Handbook). By definition, firm-level job creation and destruction in ex-

cess of what is required to achieve observed aggregate employment fluctuations does not bear directly on the level and dynamics of aggregate employment. Both theoretical models and empirical evidence, however, suggest that idiosyncratic phenomena play an important role in determining aggregate labor market outcomes over time and across countries. The intensity of disaggregated job creation and destruction is an important determinant of frictional unemployment in aggregate labor markets when labor reallocation across sectors and jobs is a time-consuming activity (see Lilien and Hall, 1986, and Mortensen and Pissarides's chapter in this Handbook). Also, and closer to this chapter's train of thought, idiosyncratic labor demand fluctuations can hardly be accommodated by voluntary quits if they are an order of magnitude larger than aggregate ones: no labor attrition rate short of 100 percent could possibly make job security and redundancy provisions irrelevant in the face of idiosyncratic labor demand shocks so negative as to make it desirable for an individual establishment to shut down. Hence, the desire on the part of at least some firms to reduce employment by more than could be accomplished by simply not replacing quits is presumably the reason why firing restrictions bind in reality, and the source of their smoothing effect on aggregate employment dynamics.

4.1 Job turnover

The simple models of labor demand introduced in Section 2 are readily adapted to the study of such issues. Instead of viewing the firm as representative of all employment opportunities in an aggregate labor market and the driving process Z as an index of aggregate shocks, consider the opposite extreme case where labor demand fluctuations are purely idiosyncratic in a large cross-section of individual firms indexed by i. In steady state, the cross-sectional distribution of exogenous forcing variables and endogenous employment levels coincides with the correspond-

ing long-run distributions for an individual firm.[15]

In the two-state model of Section 2.1.2, for example, half of the firms would have the strong labor demand level indexed by Z_G and employment l_G, while $Z_t^i = Z_B$ and $l_t^i = l_B$ for the other half. In every period, an exact fraction p of firms experience a change in productivity if there are infinitely many employers and Markov transition events are independent across them. Just because an equal cross-sectional frequency of the two states corresponds to the ergodic probability distributions of a (symmetric) Markov chain, the cross-sectional distribution remains stable over time: at the same time as $p/2$ firms suffer a transition from high to low productivity, $p/2$ other firms enjoy the opposite transition. Since the $(l_G - l_B)p/2$ jobs created in every period balance job destruction exactly, aggregate employment is stable, at a level given by the average of high and low labor demand functions. As noted above, such averaging may result in slightly lower or higher employment for any given wage level, depending on functional forms and on the strength of discounting effects;[16] but the sum of job creation and destruction divided by total employment,

$$\mathcal{M} \equiv \frac{p(l_G - l_B)}{l_G + l_B}, \tag{21}$$

is much more strongly affected by the dynamic features of the firms'

[15] The models could be extended to account for entry and exit of firms by allowing exogenous fluctuations of labor demand to be so large as to make zero employment optimal in the worst states. Like individual and collective dismissals, plant closure entails a variety of notification and compensation procedures in all countries. The intensity of job turnover generated by plant closures is hard to evaluate empirically. In the OECD (1994) data, roughly similar jobs turnover is associated to plant entry and exit in countries with widely different labor market institutions. As argued in Garibaldi et al. (1997), ownership changes and reclassification can easily generate spurious establishment entry and exit in administrative data sources.

[16] When labor demand fluctuations are given a cross-sectional interpretation, employment and (frictional) unemployment levels also depend on the intensity of labor reallocation if the latter is a time-consuming activity. For simplicity, however, such issues are neglected in the present discussion.

problem. This *job turnover rate* is easily computed from the optimality conditions (7) of the simple two-state model if an explicit functional form is specified for labor demand $\pi(\cdot,\cdot)$. If labor demand is approximated by the linear form $\pi(l,Z) = Z - \beta l$, for example, the gross turnover rate is given by

$$\mathcal{M} = p\left[Z_G - Z_B - \frac{2p+r}{1+r}F\right] / \left(\frac{Z_G + Z_B}{2} - \bar{w} + \frac{r}{1+r}\frac{F}{2}\right) \qquad (22)$$

when all firms pay the same wage rate $\bar{w}$ and follow the optimal labor demand policy (7).

The extent to which firm-level employment respond to idiosyncratic labor demand shocks is relevant at the aggregate level through its effects on productivity and firms' profits. As noted above, turnover costs have small and ambiguous effects on average employment and employers' wage bills: they unambiguously imply that a larger steady-state proportion of jobs has relatively low productivity, however, and therefore that aggregate production (and firms' profits) should be lower when firing costs are larger.

Hopenhayn and Rogerson (1993) study the effect of firing costs on labor supply and welfare in an otherwise standard competitive economy. As in the partial-equilibrium setting of Section 2 above, the effects of firing costs on labor demand at given wages generally depend on the exact parameterization of tastes and technology. Dismissal costs, however, have unambiguously negative effects on a representative agent's welfare. These effects are large in Hopenhayn and Rogerson's calibrated economy, which also features lower equilibrium employment since lump-sum rebates of separation taxes and the lower productivity and wage of labor unambiguously reduce labor supply. As lower profits also reduce incentives to save and invest, more stringent job-security provisions and lower intensity of labor reallocation are predicted to reduce the steady-state level of output, or the long-run rate of growth in an endogenous-growth economy; Bertola (1994) studies these effects in a general-equilibrium ver-

sion of the two-state Markovian labor market of Section 2.1.2. Gordon (1997) finds that, empirically, aggregate labor-supply (or wage-setting) shocks induce short-run increases in measured productivity and slower capital accumulation in "rigid" European countries. The more complex model studied by Caballero and Hammour (1998) delivers similar implications, with an important role for surplus sharing rules in shaping the incentives for capital-deepening investment.

4.2 Wage compression

The job turnover rate of an aggregate labor market may be measured as the sum total of employment creation by firms (or plants) which are expanding over a certain time span in a microeconomic data set, and employment destruction by firms (or plants) which are contracting over the same period. Perhaps surprisingly, available data on firm- or establishment level job turnover do not display the sharp differences one might expect in light of differences in job security provisions (see Table 5.3); Burgess (1994) similarly finds it difficult to detect a role for job security legislation in determining the pace and intensity of intersectoral labor reallocation.

Available data suffer from many comparability problems, of course. Most importantly, U.S. job turnover data may be downward biased by the fact that small firms are underrepresented in the Census Bureau's data; at the opposite end of the spectrum, a relatively large share of employment is accounted for by small firms in Italy, where larger firms appear to have more stable employment than in the United States.

[Table 5.3]

[Table 5.3]

[Figure 7]

The similarity of job turnover data across countries with very different institutions is remarkable, however, and equally remarkable is the ap-

parent association of stringent job security provisions and narrow cross-sectional wage differentials. As shown in Table 5.3 and Figure 7, wages are much more dispersed in the U.S. and the U.K. than in the other European countries, and increasingly so through much of the period considered in Figure 1. Of course, such international comparisons are influenced by different degrees of labor force heterogeneity. The microeconomic evidence offered by Blau and Kahn (1996) and by the papers in Freeman and Katz (1995), however, suggests that wage inequality patterns are similar when individual characteristics are controlled for, and that differences in wagesetting institutions played a key role in preventing the factors behind increasing U.S. wage inequality from affecting European wage distributions.

