Job turnover and labor turnover

Hamermesh, D.S.; Hassink, W.H.J.; van Ours, J.C.

Published in:
Annales d'Economie et de Statistique

Publication date:
1996

ANNALES D'ÉCONOMIE ET DE STATISTIQUE. – N° 41/42 — 1996

Job Turnover and Labor Turnover: A Taxonomy of Employment Dynamics

Daniel S. HAMERMESH,
Wolter H. J. HASSINK and Jan C. van OURS*

ABSTRACT. – We use information from a unique survey of Dutch firms to compare the standard proxy for job creation, which is based solely on stocks of employment in individual firms at two points in time, to the correct measure that includes counts of actual jobs. Both are compared to a measure of labor turnover that counts movements of individuals into and out of jobs. We find: 1) The standard proxy for job turnover differs little from actual job turnover; 2) Most mobility is into and out of existing jobs, not to new nor from destroyed jobs; 3) A large fraction of all hires are by firms where employment is declining, and a large fraction of all fires are by firms where employment is expanding; 4) Worker turnover is roughly three times as large as job turnover; 5) Simultaneous hiring and firing exists and is mostly due to unobservable heterogeneity in the work force.

Rotation de poste, rotation de travailleurs : une taxinomie de la dynamique d'emploi

RÉSUMÉ. – On utilise l'information provenant d'une enquête unique d'entreprises hollandaises pour comparer la mesure habituelle de créations de postes, fondée sur le stock d'emploi mesuré à deux dates, avec la mesure correcte qui inclue le comptage des postes effectifs. Ces mesures sont aussi comparées à la mesure de la rotation de travailleurs qui comptent les mouvements individuels entrant et sortant des postes.

---

* D. S. HAMERMESH: University of Texas – Austin and National Bureau of Economic Research; W. H. J. HASSINK: Free University, Amsterdam and Tinbergen Institute; J. C. van OURS: Tinbergen Institute and Erasmus University, Rotterdam. We thank Danny BLANCHFLOWER, Frank den BUTTER, Wim GROOT, John HALTIWANGER, Francis KRAMARZ and a referee for helpful comments, William PRAAT for computational assistance, and the Organization for Labor Market Research (OSA), The Hague, for the use of their data and for financial support.

1 Introduction

Job creation, job destruction and worker turnover are a recent focus of both theoretical and empirical research. This study contributes to the empirical literature by presenting an organized set of stylized facts on the relations among flows of workers, changes in employment and changes in the number of jobs at the firm level. Various terms have been used to describe, summarize and analyze employment dynamics, including "job creation/destruction", "employment growth/decline", and "hiring/firing". Our purposes here are to sort out differences in these terms and examine how the concepts should be viewed from the perspective of the individual firm. The discussion alone should demonstrate that great care is required in using the various terms, as they mean very different things and have different implications for analyzing labor-market adjustment and the impact of policies. We demonstrate some aspects of their importance using a data set that allows us to construct comprehensive measures of job creation and types of labor mobility. Our analysis confirms various results on employment dynamics and contributes important new facts.

2 Alternative Concepts of Employment and Job Dynamics

Underlying the entire discussion are two fundamental issues: 1) What patterns of changes in staffing at the firm level occur in the process of job and labor turnover? and 2) What microeconomic forces produce these patterns of changes? We do not consider the second issue. It has been analyzed from a variety of perspectives, including in the literature on adjustment costs (e.g., HAMERMESH [1993], Chapters 6 and 7) and job-worker matching (stemming from the original work of JOVANOVIC [1979]). Our interest here is not in explanation but rather in illustrating and clarifying what occurs at the firm/establishment level. Are job creation, hiring and employment growth interchangeable terms for the same phenomenon? Are job destruction, firing and employment decline interchangeable? What do we mean by job creation?

The terms job creation and destruction have been applied recently in the macroeconomic literature (e.g., DAVIS and HALTIWANGER [1990]). Though it does not use the term, what this literature really discusses are simultaneous positive and negative *firm- (or plant-) level net employment changes*. Substantial empirical work (e.g., LEONARD [1987]; DUNNE *et al.* [1989]; and DAVIS and HALTIWANGER [1992] demonstrates that employment falls (rises) in a large fraction of the micro units within a narrowly defined

aggregate in which the net change in employment is positive (negative) [1]. That *interfirm (or interplant) reallocation* is important within an aggregate is useful for demonstrating the role and importance of the dispersion of shocks in determining macroeconomic adjustment (CABALLERO *et al.* [1995]).

Even assuming that workers are observationally homogeneous, concentration on net employment changes ignores much of the potentially important adjustment costs that might be generated by shocks to costs or technology. One can easily imagine a firm (a university) with no net change in employment over some period, but where, for example, all five assistant professors of economics quit and five new ones are hired to replace them. Net employment change is zero; the measured interfirm reallocation is zero; and no jobs are destroyed or created. Yet clearly the costs to the firm are nonzero; and the costs to society are also much different from those that would have arisen if no quits had occurred. The net change in employment in an establishment can be decomposed in great detail as:

$$\Delta E \equiv NH + R + TI - Q - F - D - TO. \tag{1}$$

where NH are new hires; R are rehires; TI are transfers from other plants in the firm; Q are quits; F are fires (layoffs in American terminology); D are discharges for cause; and TO are transfers to other plants in the firm [2].

