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INSTITUTIONS AND LABOR REALLOCATION (*)

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Abstract

Despite stringent dismissal restrictions in most European countries, rates of job creation and destruction are remarkably similar in European and North American labor markets. This paper shows that relative-wage compression is conducive to higher employer-initiated job turnover, and argues that wage-setting institutions and job-security provisions differ across countries in ways that are both consistent with rough uniformity of job turnover statistics and readily explained by intuitive theoretical considerations. When viewed as a component of the mix of institutional differences in Europe and North America, European dismissal restrictions are essential to a proper interpretation of both similar patterns in job turnover and marked differences in unemployment flows.

Contents

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1 Introduction[1]

Much has been written about institutional differences between European and North American labor markets. Given the large and persistent differences between European and U.S. unemployment rates over the last fifteen-twenty years, these differences have prompted much discussion about their effects on the operation of labor markets. A conclusion common to many policy studies of European unemployment is that there is a need for increased "flexibility" in European labor markets. One dimension along which these labor markets differ is with regard to regulations regarding worker dismissal. Lazear (1990), for example, documents differences in regulations regarding advance notice and severance, and finds that such regulations are positively related to unemployment levels in panel estimation. Formal modeling of the effects of worker protection on employment, however, has not been so conclusive. It is easy to show that such restrictions affect hiring and firing in such a way as to induce opposing effects on total employment, and in fact the calibrated models of Bentolila and Bertola (1991) and Hopenhayn and Rogerson (1993) have opposite predictions as to the net employment effects of firing costs. Theory, however, offers unambiguous predictions as to the impact of such policies on labor market flows: both job creation and job destruction should be decreased by firing restrictions.

While aggregate cross-country evidence gives some support to such theoretical predictions,[2] available evidence on disaggregated job and worker flows is somewhat at odds with them. The intensity of labor reallocation is only very loosely related to various economies' institutional and other characteristics and remarkably uniform across labor markets with very different job-security institutions (Garibaldi *et al.*, 1994; Alogoskoufis *et al.*, 1995). In light of the unambiguous predictions of theory, such findings may cast doubt on the quality of available data, or on the specification of theoretical models, or on the real-life relevance of job-security provisions. As shown by Lazear (1990), in a complete-market setting it would be possible to design a contract which effectively "undoes" legal restrictions mandating payments to workers upon dismissal. Besides such severance payments, job-security regulations

[1] We thank seminar participants at Bank of Italy and ECARE, Tito Boeri, and Giovanni Pavanelli for helpful comments on earlier drafts. Giuseppe Bertola acknowledges financial support from *Consiglio Nazionale delle Ricerche*.

[2] Bertola (1990) finds that an index of job-security provisions is empirically associated to less pronounced employment fluctuations and to more pronounced cyclical productivity changes, which he interprets as resulting from labor-hoarding behavior by employers. Job security provisions have no strong empirical association to long-run unemployment levels across countries, to indicate that Lazear's (1990) findings along time-series dimensions may reflect reverse causation.

often impose administrative costs on employers, and experience-rated payments to third-party agencies also induce deadweight losses from the perspective of a firm's relationship with its employees; still, the observed similarity of employment flows might be taken to indicate that Europe is not as rigid in practice as the letter of its institutions would make it, perhaps because firms and workers successfully work around laws and regulations.

This paper argues that even if one's reading of the evidence is that turnover rates on either side of the Atlantic are roughly similar, it does not follow that worker dismissal regulations in Europe are irrelevant. The logic of our argument is very simple: all else being equal, dismissal restrictions should indeed lead to lower gross job turnover, but this need not be evident in the data if other institutional differences have the opposing effect. In actual fact, labor-market institutions differ across the Atlantic in important respects other than dismissal restrictions, and it is misleading to focus on a unidimensional characterization of institutional differences across European and North American labor markets.

Of particular importance is the fact that European wage negotiations are much more centralized and, inspired by the "equal pay for equal work" principles, naturally lead to greater uniformity of wages across employment establishments. We show that such wage compression would, by itself, tend to *increase* the intensity of firm-initiated labor turnover. The intuition for this is straightforward: if an individual firm's relative wage cannot depend on its relative business conditions, then its wage cannot decrease upon realization of a negative labor-demand shock, nor increase upon realization of a positive shock. In the absence of restrictions on layoffs, such idiosyncratic wage rigidity would imply more intense labor shedding (and more intense hiring) than in an otherwise similar economy where relative wage differentials and wage fluctuations are relatively unregulated. When institutions affecting employment and wages are jointly considered, therefore, the apparent similarity of job turnover rates across labor markets need not have any implications for whether dismissal restrictions alone do affect labor market allocations. Furthermore, we argue that cross-country differences in unemployment flows support the notion that firing restrictions do affect allocations. Whereas job turnover rates are similar across economies, the rate at which workers enter and leave unemployment is significantly greater in the U.S. as compared to Europe, and this is arguably consistent with more stringent advance-notice laws in Europe.

The outline of the paper follows. Section 2 briefly reviews available evidence on the intensity of labor reallocation in various countries. Section 3 sets up a model of idiosyncratic labor demand variability, formalizing in a simple setting the intuition for why the well-known international differences in the stringency of job security provisions should have important effects on job turnover. Section 4 briefly discusses evidence on wage differentials in the U.S. and Europe, and Section 5 extends the model to allow for costly labor mobility and thereby generate wage dispersion across establishments in the absence of regulation. Within this setting we examine how both firing costs and wage compression affect labor turnover, and derive our main result concerning the opposing effects of these two features on turnover. Section 6 argues that wage compression and dismissal restrictions may be thought of as complementary policies, and discusses the apparent effects of these policies for phenomena other than job creation and job destruction. Section 7 concludes.

2 Cross-national evidence on turnover intensity

Following the work of Davis and Haltiwanger (1992, 1993) on job turnover in U.S. manufacturing, evidence from establishment employment records has become available for other sectors and for many additional countries. Cross-country comparisons of such evidence should provide valuable insights into the effects of important institutional differences across labor markets. In particular, given stringent regulation of hiring and firing in Europe, one would expect to find a relatively "sclerotic" picture of those countries' labor markets in the data.[3] From this perspective, the actual data on idiosyncratic employment variability turns out to be rather surprising.