From a theoretical point of view, it is indeed far from surprising that relative wage variation should be heavily constrained in the same markets where job security provisions are most stringent. Quantitative firing restrictions, in fact, could hardly be binding if wages were completely unrestrained and employers could reduce them so as to make stable employment profitable, or to induce voluntary quits. Limiting the freedom offered to employers and workers in setting wages gives force to quantity constraints, and the combined policies may be rationalized by "equal pay for equal work" principles, or by the belief that freely contracting parties may not be sufficiently rational or informed as to correctly evaluate the ultimate consequences of arrangements that might appear optimal at a particular moment. They may also, however, reflect a desire by organized labor to enforce monopolistic wagesetting practices by preventing underbidding by the unemployed. While firing costs cannot be expected to reduce average employment at given wages, the combination of institutional wage compression and job security provisions is a powerful source of insider power, and their association in the data with high wages and low employment is far from surprising.

From this chapter's perspective, it is also interesting to review

briefly how wage differentiation may be related to dynamic labor demand and supply (rather than to their static counterparts). To see how labor demand fluctuations and institutional features may bear on wage differentiation, consider the implications of worker mobility costs. If mobility across firms is voluntary on the part of individual workers, it must be the case that wages paid by the firms whose employment expands are higher (or more likely to increase) than the wages paid by firms whose employment contracts. In the context of the two-state example introduced in Section 2 and given a cross-sectional interpretation in Section 4.1, firms with high labor demand should pay a wage w_G higher than that, denoted w_B, paid by firms whose labor demand is currently depressed. To characterize optimal mobility by risk-neutral workers who aim at maximizing the present discounted value of their wage income net of mobility costs, denoted W_G and W_B for workers employed by firms in the two states, consider that the maximand satisfies the recursion

$$W_G = w_G + \frac{1}{1+r}\left[(1-p)W_G + pW_B\right]. \tag{23}$$

for workers who are employed by firms with high labor demand, and have no reason to move if mobility is costly; for workers employed by firms in the worse state, the present discounted value of wages satisfies

$$W_B = w_B + \frac{1}{1+r}\left[pW_G + (1-p)W_B\right] \tag{24}$$

if they choose to stay, and

$$W_B = w_G - \kappa + \frac{1}{1+r}\left[(1-p)W_G + pW_B\right] \tag{25}$$

if they choose to move and the parameter κ denotes mobility costs—which will be taken as given in this chapter but, of course, are in general endogenous to the labor market's institutional structure and economic performance. Also for simplicity, the optimality (or no-arbitrage) conditions above treat wages as given from the individual worker's point of

view. More sophisticated and realistic models of labor mobility recognize that mobility costs generally entail bilateral bargaining situations, and address more complex issues of dynamic optimality (see the chapter by Malcomson in this Handbook). The simpler assumption of wage-taking behavior makes it possible to isolate the specific insights on which this chapters focuses narrowly, and may be rationalized from first principles if, as in Lucas and Prescott (1976), each of the model's "firms" corresponds to a sector with more than one competitive employer.

If mobility is voluntary and depressed firms have positive employment, then workers must be indifferent between moving and remaining employed by depressed firms, and (24) and (25) must simultaneously hold true. Solving the linear system formed by (23-25) yields

$$W_G - W_B = \kappa \tag{26}$$

(in equilibrium, the mobility cost κ equals the "capital gain" reflecting the expectation of higher labor income in the future), and

$$w_G - w_B = k - \frac{1-2p}{1+r}(W_G - W_B). \tag{27}$$

The wage differential between good and bad firms is then given by

$$w_G - w_B = \frac{2p+r}{1+r}\kappa \equiv w_D, \tag{28}$$

and is positive if and only if $\kappa > 0$.

This simple link between firm-level labor demand dynamics and wage variability may be relevant to the evidence illustrated by Figure 7. The model's cross-sectional wage dispersion is a reflection of time series volatility of individual workers' labor earnings. While aggregate wages are by an large unresponsive to labor demand fluctuations in all countries (as illustrated in Figure 3), relative wage dynamics at the level of workers and firms is remarkably different across countries. Not only the cross-sectional wage dispersion but also the innovation variance of

individual wage profiles has increased over the 1980s and 1990s in the U.S., both for workers who stay in the same job and for those who change jobs (Gottschalk and Moffitt, 1994). As argued by Bertola and Ichino (1995a), the centralized bargaining institutions of European countries discussed in Section 3.2 are peculiarly ill-suited to accommodate wage differentiation across workers who are ex-ante identical but happen to be holding different jobs.[17] In cross-country evidence, firm-specific factors in wage determination are relatively unimportant in European countries, and receive almost no weight in Nordic countries (some relevant evidence is collected by Layard, Nickell, and Jackman 1991, page 188 table 4.4). This is surprising from the standpoint of at least some insider-outsider models, but not from that of "local labor market" models that would rationalize wage differentials by labor mobility costs.

Further, Bertola and Rogerson (1997) suggest that wage compression may rationalize the extent of excess job creation and destruction in European countries, which is surprisingly high (and quite comparable to its American counterpart) in light of stringent job security provisions. If labor demand is approximated by the linear form $\pi(l, Z) = Z - \beta l$, so as to make explicit solutions available for the two employment levels, the amount of gross turnover implied by firms' optimal labor policies is given by a simple expression: if $H = 0$ and $F \geq 0$ represents unit firing costs, then

$$\mathcal{M} \equiv (L_G - L_B)p\frac{1}{2} + |L_B - L_G|\,p\frac{1}{2} = \frac{p}{\beta}\left[(Z_G - Z_B) - w_D - \frac{2p + r}{1 + r}F\right]. \tag{29}$$

A more compressed wage differential w_D—which need not satisfy (28) if mobility is involuntary—increases desired hiring and firing at the same

[17] Centralized bargaining may have allowed Sweden to avoid other European countries' high and rising unemployment levels, for the reasons suggested by Calmfors and Driffill (1988). Certainly, however, it led to extensive wage compression: between 1970 and 1982, the log variance of Swedish blue collar hourly wages fell from 0.036 to 0.015 (Hibbs and Locking, 1996).

time as a larger F reduces them.

When turnover data are measured on a worker (rather then firm) basis, they do differ widely across countries, in the expected direction: in Table 5.3, we see that unemployment inflow and outflow rates are much higher in the US than in European countries.

[Table 5.3]

The evidence on job duration (Table 4) is similarly unsurprising, and indicates that European countries feature a larger percentage of stable jobs than the U.S. These findings support a "dual" interpretation of labor markets phenomena (Saint-Paul, 1997a; Boeri, 1997): even in "rigid" labor markets where a core group of insiders jobs are very stable, many jobs are unstable and—like unemployment—instability falls disproportionately on small portion of the labor force.

[Table 4]

4.3 Aggregate turnover dynamics

Before reviewing recent work on such issues in Section 5 below, it will be useful to discuss briefly how the present theoretical perspective may be brought to bear on time-series job turnover evidence. The "job turnover" notion is most easily introduced with reference to a steady-state with idiosyncratic uncertainty and, as mentioned above, has implications for aggregate productivity in that theoretical situation. In reality, of course, aggregate and idiosyncratic uncertainty coexist in all time periods: employment creation and destruction at the level of individual firms offset each other to a large extent, but not completely, and aggregate employment is far from constant.