Some attention has been given to (1). BURGESS and NICKEL [1990] examined aggregates of accessions (the first three terms) and separations (the last four terms); and HAMERMESH [1995] considered the pattern of hires, quits and net employment change for several establishments. LEONARD and VAN AUDENRODE [1993] investigated hires and layoffs and demonstrated that Belgian manufacturing firms do both within the same year. We do not know, however, the extent to which establishments of firms can be classified using the identity (1) into those that are growing and hiring, and those that are declining and firing; or whether hiring and/or firing are activities that are only loosely related to net employment changes. That is, does growth in employment mean that the firm is in a "hiring regime" (LOCKWOOD and MANNING [1993])? Does a drop in employment imply a "firing regime"? We examine what net changes in employment in a firm or establishment imply about the type and extent of flows of workers into and out of it.

These distinctions are important because the assumptions underlying theories of the dynamics of labor demand equate expansion with hiring (and contraction with firing). The *locus classicus* in this area (SARGENT [1978]) presents a rational-expectations approach to the firm's net change in employment. The vast subsequent literature in macroeconomics essentially ignores the possibility that negative net changes in employment may not only occur when firms fire workers, but may instead reflect substantial hiring. Much of the analysis of changes in employment in Europe (pioneered by NICKEL, summarized by him, 1986, and which we call the "European

---

1. See HAMERMESH [1993, Chapter 4] for a summary and critical discussion of this literature.
2. This is essentially the decomposition used in the establishment data collected by the U.S. Bureau of Labor Statistics from 1958 through 1981.

approach") looks at the firm's decisions in terms of some of the gross flows in (1) that are the firm's proximate tools for altering its staffing. But this approach has had little impact on the discussion in macroeconomics, perhaps because data on these flows are very difficult to obtain.

With heterogeneous workers and jobs the distinction between job creation/destruction and hiring/firing/employment changes is essential. If, for example, the firm fires five assistant professors of sociology and replaces them with five assistant professors of economics, its costs differ from those in the example above, where economists who quit where replaced by others. If the firm abolishes one vice-presidential position and transfers the incumbent to a newly-created other such position, its costs will be greater than if no changes occurred. Most important, in both of these cases jobs are created (and an equal number are destroyed), even though there is no net employment change at the firm level.

This view implies that some care is needed in defining what we mean by a job. For example, one could easily count any slight change in duties (e.g., switching from teaching two courses and doing research to one course and somewhat more research) as the creation and destruction of jobs. A variety of arbitrary definitions are possible. We take a purely empirical approach and define a job as a distinct set of duties and responsabilities that the employer recognizes as being attached to a position of employment. Obviously in any set of data different employers may have different notions about what constitutes a change in jobs within their firms. We rely on their identification of changes in jobs in a firm where the number of employees has not changed. This is exactly the same as our standard reliance in empirical research based on establishment or firm data on employers to identify who is an employee. While that issue seems straightforward, the existence of temporary workers on short-term contracts, of independent contractors, and of other peripheral work-performers should make it clear that, in the final analysis, notions of what constitutes an employee are fraught with the same ambiguities as attempts to define jobs.

Figure 1 offers a complete taxonomy of the dynamics of flows of workers and jobs in a single-plant firm [3]. Every worker in the firm fills a job. At time t there are J_t jobs. Between times t and $t+1$ some jobs are destroyed, and some workers whose jobs were not destroyed either separate or *move internally* to existing or newly-created jobs (flows that we denote by M). Some of the separated workers were fired, either because of incompetence or because their jobs were destroyed. A flow of newly-hired workers takes the remaining newly-created jobs or fills the positions vacated by quitters.