We choose to focus on the largest industrial countries (but we exclude Japan, in consideration of its peculiar industrial organization and labor-market institutions) and on a period, the mid to late 1980s, for which the relevant data are readily available. As in Bertola (1990), the countries considered are ranked by job-security and general labor-market regulation in the Tables and Figures below. Grubb and Wells (1993, Table 9, "Protection of regular workers against dismissals") provide a suitable summary ranking for European countries, based on a careful evaluation of a variety of specific legal provisions. Consistently with common perceptions, the Italian and British labor markets are the most and least stringently regulated in this group; Germany and France are assigned intermediate ranks, the former appearing more regulated than the latter. In our analysis of the data, we proceed under the assumption that American labor markets are less regulated than European ones, and classify the Canadian labor market as no less regulated than the essentially fully flexible U.S. limit case.

[3]We do not attempt to review here the many legislative and contractual provisions that makes it difficult for European employers to dismiss redundant workers: see, among others, Lazear (1990), Bentolila and Bertola (1990), Bertola (1990).

Table 1: Job turnover

	JC	JD	ΔE	JT	ET
Italy (1984-92)	12.3	11.1	1.3	23.4	22.1
Germany (1983-90)	9.0	7.5	1.5	16.5	15.0
France (1984-92)	13.9	13.2	0.6	27.1	26.5
United Kingdom (1985-91)	8.7	6.6	2.1	15.3	13.2
Canada (1983-91)	14.5	11.9	2.6	26.4	23.8
United States (1984-91)	13.0	10.4	2.6	23.4	20.8

Source: OECD Employment Outlook (1994); estimate for U.S. total private employment from Garibaldi *et al.* (1994), based on manufacturing-only data from Davis and Haltiwanger (1992). Note: percentages of total employment; annual averages; "establishments" are legal entities (firms) for Canada, Italy, and the United Kingdom, organizational units (plants) in the other countries. JC is job creations, JD is job destruction, ΔE is net employment change, JT is gross job turnover, and ET is excess job turnover.

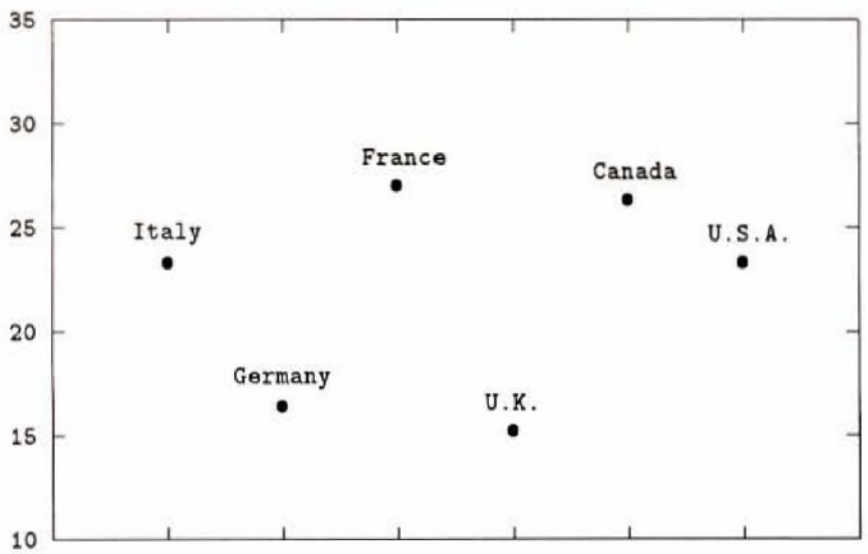

Figure 1: Gross job turnover

Table 1 reports some summary statistics for these countries. Both job creation (JC) by expanding and new establishments and job destruction (JD) by contracting and exiting ones are generally much larger than net employment changes (ΔE), reflecting idiosyncratic labor demand variability.[4] Over the period considered, which was one of cyclical upswing in all these countries, the more "flexible" labor markets of the U.K., U.S., and Canada do display more intense net job creation (ΔE).[5] Conversely, the data reveals no obvious cross-country differences in either gross job turnover (JT), obtained by summing absolute employment changes over sampled establishments and normalizing by employment stocks, or excess job turnover (ET), which measures the extent to which gross job turnover exceeds what is necessary to generate the observed aggregate employment change (i.e., ET=JT-$|\Delta E|$). In Figure 1, gross job turnover statistics hover around 20% per year in all countries considered, without revealing any pattern when plotted against labor-market regulation ranks.

The evidence of Table 2 and Figure 2, based on data from surveys of individual workers (rather than employers), is similarly difficult to interpret: across countries with very different labor market institutions, approximately one out of every four filled jobs experiences a separation and/or an accession every year, and no clear pattern is revealed when gross turnover data are plotted against rigidity rankings.

To some extent, the similarity of these statistics may simply reflect their uniform noisiness. Well-known conceptual and practical problems are encountered when attempting to gauge labor turnover from establishment data: very different jobs presumably coexist within each sampled production unit, and data are available for different definitions of "plants" and "firms" across countries; as discussed in e.g. Boeri (1996), interpretation of these data is further hampered by important and often insufficiently documented differences across countries in measurement frequency and sample composition (especially with respect to the age and size of establishments). Firm-initiated turnover need not be estimated any more precisely by worker-based surveys than by employer-based ones: the latter miss all separations which lead to replacement within the sampling interval, but the former includes immediately replaced quits and retirements (and, indeed, yield larger point estimates).

[4] Data including plant closures and openings are more likely to be measured with error than data on employment contraction or expansion by existing plants only, since administrative sources may mistakenly register a simultaneous entry and exit when a plant changes ownership or classification. As in the model of Hopenhayn and Rogerson (1993), however, entry and exit of plants are important components of overall job turnover in reality.