It is not difficult to see intuitively—but too complex to formalize in this Chapter—that the coexistence of idiosyncratic and aggregate shocks tends to smooth out the impact of the latter in aggregate time series, to an extent that depends on the responsiveness of employment to exoge-

nous events at the firm level. The simple models of the previous Section imply sudden switches from "high" to "low" employment levels (and no job turnover in excess of that required to achieve aggregate employment changes) if the Markovian labor demand shocks simultaneously hit all (representative) firms in the market. As soon as labor demand forcing processes are allowed to be less then perfectly correlated across firms, however, then aggregate dynamics experience less drastic cyclical developments.

A particularly convenient class of models lets the probability (rather than the size) of positive and negative shocks vary over the cycle: cyclical upswings are then characterized by positive shocks hitting an unusually large fraction of an unusually large stock of firms with low labor demand, while aggregate employment reductions symmetrically see negative shocks hitting many firms with unusually high employment levels. In such settings, relatively smooth aggregate dynamics are the result of exponential convergence of firm's cross-sectional frequencies towards the steady state distribution implied by the current realization of aggregate shocks (see Bertola and Caballero, 1990; Caballero and Engel, 1993; Caballero, Engel, and Haltiwanger, 1997, and other references therein; and Gouge and King, 1997).

Recent empirical and theoretical work has documented and interpreted interesting patterns of covariation between gross and net job creation: in the U.S. data studied by Davis and Haltiwanger (1992, and in this Handbook), excess job creation is countercyclical—i.e., aggregate employment reduction is accomplished by a combination of relatively weak job creation and relatively strong job destruction that is overall more intense, in gross terms, than the cyclically weak job destruction and strong job creation associated with aggregate employment growth. It might be tempting to rationalize such findings by exogenous fluctuations in the volatility of labor demand, as indexed by p in the simple two-state model introduced above. It is not difficult to see, however,

that asymmetric and time-varying probabilities for positive and negative labor demand shocks would not necessarily result in cyclical variations of job destruction and creation rates, because employers' labor demand policies adjust endogenously so as to offset exogenous parameter changes: in equation (21), a larger probability p of labor demand shocks would be associated with more intense turnover if $l_G - l_B$ could be kept constant; but in light of (8) given turnover costs imply shallower employment fluctuations when labor demand is more unstable. Similarly, if firing workers is costly and labor demand is more likely to fall than to increase, then firms should position themselves so as to reduce employment by fewer units if and when labor shedding is called for: see Caballero (1993) and Campbell and Fisher (1996) for elaborations and qualifications of this point.

It is more insightful and appealing to use asymmetries in the cyclical behavior of job creation and destruction as supporting evidence for labor market matching frictions, of the type reviewed by Mortensen and Pissarides in this Handbook, or other timing-related features of real-life labor reallocation processes. While the simple model above took all firm-level employment adjustment to be instantaneous, time-consuming search implies slow job creation and fast job destruction, and wages bargained under bilateral monopoly need not very so as to smooth out the pattern of cyclical employment dynamics. The size and (especially) the timing of hiring and firing operations is asymmetric in such settings. During cyclical downturns, many jobs are destroyed at the same time as (fewer) jobs are created, because depressed labor market conditions reduce the opportunity cost of reallocation and reorganization activities, in the models of Caballero and Hammour (1994). The cyclical behavior of gross employment flows may also be rationalized from the worker mobility cost perspective of Section 4.2. In the context of a model of competitive labor reallocation similar to the one sketched in Section 4.2, Gouge and King (1997) let labor demand fluctuations be driven by an

aggregate two-state Markov process as well as by a similar purely idiosyncratic shock. If, as in Lucas and Prescott (1976), mobility costs reflect time spent in unemployment, then the lower opportunity cost of mobility during recessions can rationalize the cyclical correlation of gross and net employment creation.

From the present survey's point of view, it is interesting to note that job turnover is not as countercyclical in European countries as in the U.S., and may be even mildly procyclical. Garibaldi (1997) rationalizes findings of acyclical labor turnover in European countries with a model where institutional arrangements reduce the speed of labor shedding. Boeri (1996) documents this and other empirical characteristics of job turnover data for eight OECD countries, and discusses how statistical artifacts could be responsible for them (the coverage of the U.S. employment survey, by excluding small firms, may overstate the amount of job destruction in downturns). Measurement problems make assessing the possible effects of institutional features on the degree of cyclicality in labor turnover even more difficult than in the simple cross-sectional perspective of Section 4.1.

5 On the determinants of institutions

The previous Sections argue, in the light of simple theoretical models, that institutional differences across otherwise similar labor markets are at least qualitatively consistent with various pieces of empirical evidence. Crucially, quantity and price rigidities are associated with each other across countries: in labor markets where employed workers are protected from dismissal by job security provisions and from outsiders' wage competition by binding equal-wage constraints, wages tend to be higher and employment lower (and more stable), while both unemployment and job instability appear to be concentrated in relatively narrow subsets of the labor force.

By taking institutional differences as given, the reasoning above begs the question of what might determine institutions in the first place. It may or may not be possible to answer such question by economic theory alone, but economic interactions of the type outlined above are certainly an important component of any meaningful answer. This final Section briefly reviews theoretical mechanisms relevant to the issue at hand.

5.1 The economics and politics of protection

The quantity and price rigidities entailed by legal regulation would make little or no sense if efficient contingent contracts could be enforced in perfect and complete intertemporal markets. In such circumstances, in fact, any inefficient regulation could and should be circumvented by private contracts, along the lines of Lazear (1990). Reality, however, clearly provides incomplete hedging opportunities against labor-income risk, and both market incompleteness and institutional constraints make it difficult for private parties to write and enforce contracts meant to work around price and quantity rigidities. For obvious reasons of moral hazard and adverse selection, it is difficult for individuals to shelter their consumption pattern from idiosyncratic wage and employment fluctuations by pooling the relevant in financial or insurance markets.[18] Labor market regulations rule out employment and wages adjustment even when negotiation would be profitable for individual workers and employers, and the involvement of third-party agencies in many instances (ranging from experience rating of U.S. unemployment contributions, to governmental approval of employment reduction plans in Germany) makes it difficult for individual employers and workers to write the side contracts that would replicate *laissez faire* outcomes.

[18] In the U.S., in fact, consumption inequality has increased roughly in parallel with labor-income inequality, and poor people, in particular, appear to reduce their consumption in response to decreased labor income (Cutler and Katz, 1992).