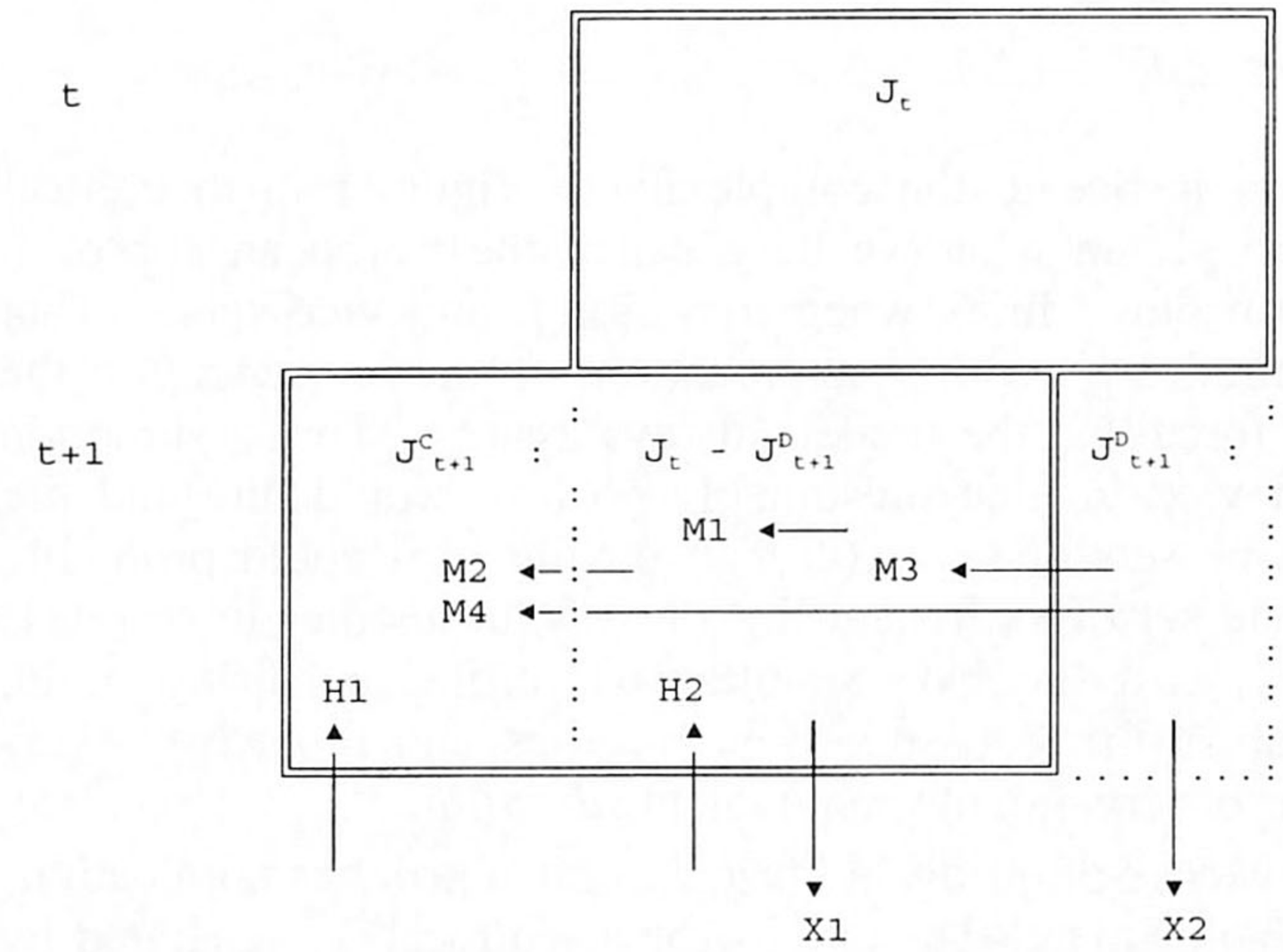
The simplest concept illustrated in Figure 1 is the same net employment change, ΔE, as in (1), which by definition equals $J_{t+1} - J_t$. The second concept is the firm-level net employment change, $\Delta E^+ + \Delta E^-$; which measures the sum of all jobs created and destroyed (and ignores shifts of jobs within the firm). This is the now-standard calculation based on observations on plants or firms between two time periods. If the firm is

---

3. The figure is simplified by omitting vacant jobs. It is based on people and jobs and necessarily ignores intensity of effort (including hours worked in each job and effort per hour).

FIGURE 1

Heterogeneous Jobs and Workers in the Firm



Stocks

J = jobs

Flows

H1 = hires to new jobs
H2 = hires to existing jobs
X1 = outflow from existing jobs
X2 = outflow from destroyed jobs
M1 = internal mobility between existing jobs
M2 = internal mobility from existing to new jobs
M3 = internal mobility from destroyed to existing jobs
M4 = internal mobility from destroyed to new jobs
J^C = new jobs
J^D = destroyed jobs

expanding, its employment is part of the aggregate ΔE^+; if it is contracting its decline is part of the aggregate ΔE^-. The third measure, which we denote by $J^C + J^D$ (jobs created plus jobs destroyed) and call firm-level *job turnover*, adds gross shifts in jobs within the firm to the second measure. Thus just as $\Delta E^+ + \Delta E^-$ departs from ΔE by adding interfirm gross employment creation and destruction within an aggregate of firms, $J^C + J^D$ departs from $\Delta E^+ + \Delta E^-$ by adding intrafirm gross job creation and destruction in the aggregate of jobs within individual firms.

All three of these measures ignore workers' identities. All, including the third, which is novel here, are based on positions, not people. The fourth measure is labor turnover, based on total hires H and separations X. The relations among the four terms are:

$$(2) \qquad \Delta E \leq \Delta E^+ + \Delta E^- \leq J^C + J^D \leq H + X.^4$$

4. One might add the term $2M$ to $H + X$, where M is the number of jobs created and destroyed within the firm independent of any hiring or separations that have occurred.

Net employment change within any aggregate is the same no matter on which concept it is based:

$$\Delta E \equiv \Delta E^{+} - \Delta E^{-} \equiv J^{C} - J^{D} \equiv H - X. \tag{3}$$

It is difficult to do justice to the complexity of Figure 1 in theoretical or empirical research. Even what we have called the European approach assumes that the firm never hires when it is firing, and vice-versa. That assumption is required by profit maximization in the presence of the homogeneous work force that the models always assume. That assumption is an expositional device, so that presumably no firm would hire and fire workers with the same sets of skills (though obviously it could profitably hire workers with one set of skills and fire those with another in response to relative demand or cost shocks). Simultaneous hiring and firing could, however, be rational as firms dissolve bad matches and replace workers with others who are observationally equivalent *ab initio*.