[5] The U.K. figure is lower than those for other European countries: after the Thatcher reforms, in fact, this country's regulations concerning worker dismissals are generally viewed as being among the least restrictive.

Table 2: Worker turnover

	Employment inflow [h/E]	Employment outflow [s/E]	Gross turnover [(h+s)/E]
Italy (1985-91)	33.00	34.00	67.00
Germany (1987)	22.33	21.47	43.80
France (1987)	28.86	30.69	59.55
U.K. (1987)	6.55	6.61	13.16
Canada (1974-82)	41.50	40.70	82.20
U.S. (1987)	25.27	26.53	51.80

Source: Burda and Wyplosz (1994) for France, Germany, U.K., and U.S.; Baldwin *et al.* (1987) for Canada; Contini *et al.* (1995) for Italy.
Note: Employment flows expressed as percentage of the stock of employment.

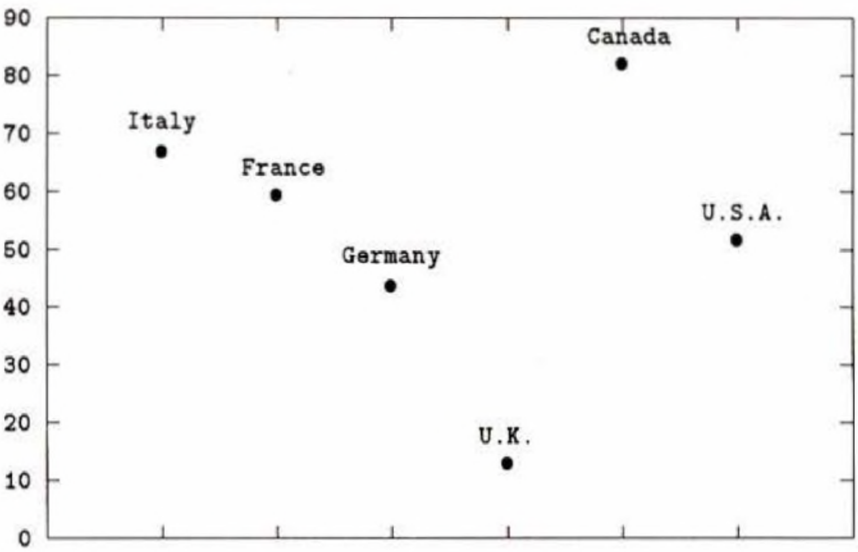

Figure 2: Gross worker turnover

Such considerations, however, can hardly lead us to dismiss altogether the striking similarity in the intensity of job turnover across countries with very different labor-market institutions. Perhaps most remarkably, the Italian excess job turnover estimate (22.1%) is not only very large in absolute terms (one of every five jobs is either created or destroyed every year after accounting for aggregate changes), but even larger than the U.S. estimate (20.8%) despite heavy regulation of dismissals in the Italian labor market.[6] Our theoretical analysis below aims at reconciling the standard view, that dismissal regulations should lead to lower turnover, with the apparent stylized fact of rough similarity in job turnover rates across industrial countries.

3 Standard View of Firing Costs

In this section we lay out a simple equilibrium model of job turnover and analyze the effects of firing costs on equilibrium turnover. Given our goal of illustrating the interaction of some very basic forces relevant to job turnover, we choose to carry out the analysis in an environment which is as simple as possible.

We begin with a discussion of the labor demand problem of a representative firm, or, equivalently from our perspective, a representative plant. We assume that there are a large number (in fact of continuum) of firms. Each firm has an identical production function which uses labor to produce a homogeneous good, but is subject to shocks to its marginal product of labor. The process for these shocks is the same for all firms, but purely idiosyncratic: its realizations, denoted by α_t^i for firm i in period t, are independent across firms. The marginal product of labor at firm i and time t is denoted $\pi(l_t^i, \alpha_t^i)$, and is a decreasing function of (homogeneous) employment l_t^i. We let dismissal regulations take a very simple form: in each period a firm must pay a firing cost F per unit of employment decrease relative to the previous period, i.e., the firm incurs a cost equal to $\max(0, l_{t-1}^i - l_t^i)F$. We shall work under the assumption that F does not have a direct counterpart in direct payments to workers, although what matters is simply that this cost is not internalized by the employer-employee relationship. For simplicity we abstract from any costs associated with hiring or firing that do not reflect institutional differences across labor markets. We assume that each firm maximizes the expected present discounted value of profits net of firing costs, using an interest rate of r. Our analysis will focus on a steady-state equilibrium in which aggregates,

[6] Different data cuts do reveal sensible differences: large firms are fewer, and their employment is more stable, in Italy than in the United States. See, e.g., Contini and Revelli (1993), Gavosto and Sestito (1993).

in particular the wage rate and interest rate, are constant over time.

Suppose for concreteness that the profit-maximizing employment level at given wages is an increasing function of α, and let α follow a two-state Markov chain with symmetric transition probability p:

$$\alpha_{t+1}^i = \begin{cases} \alpha^G & \text{with prob. } p \text{ if } \alpha_t^i = \alpha^B, \text{ with prob. } (1-p) \text{ if } \alpha_t^i = \alpha^G \\ \alpha^B & \text{with prob. } (1-p) \text{ if } \alpha_t^i = \alpha^B, \text{ with prob. } p \text{ if } \alpha_t^i = \alpha^G. \end{cases} \tag{1}$$

Let the employment levels corresponding to $\alpha = \alpha^G$ and $\alpha = \alpha^B$ be l^G and l^B, respectively. We shall proceed under the assumption that parameters are such as to yield positive employment in both states and to generate labor turnover, or that $l^G > l^B > 0$.