Regulations themselves are hardly enforceable in relatively informal spot markets, and it is not surprising that "black" labor markets should develop alongside heavily regulated primary sectors. But to the extent that labor market regulation draws its effectiveness from realistic contractual imperfections, and that governments and other *super partes* coalitions may be better equipped than atomistic market agents to stipulate and enforce optimal risk-sharing contracts, labor market institutions of the type considered in this Chapter might at least originally be meant to obviate *laissez-faire* imperfections: insurance contracts against the risk of unemployment may be impossible to enforce *ex post* unless the scheme is mandatory and run by a government agency, and similar considerations apply to the job security provisions and wage-compressing institutions considered here. Idiosyncratic labor demand risk and mobility costs make it desirable for workers to receive compensation when made redundant. While lump-sum payments to be paid in the event of job termination can emerge from laissez-faire contractual arrangements (see, e.g., Booth, 1996), they may not be *ex post* incentive compatible or enforceable in court unless they are part of a state-mandated scheme. And the compression of cross-sectional wage differentials resulting from centralized wagesetting institutions—which, as mentioned above, naturally complements job security provisions—can be rationalized by workers' risk aversion, i.e., by incompleteness of the asset markets where insurance against idiosyncratic events should in principle be available (Agell and Lommerud, 1992).[19]

Institutional price and quantity rigidities do generally purport to protect individuals against "unfair" adverse developments (at the cost of some productive efficiency). The extent and character of such pro-

[19] The role of risk aversion is similar in this context and in that of "implicit contract" models of wage and employment determination, surveyed by Parsons (1986). In contrast to that literature, however, rules and regulations pertaining to wage equalization and job security are quite explicit.

tection vary substantially across countries and over time, and may in actual fact reflect political-economic interactions between groups of self-interested individuals rather than unanimous *ex ante* agreement. As shown in Wright (1986), unemployment benefits can be supported in political-economic equilibrium even when complete markets exist: a policy package that transfers resources from the employed (or from the employers) to the unemployed is not only supported *ex ante* by risk-averse individuals who are generally exposed to unemployment risk, but also by individuals (such as those who are currently unemployed) who expect the policy to transfer resources towards them as of the time voting takes place.

Similar considerations may again be applied to other labor market policies. The models reviewed in Section 3.1 study how such labor market institutions as job security and unionized wage bargaining can influence wage and unemployment dynamics, and politico-economic models of labor market institutions apply similar reasoning to the question of what might in turn determine the character of an economy's labor market institutions themselves. Whenever labor market policies are chosen, median voters are likely to be employed. Like union members who enjoy the protection afforded by reverse-seniority layoffs and other forms of job security in models like Oswald's (1993), currently employed voters may aim at high wages and employment stability rather than at high employment and productive efficiency. In the models proposed and solved by Saint-Paul (1993,1996), majorities of employed insiders manipulate labor market regulations disregarding the weaker unemployed outsiders' welfare, and labor market regulation is essentially aimed at reducing competitive pressure on the currently employed workers' wages and jobs. High unemployment may often not reflect "outsider" status in the strictest sense of the world: the unemployed are a typically poorly organized minority in the models proposed by Saint-Paul (1993,1996), but they do often support subsidies to their own income rather than the dismantling of those

rigidities that make it impossible for them to succesfully bid for the insiders' jobs. An important clue to why such behavior may be rational is offered by labor force participation rates, which are more clearly related to labor market institutions than unemployment rates.

[Table 5.3]

As shown in Table 5.3, in fact, prime-age male employment rates are very high in all of the five countries considered. Labor markets where prime-age male labor income is strongly protected feature a markedly "dual" structure, with higher youth unemployment and lower female employment than more flexible ones. While these empirical features may reflect exogenous social attitudes and family structures, the observed cross-country variation is arguably consistent with labor market institutions meant to protect primary wage earners from labor market risk and—to the extent that gainers and loser from rigid institutions are members of the same family—with their political stability over time.

5.2 Causes and consequences

While the "protective" character of labor market institutions and regulations is similar in all industrialized countries, the stringency of job security and wage equalization policies is remarkably different across otherwise similar industrialized economies. Within the politico-economic framework outlined above, one might try and rationalize such institutional heterogeneity by depicting European workers as intrinsically more risk-averse than their American counterparts and/or more politically powerful. Vague (and themselves unexplained) exogenous differences can hardly offer a satisfactory explanation, however; Bertola (1997) suggests that financial market imperfections could be brought to bear on the effective degree of risk aversion in labor market behavior.

A useful perspective on the relevant issues is offered by recent contributions emphasizing interactions between various labor market insti-

tutions and their effects. The terms of the efficiency/security tradeoff, in fact, generally depend on the institutional *status quo*: if job security provisions reduce hiring rates, for example, it is all the more desirable for currently employed workers to seek protection from dismissal. In models such as those proposed and solved by Hogan and Ragan (1995a,b), job security—whether due to legislation or to partial-equilibrium contracts between workers and firms—is more attractive when rehiring probabilities are low, but also induces firms to refrain from hiring and firing (e.g., by adjusting hours per employee rather than employment levels), again establishing a positive feedback between the effects and desirability of labor market rigidity. Such positive feedbacks from institutions to their desirability are appealing, because they can rationalize widely heterogeneous institutions and labor market outcomes in light of small exogenous differences in the history and political environment of industrial countries—and, if reinforcing effects are so strong as to generate multiple equilibria, even in the absence of any such difference: Saint-Paul (1995b) and Blanchard and Summers (1988) suggest that, since a low quit rate makes firing costs a more important determinant of hiring behavior and restrained hiring makes workers more reluctant to quit, both high- and low-turnover equilibria may exist for given technological and institutional parameters.

To the extent that different labor market policies and their effects interact with each other in an important way, small differences in initial conditions can lead to substantial divergence in outcomes, and the varied institutional landscape of industrial countries may be rationalized without recourse to important exogenous differences. Treating both institutions and outcomes as endogenous variables, however, makes it quite difficult to pinpoint and test the theory's causal implications. Empirically, the interaction of institutions' economic effects with their own political desirability makes it difficult to ascertain the direction of causality (see Saint Paul, 1996). In cross-country comparisons, unemployment

duration outcomes are most strongly associated to labor market institutions and outcomes: countries with high job security and generous unemployment benefits feature a large proportion of long-term unemployed, and relatively small flows into and out of unemployment. Models which take labor-market rigidity as given explain market outcomes as the endogenous result of optimizing choices by workers (who will not search as hard when benefits are high) and employers (who will not hire and fire as much when firing costs are high). The association of small unemployment flows with institutional rigidities, however, can also be read as support for a politico-economic interpretation: when the majority currently employed workers face little risk of becoming unemployed, there will be little support for policies aimed at improving the job-finding prospects of the unemployed.

5.3 Transitions and reforms

Though most of the Chapter's theoretical arguments and cross-country empirical comparisons, labor market institutions were not only conceptually taken as given, but also treated as invariant over time. While making it easy to highlight the implications of different institutions in otherwise similar dynamic environments, this perspective neglects important time-series institutional developments: since the relative rigidity of European labor markets largely emerged in the late 1960s and early 1970s, many dynamic features of cross-country labor market outcomes may be better interpreted in terms of out-of-steady-state transitions—as in Saint-Paul (1997b), Blanchard (1997), and Caballero and Hammour (1998)—rather than from the long-run, steady state perspective of the simple models outlined in Section 2. In more recent times, the British labor market has undergone a flexibility-oriented institutional transition. The conservative governments of the 1980s tried and largely succeeded to eradicate unions and labor market rigidities and—not surprisingly, from the comparative

institutional perspective of the present Chapter—the British labor market's performance is now similar to its American counterpart in many respects (but not all, see Blanchflower and Freeman, 1993).

Such evidence of institutional variability along the time-series dimension calls for economic and political studies of reform processes, rather than of institutions at each point in time. As shown in Coe and Snower (1997), various labor market policies strengthen each other's effects on the labor market's productive efficiency, to imply that comprehensive reforms should be preferred to marginal adjustments. In a dynamic environment where expectations have an important role, the timing and credibility of reforms is also important. Saint-Paul (1997a) notes that the employment benefits of a permanent transition to two-tier labor market are front loaded: as employers take advantage of new. more flexible hiring opportunities at the same time as they still hoard protected employees, employment increases during the transition to the new steady state. Symmetrically, Bertola and Ichino (1995) discuss how uncertain prospects of durable reform may undermine positive labor market developments: those among the employers that find it optimal to reduce employment will do that when job security provisions are relaxed, but aggregate employment may decline if other employers refrain from hiring for fear of future reinstatement of firing costs.