The possible coexistence of hiring and firing within a firm has implications for macroeconomic adjustment. The employment reallocation generated by macroeconomic shocks may greatly exceed the interfirm (or interplant) reallocation that has been the focus of so much recent research. The greater intrafirm and intraplant reallocation are, the greater are the implicit costs of changing output levels. The cost to the firm of a negative macroeconomic shock is indicated not by the loss in employment, but by the costs of hiring and firing that may accompany the shock. Because hiring and firing may occur simultaneously, these costs cannot be inferred simply by summing up hires in firms that are only hiring, and fires in those that are only firing. The subtleties of analyzing employment fluctuations at the macro level are even greater than moving from aggregating firms' net employment changes to aggregating their gross changes would suggest.

3 Estimates of the Component Flows of Workers and Jobs

In this section we show that the distinctions between gross and net flows are important empirically and should condition how we discuss labor-market dynamics. We make no attempt to model the determinants of these flows or their interrelationships. Rather, using a broad-based random sample that allows the simultaneous analysis of net employment changes, job changes and flows of workers at the firm level, we inquire about the definitional and conceptual issues raised in the previous section. These include examining the relationships between: 1) Flows of jobs within a firm and flows of workers to and from the firm; 2) Net employment changes within a firm and the firm's patterns of hiring and firing; and 3) Hiring and firing within a firm during the same time period.

This data set, whose inclusion of information on types of flows of workers and on internal mobility makes it unique for any industrialized economy, is based on two surveys by the Organization for Labor Market Research (OSA) of the Netherlands [5]. The surveys are of organizations, which we refer to as firms, and are representative of all industries (including government and education) in the Netherlands in 1988 and 1990. The samples are stratified according to the area of economic activity and the size of the firm (10-49, 50-99, and 100+ employees), with firms of fewer than 10 employees excluded [6]. While the data are representative only of one small economy, the Netherlands is highly advanced and typical in its mix of industries. Moreover, this data set, unlike many of those used to study employment dynamics that are restricted to the small and decreasingly important manufacturing sector, covers the entire economy.

Each survey uses two questionnaires. The first, which was administered by enumerators, concerned qualitative characteristics and financial data; the second concerned administrative information. The mail responses to this second questionnaire came some time after the first questionnaire was answered and had a nonresponse rate of 20-25 percent. The firms included in each survey contained roughly 3 percent of total employment in the Netherlands. The surveys were set up as a panel, but a large number of the 1988 firms did not cooperate in 1990, had a substantial change in activities or merged.

Tables 1 and 2 (illustrating Figure 1) are based on data for 1158 firms from 1990. For each firm in that year, if there was any internal mobility, hiring or separation of workers, information on the most recent worker in these flows was registered. The respondent from the firm reported whether the worker came from a destroyed or existing job (in case of X and M), or whether the worker went to a (newly) created job or existing job (in case of H and M). Aggregation of the information on workers across all firms in the sample gives estimates of the relevant fractions. After multiplication by the average H, X or M we obtain the size of each of the subflows. The results in Tables 3, 5-8 and Figures 2 are based on the pooled sample of the 2204 firms (with some firms appearing in both years) for which there are complete data on all the levels and flows. A panel of 558 firms with complete responses in both 1988 and 1990 forms the basis for Table 4. The data are weighted by sector and firm size to be representative of all DUTCH firms having at least 10 employees except in Tables 1 and 2 (because those data, unlike those that form the basis for the other tables, are from interviews with only one worker in each firm) [7].

---

5. Three studies (CRAMER and KOLLER [1988]; ANDERSON and MEYER [1994], BURGESS *et al.* [1994]) have used establishment data to examine employment changes and worker flows, though none has accounted for internal mobility, and none has information on types of flows of workers.
6. Deaths of firms are excluded from the sample, which may bias downwards the measures of job and labor turnover.
7. The raw estimates imply $J^C - J^D = 2.6$ percent, which does not satisfy the identity (3). To obtain the identity we adjusted $H1$ and $X2$ by adding respectively $\delta_1 H1$ and $\delta_2 X2$. The optimal weights δ_i are those that minimize the quadratic loss function $\delta_1^2 + \delta_2^2$, subject to $(1+\delta_1) H1 - (1+\delta_2) X2 = H - X + M3 - M4$.

In addition to the level of employment, which is calculated irrespective of the number of hours worked, we have information on the number of hires, separations and internal mobility of workers. The cause of each worker's separation is also available. Generally, there are two types of contractual forms of employment relationship in the Netherlands. First, workers may have a temporary contract for a period shorter than one year. In most cases such workers are hired from a specialized agency and are excluded from our measures of employment and worker flows. Second, workers may have a long-term employment relationship with a firm with a contract that is generally at least one year long. Their appointment is indefinite and begins with a probationary period during which either party may terminate the contract immediately. Workers with these contracts are included in the employment measure and the hiring and separation flows. Note that this second group also includes temporary workers who obtained a long-term contract at some point during their temporary relationship with the firm.