If the wage and the interest rate are fixed at $\bar{w}$ and r then, by (1), 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 (bad) firm, by definition, satisfy the relationships

$$\begin{aligned} V^G &= \pi(l^G, \alpha^G) - \bar{w} + \frac{1}{1+r}\left[(1-p)V^G + pV^B\right] \\ V^B &= \pi(l^B, \alpha^B) - \bar{w} + \frac{1}{1+r}\left[pV^G + (1-p)V^B\right]. \end{aligned} \tag{2}$$

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, profit maximization implies that the shadow loss of net revenues from dismissing workers equals the actual cost of firing them ($V^B = -F$), and that $V^G = 0$. The equations in (2) can be solved to yield

$$\begin{aligned} \pi(l^G, \alpha^G) &= \bar{w} + \frac{p}{1+r}F, \\ \pi(l^B, \alpha^B) &= \bar{w} - \frac{r+p}{1+r}F. \end{aligned} \tag{3}$$

The above discussion focused on the decisions made by a particular firm which does reduce employment upon receiving a negative shock (but does not set it to zero), and increases it back upon the opposite transition. We next turn to characterizing the properties of some of the aggregates. In the steady-state of this economy, $\alpha_t^i = \alpha^G$ for 50% of the firms, and $\alpha_t^i = \alpha^B$ for the others. These frequencies correspond to the ergodic probability distributions of the symmetric Markov chain (1) and, since firms form a continuum, remain stable over time. In every period, a proportion p of the firms experience a change in productivity: at the same time as $p/2$ firms suffer a transition from high to low productivity, $p/2$ other firms enjoy the opposite transition, and $p(l^G - l^B)/2$ units of labor are relocated from formerly good to newly good firms. Accordingly, the sum of accessions and separations divided by total employment (N), denoted $\mathcal{M}$, is given by

$$\mathcal{M} \equiv \frac{p(l^G - l^B)}{N}, \tag{4}$$

and corresponds to the gross job turnover statistics in Tables 1 and 2. Since in the steady-state there is no change in total employment, this measure is also equal to excess job turnover.

Until now we have made no mention of the labor supply side of the market. In a steady state, aggregate labor supply will be some function of the wage rate and the amount of transfers, if any (e.g. profits), received by workers; and the wage $\bar{w}$ may or may not be set to a level consistent with full employment. Our analysis could handle any specification of income and substitution effects implicit in a labor supply function and, if combined with a suitable model of noncompetitive wage determination, it could account for persistent unemployment. Since focus is on turnover rather than employment, however, we shall simply take as given the aggregate labor supply function and aggregate unemployment (if any), normalize N to unity, and abstract from any effects of F on steady-state employment.[7]

To illustrate the effects of firing costs on gross employment flows, it is simplest to use a linear specification for $\pi(\cdot,\cdot)$. As in Bertola and Ichino (1995), let the derivative of every firm's marginal revenue product with respect to employment be a constant β, i.e., $\pi(l_t^i, \alpha_t^i) = \alpha_t^i - \beta l_t^i$. We can then invert the labor-demand relationship in (3) to obtain

$$l^G = \frac{1}{\beta}[(\alpha^G - \bar{w}) - \frac{pF}{1+r}], \qquad l^B = \frac{1}{\beta}[(\alpha^B - \bar{w}) - \frac{(r+p)F}{1+r}], \tag{5}$$

and turnover, as defined in (4), is conveniently linear in F:

$$\mathcal{M} \;=\; \frac{p}{\beta}[(\alpha^G - \alpha^B) - \frac{2p+r}{1+r}F]. \tag{6}$$

The effect of firing costs upon gross job turnover is straightforward: a higher F is associated with a lower $\mathcal{M}$. This prediction accords well with intuition but, as stated in the introduction, is far from consistent with the actual data. In Section 5 we explore one explanation for reconciling this finding with the data presented earlier. To do so we will need first to develop a slightly more complicated model in which mobility across firms is costly, thereby producing relative wage movements across firms in equilibrium. We first examine some evidence about wage dispersion in the U.S. and Europe.

[7]The employment effects of firing costs have been studied in isolation in several papers. See, for example, Bentolila and Bertola (1990) and Hopenhayn and Rogerson (1993).

4 Cross-country evidence on wage variability

The evidence of Tables 1 and 2 is indeed puzzling in terms of this simple model. If the technological characteristics parameterized by the shocks' size $(\alpha^G - \alpha^B)$ and frequency p are similar in the U.S. and Europe, but the job-security provisions parameterized by F are much more stringent in the latter, why is it that measures of gross job turnover are so similar across the Atlantic? The view we put forward here is that it is misleading to characterize the differences between European and North American labor markets as only consisting of higher firing costs in Europe. Even a casual reading of the literature on cross country differences in institutions makes it clear that there are also very different practices regarding wage determination. In particular, wage setting is much more centralized in most European countries. These cross country differences in wage determination may lead to very different average wages, and thus potentially explain some of the differences in total employment across economies. The aspect on which we focus our study of turnover, however, is that greater centralization of wage setting is likely to imply greater uniformity of wages across firms for a given type of labor. This notion is certainly in line with much that has been written about labor market institutions in Europe.[8] Here, we simply provide some simple quantitative indicators of the extent to which Europe and North America differ along this dimension.

Table 3 presents some measures of cross country differences in wage dispersion. This evidence, like that on labor market flows in previous tables, is not immune from statistical problems. Observed wages, of course, depend on individual workers' characteristics: both the distribution of worker characteristics and the extent to which wages depend on them may differ across countries and over time, and it would be desirable to account for this before interpreting the evidence from the standpoint of a model which—like the one outlined above—treats all workers as homogeneous labor. Unfortunately, the quality of wage data does not make it possible to control appropriately for worker characteristics, particularly in European countries. What evidence is available on wage differentials "within" comparable worker groups, however, does not overturn the basic picture offered by the raw statistics in

[8]See, for example, the OECD Employment Outlook 1994 for comparisons of cross country differences in wage-setting institutions. The detailed country-specific studies in Freeman and Katz (1995) also provide information on such institutions and on the resulting extent of wage compression.

Table 3: Wage inequality in the late 1980s

	p^{90}/p^{50}	p^{50}/p^{10}
Italy	1.56	1.33
Germany	1.65	1.39
France	2.11	1.52
U.K.	1.96	1.64
Canada	1.75	2.27
U.S.	2.14	2.63

Source: OECD Employment Outlook (1993).
Notes: The "p^{90}/p^{50}" columns report the ratio of the upper limit of the 9th decile of the male earnings distribution to the upper limit of the 5th decile; similarly, "p^{50}/p^{10}" refers to the ratio of the upper limit of the 5th decile to the upper limit of the 1st decile. Larger figures indicate more inequality.