This final Section has only too briefly sketched how labor market regulation may be modeled as the endogenous result of political and economic interactions, and the analysis of reform processes is a promising direction for further research. Like earlier modeling efforts focused on the effects of exogenously given institutions, normative and positive analyses of endogenous institution formation and evolution will likely be motivated and inspired by empirical observations. In fact, many of the simple cross-country stylized facts cited in the Chapter as motivating and corroborating evidence for theoretical work and insights are becoming less useful pegs for further theoretical work, as recent wage and employment

dynamics in many European countries are more similar to their U.S. counterparts than to their own behavior in previous periods. The theoretical insights outlined in the Chapter may prove valuable as European countries undertake reforms of their poorly performing labor markets.

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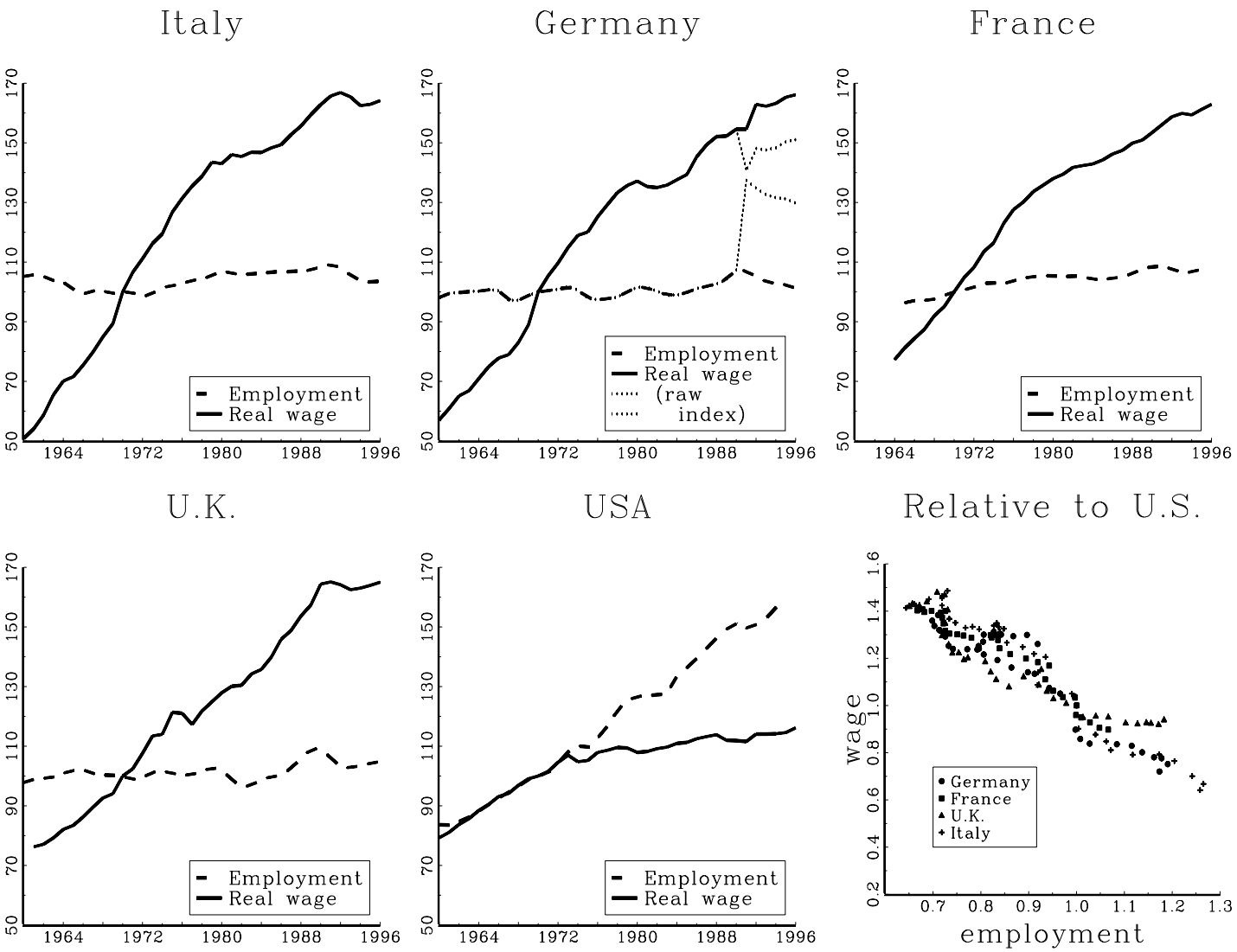

Figure 1: Total employment and real total compensation per employee. 1970=100 in the country-specific panels; German raw data are plotted as a dotted line, and spliced at the time of reunification for comparability. In the last panel, European wage and employment data are normalized by the U.S. observation in the same year. Source: OECD Economic Outlook database.