We defines hires as employees who entered the organization during the year, including employees with a probationary period but excluding employees with a temporary contract shorter than one year. Outflows of workers are defined similarly using the number of separations. Internal mobility is defined as the number of workers who changed function and/or department within the organization during the year. We calculated the flows as annual percentages of employment at the start of the year. The Appendix presents definitions of the main variables.

One should note that the data are based on firms, not plants. This choice is dictated by the nature of the survey, just as it has been in the literature on aggregating employment changes across units, part of which uses firm data, part of which uses establishment data (HAMERMESH [1993], Table 4). Firm data have the advantage that the firm is the main locus of decision-making about employment in its constituent units. They have the disadvantage of necessarily masking some worker mobility and some changes in employment to the extent that there are interplant transfers and that some of the firm's units expand while others contract. The former problem is likely to be unimportant, since old evidence from American establishment data suggests that interplant transfers are a minute fraction of all flows of workers. The importance of the latter difficulty is unclear; but since the results in this section differ little if the sample is restricted to firms employing fewer than 100 workers, it is unlikely that basing the study on establishment data would alter our conclusions qualitatively.

3.1. **Job Flows and Flows of Workers**

Table 1 presents estimates of the flows in Figure 1 and demonstrates the well-known fact that there is substantial turnover of workers at the firm level. The distinction between existing and newly-created jobs in this taxonomy generates several interesting and novel observations, however. Most important, the very large majority of mobility is to and from existing jobs: Nearly three-fourths of hires are in the category $H2$, hires to existing jobs, while an even greater fraction of separations are in $X1$, flows out of jobs that continue in existence. Over half of all internal flows are in the

TABLE 1

Estimates of the Flows in Figure 1, Netherlands (1990) (percent of employment)

Hires		Outflows		Internal flows	
$H1$	3.2	$X1$	8.2	$M1$	1.8
$H2$	8.7	$X2$	1.9	$M2$	0.9
				$M3$	0.4
				$M4$	0.3
Total	11.9		10.1		3.4

category $M1$, representing workers who move from one job that continues in existence to another that had been occupied previously. Most ouflows, inflows and internal flows represent reshuffling of people into and out of positions that had been filled and that continue to exist.

The most important use of the taxonomy in Figure 1 is its illustration of the inequalities in (2), which we present in Table 2. The standard proxy measure for job turnover that ignores internal mobility, absolute net employment change at the firm level, $\Delta E^+ + \Delta E^-$; dwarfs average net employment change (6.2 versus 1.8 percent), as is usual in the burgeoning literature on this issue.

TABLE 2

Estimates of (2), 1990 (percent of employment)*

	Positive Part	Negative Part	Sum
ΔE			1.8
$\Delta E^+ + \Delta E^-$	4.0	2.2	6.2
$J^C + J^D$	4.4	2.6	7.0
$H + X$	11.9	10.1	22.0

* E = employment; J^C = jobs created; J^D = jobs destroyed; H = hires; X = separations.

Including intrafirm gross job creation and destruction to allow the calculation of $J^C + J^D$, which is novel in this study, raises the estimate of job turnover to 7.0 percent, roughly 15 percent above what the standard measure suggests. This is important; but it is obvious that the simultaneous creation and destruction of jobs within firms does not occur frequently, so that we should not greatly alter our views about the relative magnitudes of aggregate employment change and firm-level absolute net employment change.

Table 2 also demonstrates that job turnover is only one third of labor turnover [8]. The huge size of flows of workers compared to net changes

8. The measure of labor turnover is the sum of hires and separations and may double-count movements of workers.

in employment replicates results found for several American states by ANDERSON and MEYER [1994] and BURGESS *et al.* [1994]. Our results expand on those studies a bit, however, for they cover an entire economy and show how large these flows of workers are even compared to flows of jobs, not just to changes in employment. The sheer magnitude of worker flows shown here and in the two other studies suggests the value of paying more attention to the gross costs of adjusting employment rather than to the net employment changes that to capture most of the attention of researchers studying the dynamics of labor demand.

3.2. **Net Employment Changes and Flows of Workers**

Table 3 presents summary statistics for the pooled sample. Because the data are weighted and cover both 1988 and 1990, the estimates are not identical to their counterparts in Table 1. The average annual hiring rate is 12.4 percent, while the separation rate is 11.8 percent, of which the firing rate is 1.5 percent, the quit rate 8 percent, and the rest miscellaneous separations. The average annual internal mobility rate is 3.3 percent.