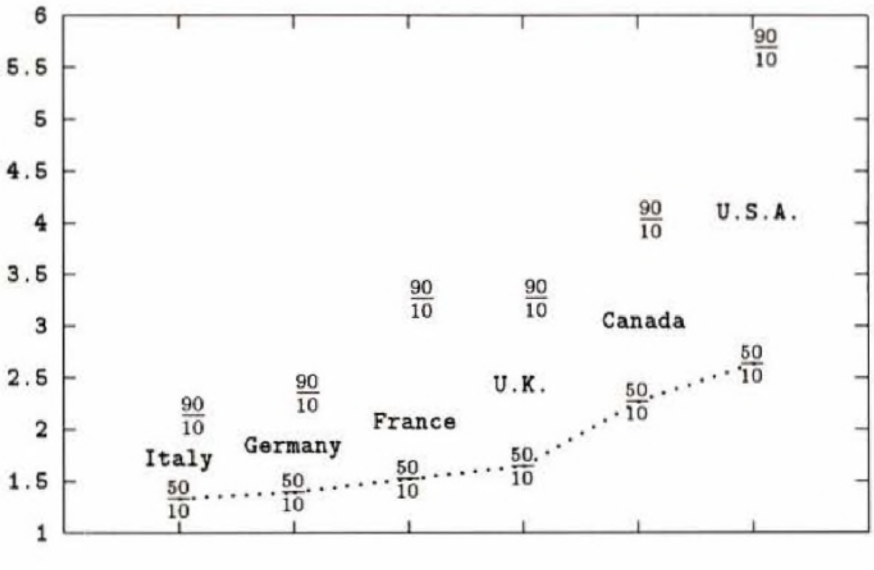

Figure 3: Wage inequality (90-10 and 50-10 percentile ratios)

Table 3: wage inequality (especially at the low end of the distribution) is indeed higher in less regulated labor markets.[9]

While the wage-inequality evidence displayed in Table 3 and Figure 3 cannot be considered as definitive, available evidence is at least consistent with the notion that wages are more compressed in Europe. In the next section we explore the consequences of a particular aspect of wage compression for gross job turnover.

5 Policy Analysis With Costly Mobility

5.1 The Model

In this section we lay out a simple extension to the model considered in Section 2. This extension generates the result that wages earned by homogeneous workers depend on the business conditions of the specific firm employing them (it would be easy to generalize the model so that such wage differentials depend not on individual firm effects *per se*, but rather on effects that are common to firms that are either locationally close or produce similar products). We achieve this by elaborating the labor-supply side of the idiosyncratic-uncertainty model above to allow for costly mobility.

The demand side of the model is identical to that of the previous section, and we again normalize total employment to unity, abstracting from all issues of aggregate labor supply and unemployment determination. We shall think of the labor force consisting of a continuum of individual workers, each supplying one unit of homogeneous labor. As before, our analysis is concerned solely with steady-state equilibria. Previously, this entailed time invariant employment levels associated with the state of a firm, i.e., l^G and l^B. In the current environment, there will also be time invariant wages associated with the state of a firm. We shall simply suppose that labor can move instantaneously across firms, that all workers bear the same cost κ if they move, and that they take as given the wages w^G and w^B paid by "good" and "bad" firms.[10]

Let mobility choices be made at the beginning of each period, after productivity states

[9]See Bertola and Ichino (1995) and the papers in Freeman and Katz (1995) for evidence on "within" wage inequalities, and for discussions of inequality changes (which we disregard in our steady-state analysis).

[10]For simplicity, we model all market participants as wage takers, neglecting the elements of monopsony and/or monopoly introduced by match-specific costs in employment relationships. To rationalize this assumption from first principles one may suppose that productivity shocks are perfectly correlated across two or more independently managed firms engaging in Bertrand competition, and that intertemporal contracts cannot be enforced.

for the current period are revealed for each of the firms.[11] Let workers be risk neutral and infinitely lived, and denote by W_t^j the human capital of a worker currently attached to a firm with shock j as of time t, i.e., the present discounted (at rate r) expected stream $\{w_t^j\}$ of his or her wages net of mobility costs.[12] In the remainder of this section we characterize the steady state wage and employment levels associated with the two productivity states. First note that, by definition,

$$W_t^j = \begin{cases} w_t^j + \frac{1}{1+r} E_t \left[W_{t+1}^j \right] & \text{if worker stays,} \\ w_t^j - \kappa + \frac{1}{1+r} E_t \left[W_{t+1}^j \right] & \text{if worker moves.} \end{cases} \tag{7}$$

Clearly, the option to move and pay the mobility cost κ may be attractive if moving increases current net income (i.e., $w^B < w^G - \kappa$) and/or increases the likelihood of "good" wages in the future (which is the case if $p < 1/2$, i.e., if the productivity-shock process has positive persistence).

The human capital W^B of a worker currently at a firm with a bad realization satisfies:

$$W^B = w^B + \frac{1}{1+r} \left[pW^G + (1-p)W^B \right] \tag{8}$$

if they choose to stay, and

$$W^B = w^G - \kappa + \frac{1}{1+r} \left[(1-p)W^G + pW^B \right] \tag{9}$$

if they choose to move.

If equilibrium entails positive employment at each firm type and positive turnover (i.e. $l^G > l^B > 0$), then wage differentials can be determined entirely from considering the worker's mobility decision. Indeed, if mobility (turnover) does take place in equilibrium and some workers choose to remain at firms with "bad" states, then both (8) and (9) must hold true, and simple manipulation gives:

$$w^G - w^B = k - \frac{1-2p}{1+r}(W^G - W^B). \tag{10}$$

Thus, the equilibrium wage differential equals the mobility cost if $p = 0.5$, which is intuitive since the future then looks identical at both types of firms. In the more interesting case of

[11] This is the same timing convention adopted in Bertola and Ichino (1995).