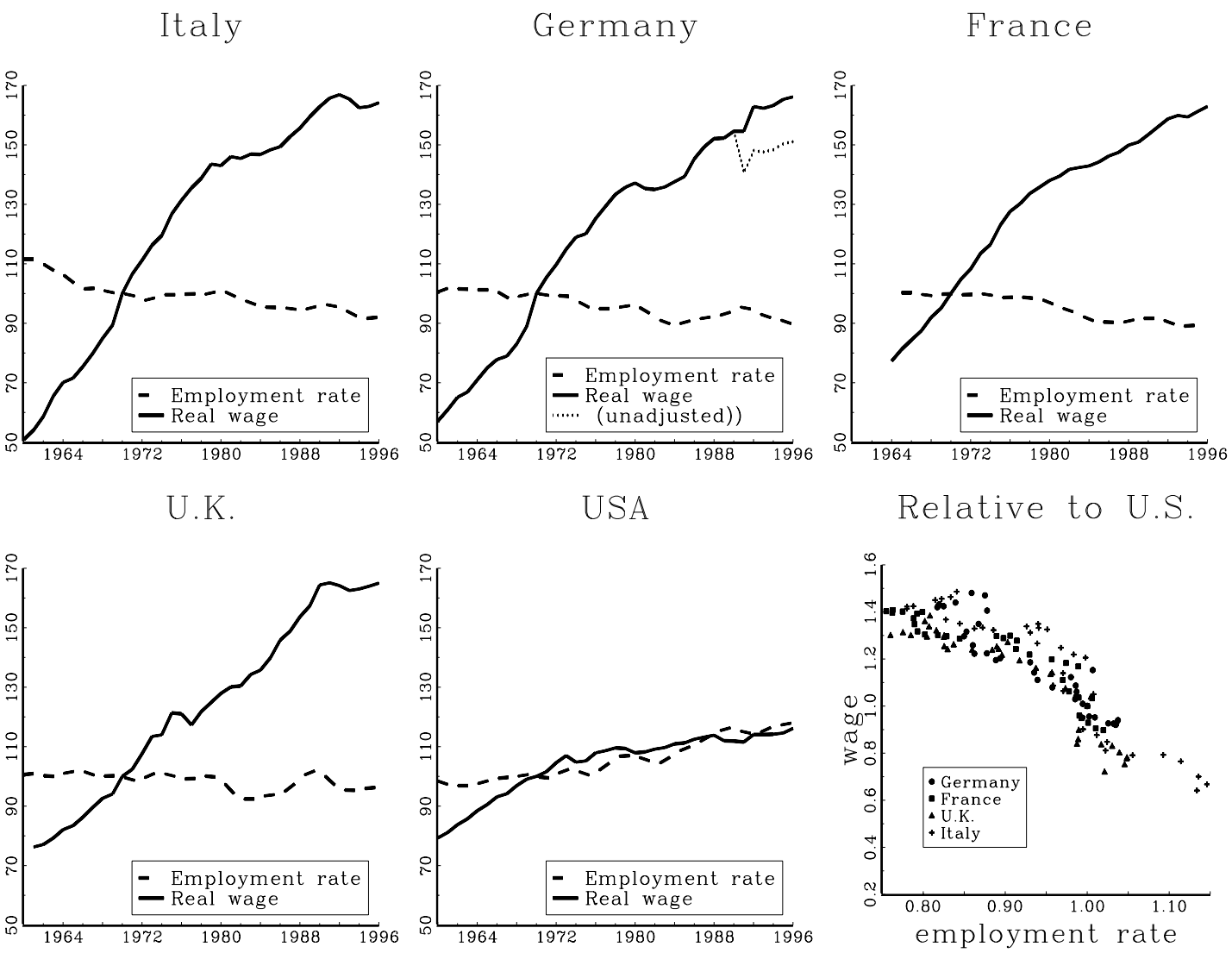

Figure 2: Total employment as a fraction of population 15-64; real total compensation per employee, in the major industrial countries. 1970=100 in the country-specific panels. In the last panel, European wage and employment data are normalized by the U.S. observation in the same year. Source: OECD Economic Outlook database.

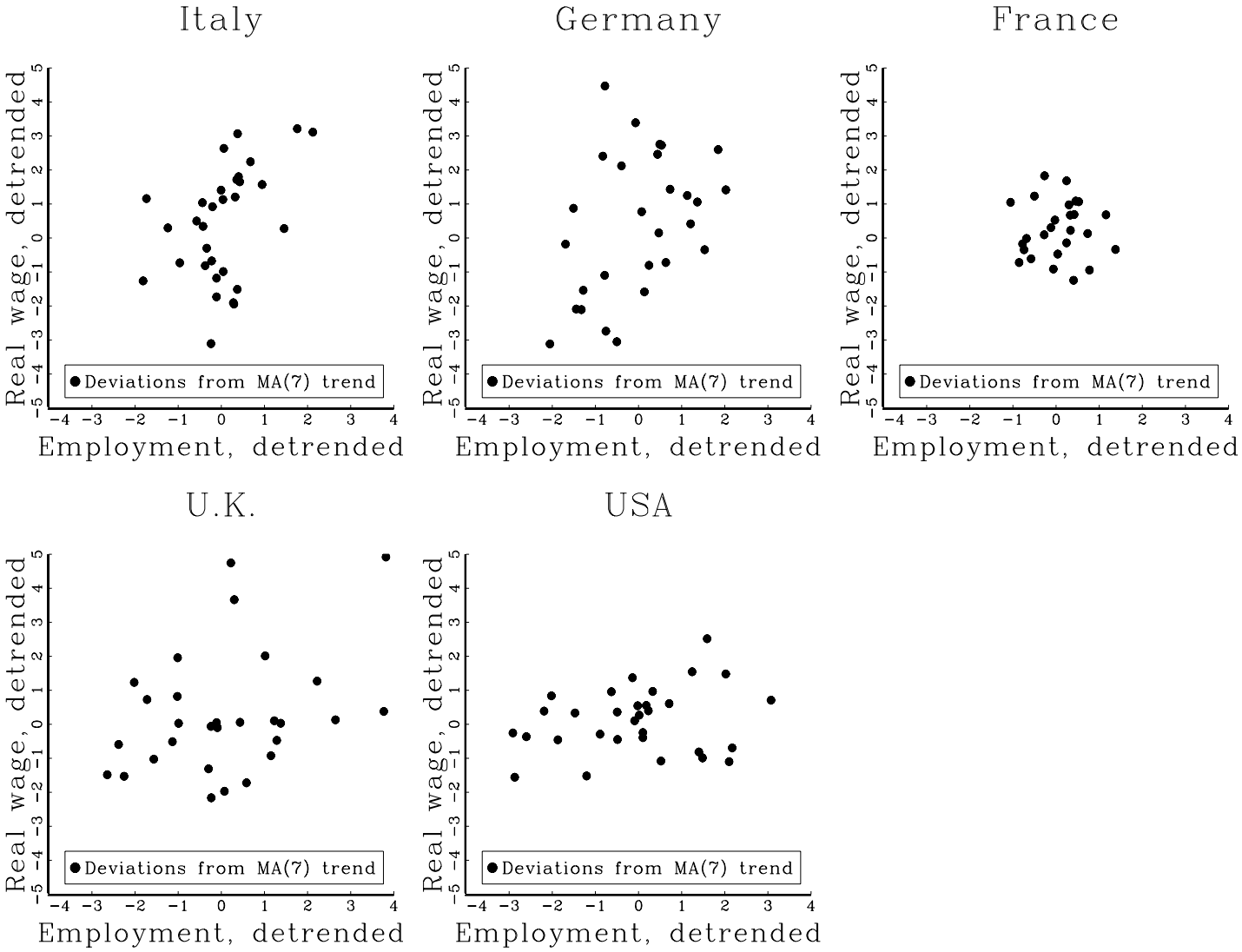

Figure 3: Total employment and real total compensation per employee, 1970=100, deviations from country-specific moving averages; German data are spliced at the time of reunification for comparability. Source: OECD Economic Outlook database.