TABLE 3

Means and Standard Deviations of Hires (H)***, Separations*** (X)***, Fires*** (F)***, Quits*** (Q) ***and Internal Mobility*** (M)***, 1988 and 1990 (annual percentages of employment at the start of the year)****

	H_t	X_t	F_t	Q_t	M_t	N
$\Delta E > 0$	20.3 (14.2)	9.8 (7.9)	1.1 (2.9)	7.0 (7.0)	4.2 (8.1)	890
$\Delta E = 0$	11.3 (13.8)	11.3 (13.8)	0.8 (3.0)	8.6 (12.1)	2.4 (6.4)	367
$\Delta E < 0$	5.9 (7.0)	13.9 (9.7)	2.3 (6.4)	8.4 (7.8)	3.0 (5.7)	947
Total	12.4 (13.4)	11.8 (10.0)	1.5 (4.7)	8.0 (8.4)	3.3 (7.0)	2204

* N = number of firms; ΔE = annual employment change.

Table 3 divides the pooled sample into firms with growing, stable or declining employment. Unsurprisingly, the hiring rate decreases as employment growth moves from positive to negative. Still, hiring rates in firms with declining employment average 5.9 percent. Most important, calculations based on the table show that only 58 percent of all hires occur in firms that are expanding. The firing rate where employment is declining is higher than where it is increasing or stable. Firms with expanding employment still fire 1.1 percent of their workers each year, though; and only 40 percent of all fires occur in firms that are contracting.

Table 4 examines the extent to which firms can be classified as remaining in the same regime over time (e.g., expanding and hiring, declining and hiring, etc.) by presenting data describing the panel of 558 firms. Roughly 14 percent of firms are declining in both years; and another 14 percent are growing in both years. A large majority, though, are growing in one year and stable or declining two years later. Probably most interesting is the relative lack of persistence in hiring. The probability that firms with stable

TABLE 4

Persistence in Employment Adjustment (percent of firms)

	1990					
1988	$\Delta E < 0$ $H = 0$	$\Delta E < 0$ $H > 0$	$\Delta E = 0$ $H = 0$	$\Delta E = 0$ $H > 0$	$\Delta E > 0$ $H > 0$	Total
$\Delta E < 0,\ H = 0$	1.3	1.8	0.0	2.3	2.3	7.7
$\Delta E < 0,\ H > 0$	4.8	6.0	0.0	4.9	9.2	24.9
$\Delta E = 0,\ H = 0$	0.6	0.0	0.0	5.7	3.5	9.8
$\Delta E = 0,\ H > 0$	3.4	4.8	0.0	6.8	8.1	23.1
$\Delta E > 0,\ H > 0$	3.6	8.0	0.0	8.6	14.3	34.5
Total	13.7	20.6	0.0	28.3	37.4	100.0

employment in both years that are hiring in the first year are also hiring in the second year is only 0.54. Similarly, hiring behavior among firms that are declining in both years is quite variable over time. While there is some persistence in hiring among continuously growing and stable firms,