[12] Equivalently, we could assume that workers are risk averse but have access to complete markets and hence act so as the maximize the expected present discounted value of income. Below, we briefly discuss the implications of relaxing such convenient, but clearly unrealistic assumptions.

positive persistence ($p < 1/2$), the "capital gain" term $W^G - W^B$ is also relevant and is readily computed. It is never optimal for a worker at a firm experiencing a good shock to move, so the human capital W^G of a worker in this situation satisfies

$$W^G = w^G + \frac{1}{1+r}\left[(1-p)W^G + pW^B\right]. \tag{11}$$

Equations (11) and (9) then yield

$$W^G - W^B = \kappa. \tag{12}$$

If mobility occurs in equilibrium, it does so up to the point where the mobility cost κ equals the "capital gain" reflecting (the expectation of) higher labor income in the future. Workers are effectively arbitraging across the income streams associated with the different types of firms, and in equilibrium the only differential in expected present discounted values that can exist are those less than or equal to the mobility cost.

Inserting (12) in (10), the wage differential between good and bad firms is

$$w^G - w^B = \frac{2p+r}{1+r}\kappa. \tag{13}$$

If $\kappa = 0$, this model reduces to the model discussed in the previous section; in particular there are no wage differentials. In the limit as p approaches 0 then $w^G - w^B = \kappa r/(1+r)$, the annuity value of the mobility cost. As p gets closer to 0.5, the mobility investment is more and more likely to be wasted ex-post, while the option to remain in a currently "bad" firm and hope for a positive productivity shock becomes increasingly attractive. Hence, as already noted above, current wage differentials must fully compensate for the moving cost in the $p = 1/2$ limit case.

Given the wage differentials derived above, the steady state employment levels of "good" and "bad" firms are readily computed from the firm's optimization problem. Under the convenient assumption that labor-demand schedules are linear, the procedure outlined in Section 2 can be slightly modified to allow for state contingent wages, and we obtain the following characterization of gross job turnover in the case of no firing costs:

$$\mathcal{M} = \frac{p}{\beta}[(\alpha^G - \alpha^B) - (w^G - w^B)], \tag{14}$$

or, using (13),

$$\mathcal{M} = \frac{p}{\beta}[(\alpha^G - \alpha^B) - \frac{2p+r}{1+r}\kappa]. \tag{15}$$

In the analysis that follows we will treat this as the benchmark case, i.e. we will think of the expression in (15) as the amount of gross job turnover that would occur in the absence of institutional restrictions on labor market price and quantity outcomes. We see that turnover is decreasing in the size of the wage differentials (or decreasing in the size of the moving cost since, all else being given, the wage differential is increasing in the size of the mobility cost). Before analyzing the interaction between such phenomena and specific labor market policies, we note that the wage differentials generated by such a model are "dynamic", in the sense that they reflect individual workers' wage instability rather than permanent differences across heterogeneous workers' earnings potential. As suggested by Bertola and Ichino (1995), such phenomena may have become increasingly important in the United States, where both cross-sectional wage dispersion and the innovation variance of individual wage profiles have increased over the 1980s and 1990s (see, e.g., Gottschalk and Moffitt, 1994). We repeat the earlier caution regarding the wage distribution data presented above: cross-country data does not permit us to ascertain the relative importance of this type of heterogeneity; only a careful comparative analysis of wage fluctuations for given worker characteristics (or, perhaps, for workers employed in specific firms or plants) could evaluate the empirical relevance of the phenomena we focus on. We note, however, that the work of Davis and Haltiwanger (1993) on U.S. data does show that there are significant wage movements associated with the changing circumstances of an individual plant. For example, one of the strongest findings is that of a positive correlation between plant size and wages, and the above model is qualitatively consistent with this finding.

5.2 Policy Analysis

We now examine two different policies in the context of the above model. One of the policies is the firing cost policy examined above; the second is a policy that restricts the size of the wage differential that is allowable across firms. As wages will generally not induce the appropriate amount of voluntary mobility by workers when policy restricts wage differentials, we shall characterize steady-state turnover in terms of the firms' optimal dynamic labor demand programs for given firing costs and wage differentials: in other words, the derivations below will let all employment decisions be made by firms.

When dismissing a unit of labor entails a cost F for employers, the wage differential across good and bad firms is w^D, and labor demand schedules are linear, then a procedure similar to that in Section 2 yields:

$$\mathcal{M} \ = \ \frac{p}{\beta}[(\alpha^G - \alpha^B) - w^D - \frac{2p + r}{1 + r}F]. \tag{16}$$

Note that to completely specify the equilibrium, wage levels should be consistent with the (given) employment level that our model normalizes to unity. In the simple linear specification, however, only differentials matter in (16), and there is no need to compute levels to analyze the model's implications for turnover.

A few points deserve mention here. As in Section 3, mobility is quite intuitively more intense the larger are productivity innovations $(\alpha^G - \alpha^B)$, and a larger firing cost F is associated with lower turnover. In fact, a comparison of (16) with (6) reveals that these effects on gross job turnover are exactly the same here as when wages were equalized across firms, so that one's intuition about the effects of firing costs is valid regardless of whether mobility is costly for workers.[13] Further, and crucially for our argument, a smaller wage differential is predicted to increase the amount of turnover generated by our model's firms. Hence, wage compression has an opposing effect on gross job turnover in comparison to the firing cost.

To see why relative wage rigidity enhances the turnover effects of any given variability in labor demand schedules, consider Figure 4. In each panel of the Figure, possible levels of labor demand are identified by the intersections of two downward-sloping labor demand schedules with two different wage levels.[14] At a given point in time, the employment implications of different labor-demand schedules depend on the wages relevant to each of them: if the wage levels associated to the higher and lower labor demand schedules do not differ much from each other, as in the top panel of the Figure, then the employment levels are more distant from each other than in the bottom panel, where wages are more sharply different. This comparative-statics point has an equally obvious dynamic application. If a firm suffers a worsening of business conditions, then the extent to which it lowers its demand for labor depends upon the extent to which wages fall to compensate for the drop in productivity; conversely, if a firm experiences an improvement in business conditions and wages do not rise, it will have a greater increase in demand for workers than it would if wages were to

[13] As noted in Bertola and Ichino (1995), the effect of more pronounced volatility (p closer to 0.5) is ambiguous: while a larger measure of firms experience productivity transitions in each period, fewer units of labor are reallocated out of and into each of them.