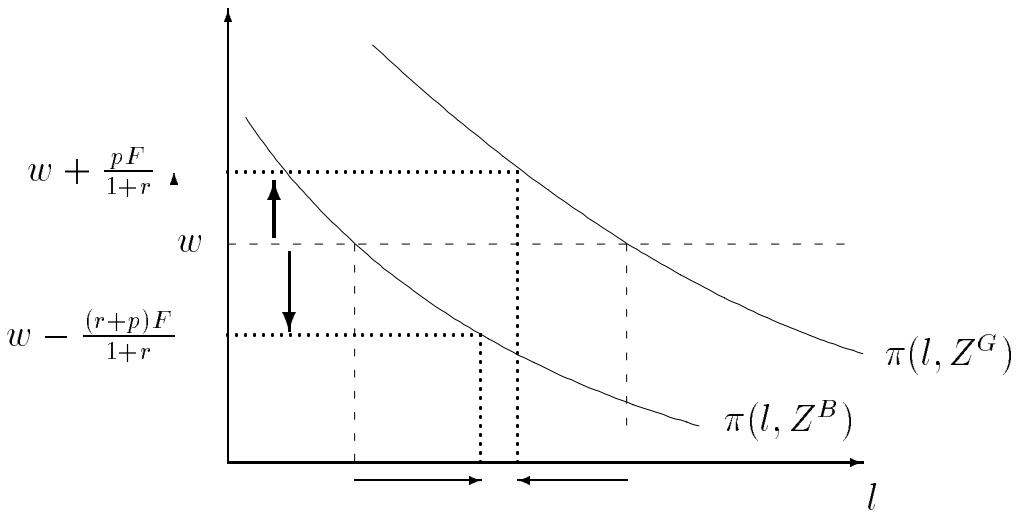

Figure 4: The effects of turnover costs

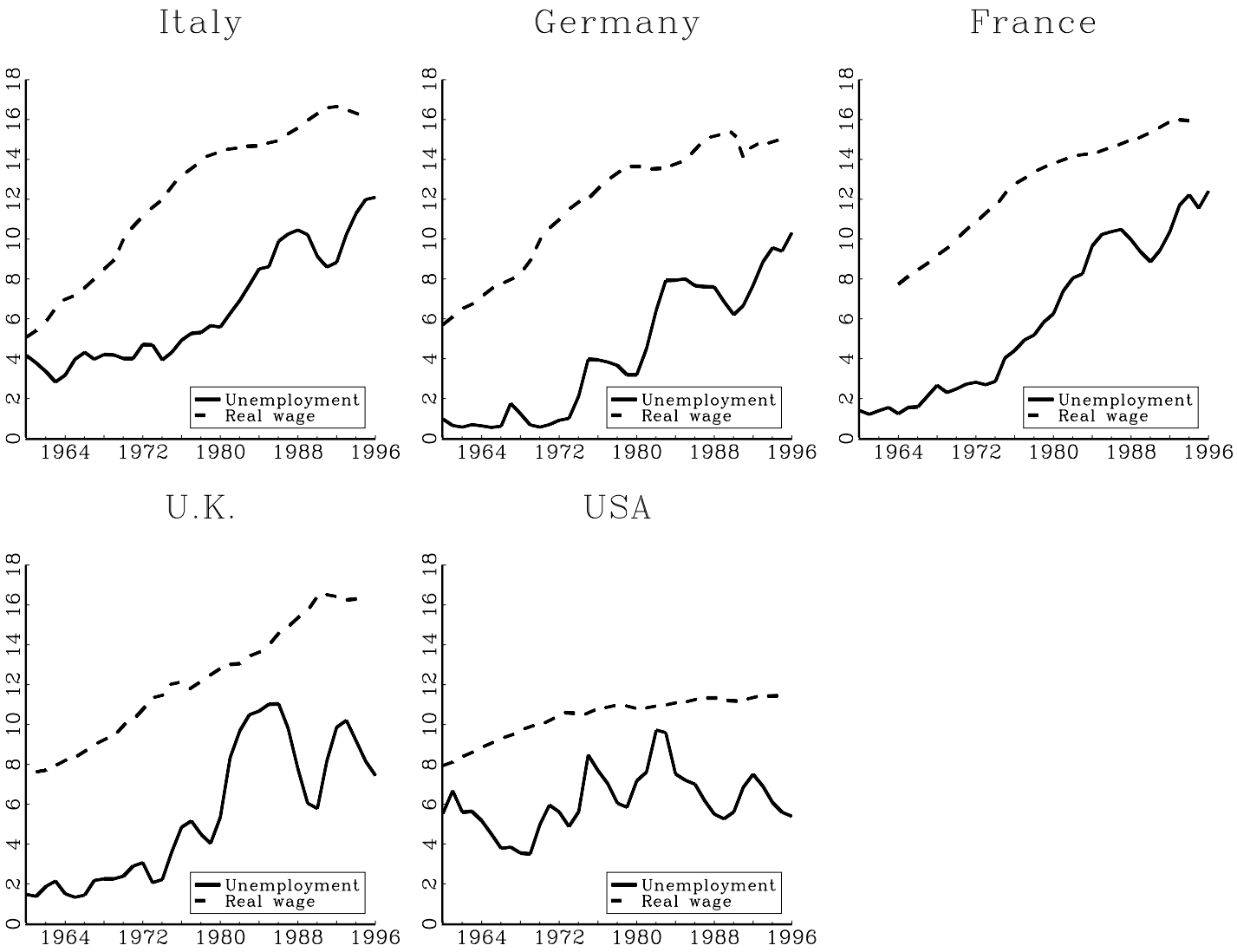

Figure 5: Unemployment rate (percentage points) and real total compensation per employee (1970=10). Source: OECD Economic Outlook database.

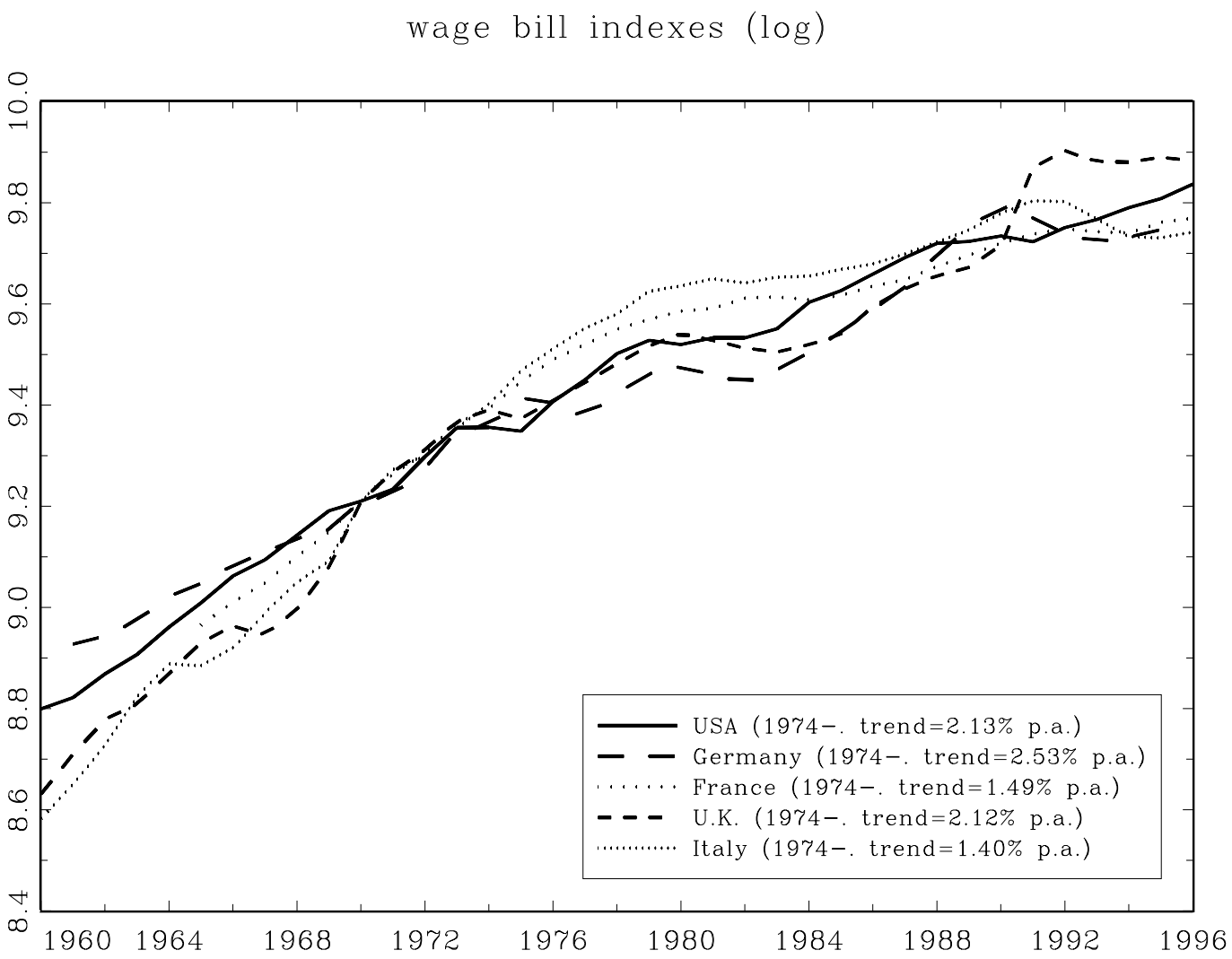

Figure 6: Log of real total compensation per employee times total employment, 1970=100 indexes. Source: OECD Economic Outlook database.