FIGURE 2*a*

Hiring Rate by Growth of Employment

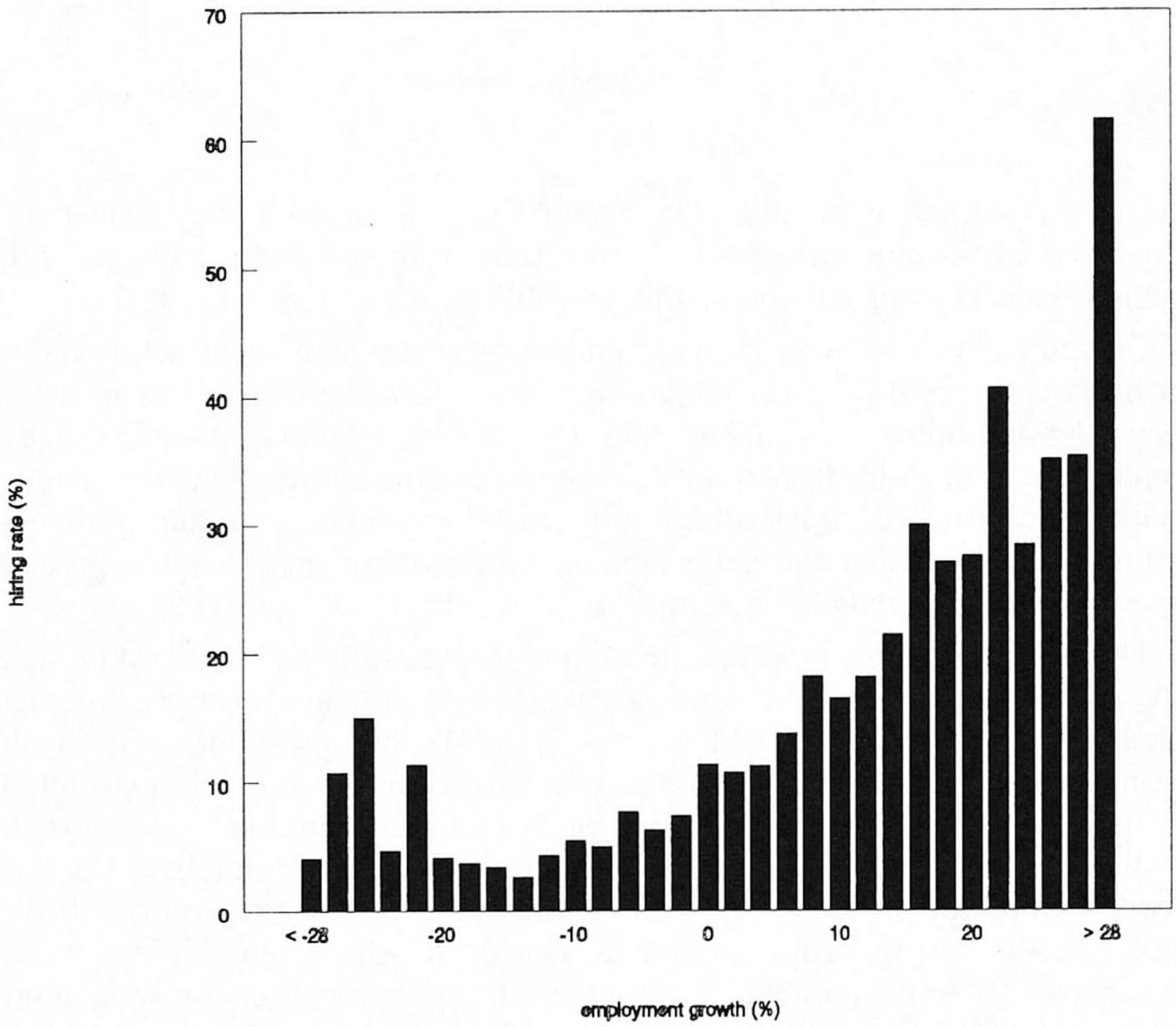
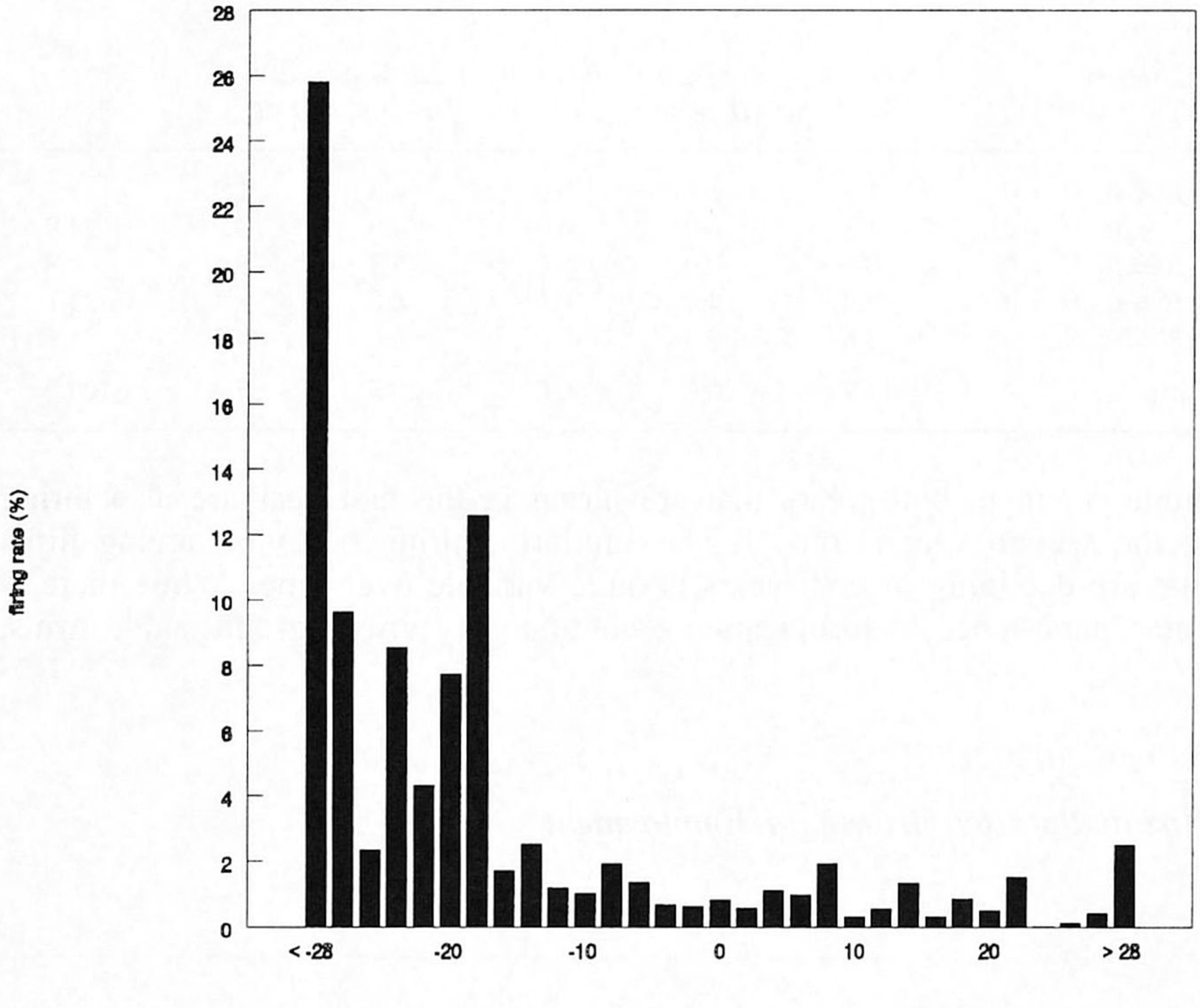