[14] The labor demand schedules are identified as standard marginal-product functions $\pi(\cdot,\cdot)$ in the Figure: clearly, however, a similar picture would obtain if we explicitly accounted for the wedge between such functions and wages induced by F in equation (3).

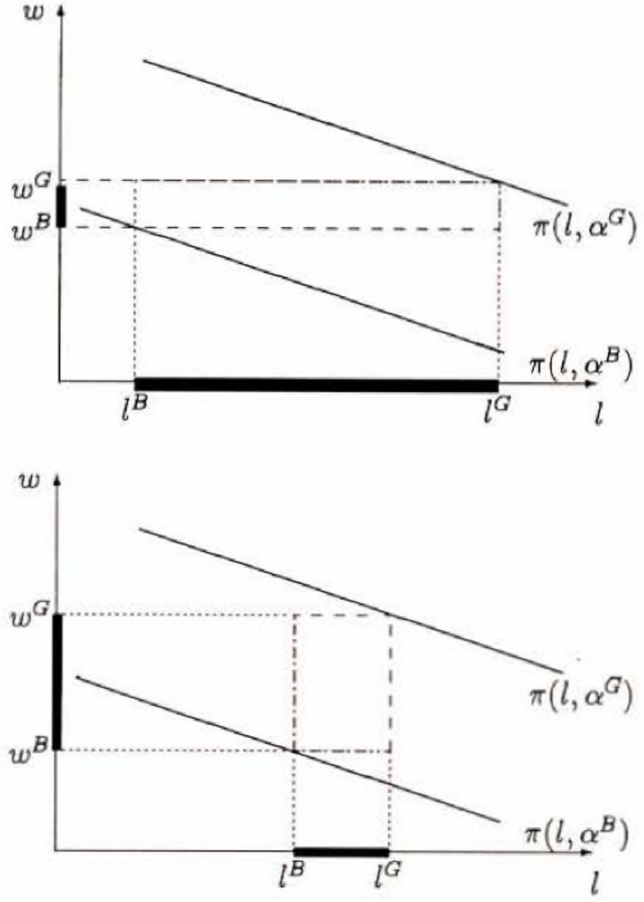

Figure 4: Wage differentials and labor reallocation

increase. Hence, cross-sectional wage compression is associated with more pronounced hiring and firing as a given firm goes through a business-conditions cycle, and to more intense labor reallocation in a steady-state situation where all business-conditions uncertainty is idiosyncratic.

6 Discussion

To summarize the main finding of the analysis, we have shown that if wage compression policies and firing cost policies are implemented together then the effect on gross job turnover is ambiguous. Any reading of institutional differences between European and North American labor markets would stress differences in both employment protection measures and wage setting practices: to the extent that higher job security is associated with more compressed wage differentials, our simple model readily explains the otherwise puzzling similarity of idiosyncratic employment variability across different institutional settings.

Informal considerations on the political economy of labor market institutions in more complex and realistic models suggest that wage compression and dismissal restrictions should indeed arise together naturally. To see this, recall that an unregulated equilibrium is supported by dynamic wage differentials across "good" and "bad" firms when job finding is a resource-consuming activity for workers, and imagine a model in which job-finding also requires time, and risk-averse workers do not have access to perfect insurance or credit markets. In this setup, it is certainly plausible that workers would support policies aimed at decreasing labor-income fluctuations. Suppose to begin with that wages were forced to be equal across all establishments. Wage compression would obviously produce smoother incomes for workers who work continuously but, as shown in the previous section, would also lead firms to increase the intensity of labor reallocation. Thus, job losers would be faced with increased variability in earnings, and increased turnover would be all the more disagreeable for them if reallocation is costly (at least in terms of time opportunity costs) and wage compression makes it impossible for mobility costs to be offset in expectation by higher wage offers at hiring firms. While this could be dealt with in different ways, at least one way to partially reduce this variability is to reduce the amount of labor reallocation by making it costly for firms to dismiss workers.

Alternatively, imperfectly insured workers may successfully lobby for firing restrictions to reduce income variability associated with turnover. Absent policies regarding wages, however, nothing would prevent firms from reducing wages so as to make current employment levels profitable, or induce quits and circumvent the dismissal cost. The equilibrium upshot of job security and unrestrained wage differentials would be a more variable wage process, thus leading again to undesirable labor-income variability—and to political pressure for wage-compression legislation.

From our theoretical perspective, gross job turnover evidence indicates that countries

Table 4: Unemployment flows in 1987

	Inflow (a)	Outflow (b)	Duration (c)	Long term (d)
Germany	3.01	93.33	8.04	36.98
France	3.88	69.62	8.02	39.52
U.K.	7.80	120.40	10.67	42.16
U.S.	23.88	545.47	5.04	12.66

Source: Burda and Wyplosz (1994).
Notes: a: Unemployment inflow, as a percentage of population aged 15 to 64, less unemployment; b: Unemployment outflow, as a percentage of the stock of unemployment; c: Average duration of unemployment (months); d: Proportion of those unemployed more than a year, as a percentage of unemployment stocks.

with relatively stringent job security provisions also feature more artificial compression in wage differentials, and the above arguments suggest that it is indeed intuitive to see these two policies in place together.