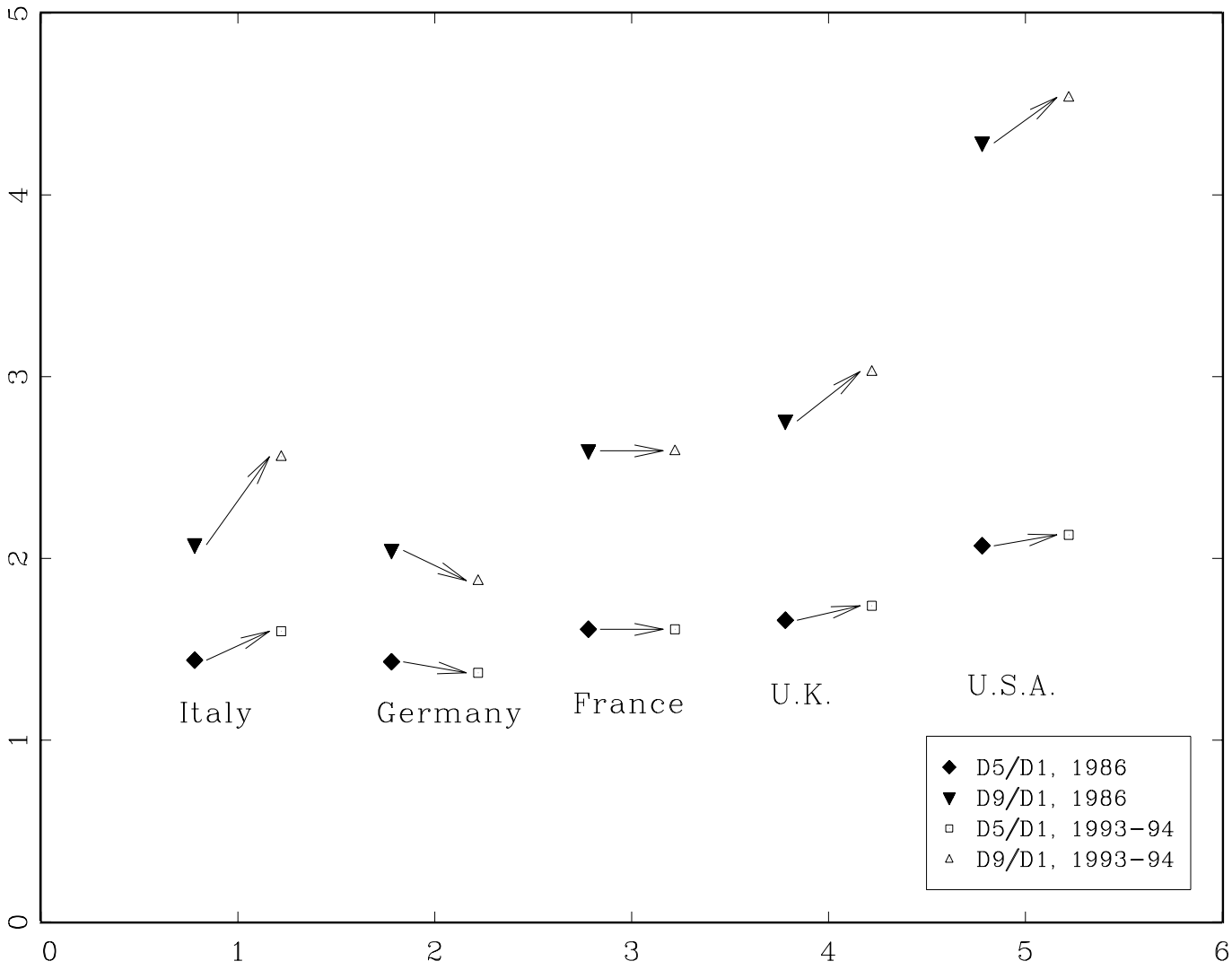

Figure 7: Male earnings inequality. Country data are displayed (from left to right) in order of increasing labor market flexibility. See the Table for definitions and source.

	Tot	Cont	Entry/Exit
Italy (1984-92)	23.4	15.7	7.7
Germany (1983-90)	16.5	12.1	4.4
France (1984-92)	27.1	12.9	14.2
United Kingdom (1985-91)	15.3	8.7	6.6
United States (1984-91)	23.4	18.9	5.7

Table 1: Job turnover: percentages of employment, annual averages; the second and third column refer to continuing establishments and to entering/exiting establishments, respectively. Establishments are legal entities (firms) for Canada, Italy, and the United Kingdom, organizational units (plants) in the other countries. Source: OECD Employment Outlook (1994).

1986	D5/D1	D9/D5	1994 (or...)	D5/D1	D9/D5
Italy	1.44	1.53	Italy (1993)	1.60	1.65
Germany	1.43	1.66	Germany(1993)	1.37	1.64
France	1.61	2.10	France	1.61	2.13
U.K.	1.66	1.73	U.K.	1.74	1.86
U.S.	2.07	1.87	U.S.	2.13	2.01

Table 2: Summary indicators of male earnings inequality (decile ratios). The columns report the ratio of the upper limit of the 5th decile to the upper limit of the 1st decile, and of upper limit of the 9th decile to the upper limit of the 1st decile. Larger figures indicate more inequality. Source: OECD (Employment Outlook 1996, table 3.1).

	Unemployment inflows (a) 1988	Unemployment outflows (a) 1988	Long-term unemployment (b) 1983	1993
Italy	0.18	2.3	57.7	58.2
Germany	0.26	6.3	39.3	33.5
France	0.33	5.7	42.4	34.2
United Kingdom	0.68	9.5	47.0	35.4
United States	1.98	45.7	13.3	11.7

Table 3: Unemployment flows, a: average monthly flows as a percentage of source population; b: percentage of total unemployment. Source: OECD Employment Outlook (1990, 1994).

	Tenure on current job		
	$<$ one year, % of jobs	$>$ ten years, % of jobs	average, all jobs
Italy	8.5	45.6	11.6
Germany	16.1	35.4	9.7
France	15.0	42.0	10.7
United Kingdom	19.6	26.7	7.8
United States	28.8		6.7

Table 4: Completed duration of jobs in existence, 1995. Source: Eurostat

	total	Males aged 25-54
Italy	52.6	84.2
Germany	63.1	88.2
France	57.6	87.3
United Kingdom	67.5	84.8
United States	71.7	87.3

Table 5: Employment rates, 1990-96 average; source: OECD Employment Outlook database.