Until now the paper has focussed on the general impression of similar job turnover rates across industrial countries. In other respects, however, labor market flows are markedly different across countries. We proceed to consider one such aspect, and suggest that this pattern is at least qualitatively consistent with differences in labor market policies. As is apparent in Tables 4 and 5, flows into and out of unemployment are much smaller in Europe than in the United States and, as a consequence, the duration of unemployment is much longer in the former than in the latter. These marked unemployment-flow differences indicate that in heavily regulated European countries a similar amount of labor reallocation much more frequently takes the form of direct job-to-job mobility rather than of transitions through unemployment or non-labor force status. Moreover, conditional upon becoming unemployed, the likelihood of leaving unemployment is much higher in the U.S. than in Europe.[15]

How is this consistent with our simple characterization of labor market interactions and of the effects of institutional regulation? As mentioned above, individual workers are likely

[15]See Alogoskoufis *et al.* (1995) for further discussion of relevant evidence. In the model proposed by Boeri (1995), labor-market regulation increases the proportion of job turnover accounted for by job-to-job moves triggered by successful on-the-job search, at the same time as it decreases job losses and job findings triggered by labor-demand shocks.

Table 5: Unemployment flows

	Unemployment inflows (a)	Unemployment outflows (a)	Long-term unemployment (b)	
	1988	1988	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
Canada	1.89	30.8	9.9	14.1
United States	1.98	45.7	13.3	11.7

Source: OECD Employment Outlook (1990, 1994).

Notes: a: average monthly flows as a percentage of source population; b: percentage of total unemployment.

to have a rather passive role in a heavily regulated labor market's turnover dynamics, where compressed wage differentials can hardly be relied upon to stimulate voluntary mobility by workers. Accordingly, most of our analysis was based on a characterization of firms' optimal dynamic labor demand. From this point of view, of course, all that matters is the total cost of dismissing a unit of labor, conveniently indexed by the single parameter F, rather than its decomposition in terms of administrative costs, redundancy payments, or a variety of other employment-protection provisions. Most if not all worker protection laws, however, mandate a specific lapse of time between advance written notice of individual or mass dismissals and their actual implementation. From the employer's perspective, it is qualitatively reasonable to capture such constraints by the firing cost F. When analyzing labor market regulations' implications for worker flows, however, advance notice provisions have distinctive implications, and their effect on unemployment flows is arguably consistent with the above mentioned facts. The argument is as follows. Evidence for the U.S. clearly suggests that the vast majority of workers who become unemployed find a new job within a relatively short period of time. Job-finding hazard rates, however, are rather sharply declining in the early months of unemployment, and subsequently become flat (see, e.g., the evidence reviewed by Wolpin, 1994). In other words, even the unregulated U.S. labor market does not seem capable of eliminating long-term unemployment altogether: the unemployment spells facing workers who fail to find a job quickly are much longer than those facing the average worker entering unemployment.

A straightforward reading of this evidence indicates that, in real-life labor markets, heterogeneity across individual workers (or their careers) is such that job-finding and exit from unemployment is much more difficult for some workers relative to others. Given advance notice requirements, workers in the latter group are likely to line up alternative employment before they are actually dismissed, and hence will not show up as a flow through unemployment. Those who do enter unemployment, conversely, are more likely to belong to the former group, who more often experience long unemployment spells in unregulated labor market.

A precise analysis of the mechanism outlined here would require formal modeling of unemployment and worker heterogeneity, neither of which is explicitly featured in our theoretical framework. When taking such features into account, of course, unemployment insurance policies and the level of unemployment itself (with particularly grim job-finding prospects for new entrants in the labor market) should also be important factors in any explanation of unemployment duration differences across countries. However, employment-protection legislation in the particular form of mandated notice periods is qualitatively consistent with longer unemployment spells in more heavily regulated markets, and further work may try and specify more realistic if less tractable models to see whether advance-notice provisions account for a significant part of the observed differences in unemployment flows.

7 Concluding comments

The combined effects of job-security provisions and other institutional features are more subtle than simple policy-evaluation exercises would make them, particularly when their implications for the effects of idiosyncratic labor-demand fluctuations are considered. Any reading of the evidence should take into account regulation of both quantity and price aspects of real-life markets, and of important interactions between them. This paper makes the simple point that employment protection legislation and relative wage compression have opposite effects on the intensity of employer-initiated labor reallocation in the face of idiosyncratic uncertainty. Hence, the otherwise puzzling similarity of gross turnover flows across countries with very different labor markets suggests that the stringency of job-security provisions (such as dismissal restrictions, redundancy payments, and advance notice requirements) is associated with a larger degree of institutional wage equalization (induced by centralized negotiation practices and by "equal pay for equal work" legislative principles).

Such covariation across the components of labor-market policy packages is consistent with standard discussions of labor market institutions, which typically identify firing costs and wage compression as the most important differences across European and North American economies.[16]

Moreover, the apparent empirical association of wage equalization and job security provisions can be intuitively rationalized in terms of simple politico-economic considerations. When implemented in isolation, neither wage compression nor dismissal restrictions can fulfill a likely aim of intervention in the labor market—namely, stabilization of labor incomes in the face of idiosyncratic (yet uninsurable) labor-demand shocks. Our simple theoretical and empirical work, of course, begs the question of whether jointly implemented equal-wage and job-security laws do in fact succeed in isolating labor incomes from idiosyncratic market shocks, and indeed of whether such isolation is an appropriate policy objective. Constraints on dismissals or wages certainly tend to decrease an economy's productive efficiency in equilibrium models such as Hopenhayn and Rogerson's (1993). Models where worker behavior is treated on a risk-neutral basis, however, are obviously inadequate to evaluate the possible welfare-enhancing role of labor market institutions in an incomplete-markets setting, and a formal analysis of these important and difficult issues must await further research.

[16]By contrast, no empirical linkage is apparent between the stringency of labor-market regulation and the cyclical behavior of real wages at the aggregate level, on which the evidence—as surveyed by Abraham and Haltiwanger (1995) and by Brandolini (1995)—is at best inconclusive in all countries. As in the implicit contract literature, employers may provide insurance to the aggregate labor force against relatively mild and temporary aggregate shocks—choosing employment levels efficiently in the absence of regulation, but hoarding labor under job-security provisions (consistently with the aggregate evidence discussed in our footnote 1 above). In the absence of regulation, conversely, implicit contracts would not be operative in the face of idiosyncratic and fairly persistent shocks, as workers could not be prevented from leaving during bad times to find higher wages elsewhere.

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