FIGURE 2*b*



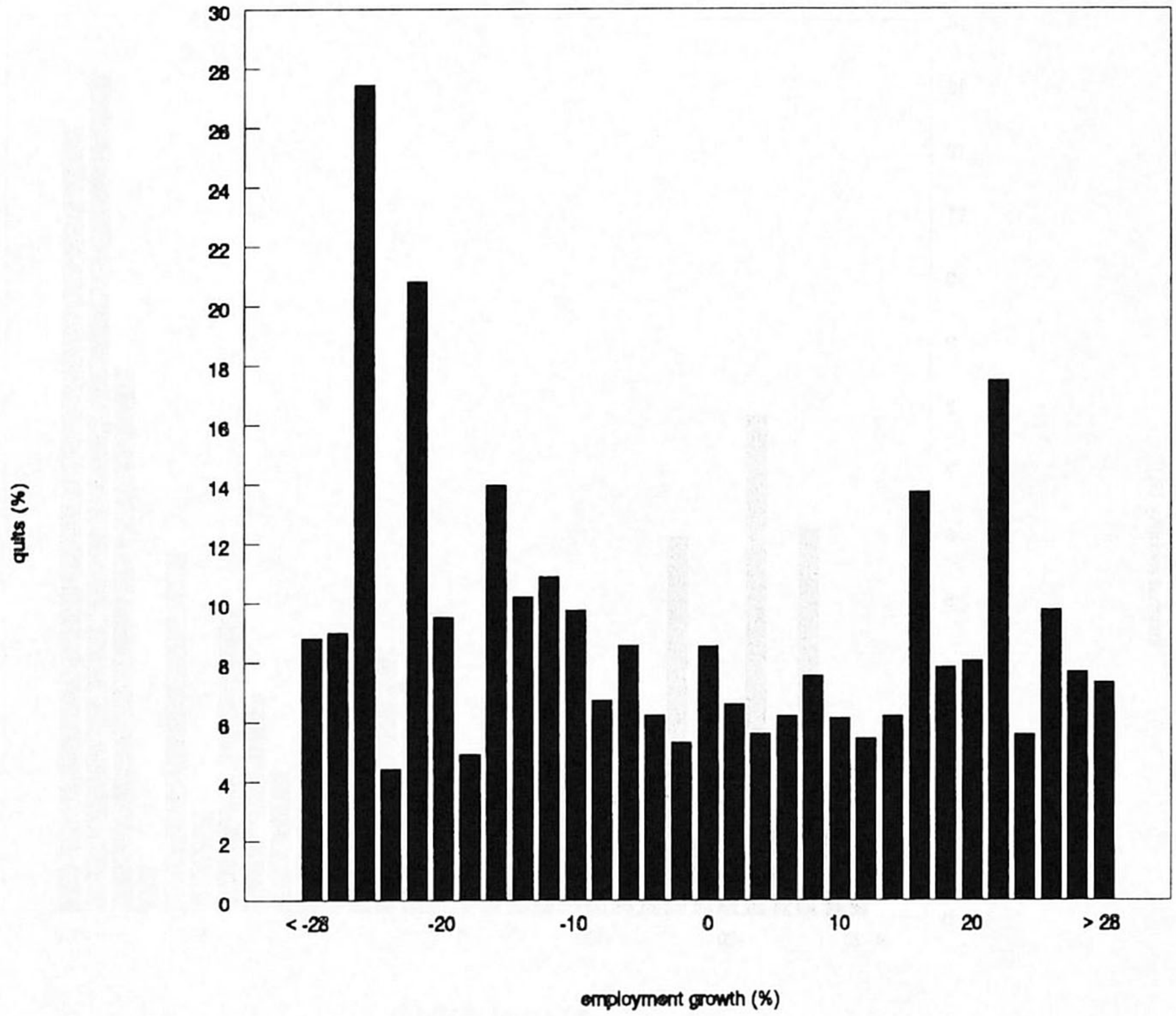
even they vary their greatly. The implied on-off behavior may reflect the existence of nonconvex costs of hiring (HAMERMESH [1989]), though with annual data we cannot explore this possibility in great detail.

Quit rates in firms with growing employment are somewhat below those in firms with decreasing or stable employment, but the differences in these averages are quite small. The quit rate seems relatively unaffected by conditions within the firm (presumably responding more to general labor-market conditions). Internal mobility rates are highest among growing firms, suggesting that the expansion of employment does lead to greater opportunities for incumbent employees.

The data on internal mobility are unique to this study and merit additional attention. Table 5 presents one novel, though perhaps unsurprising fact (demonstrated again by HASSINK *et al.* [1994]: Internal mobility is much more common within larger firms than in smaller ones. In nearly two-thirds of firms with fewer than 100 employees no internal mobility was reported, while three-fourths of larger firms reported some internal mobility. Greater opportunities for promotion have long been adduced as a reason for lower quit rates in larger firms. (Even in our data, which ignore firms with fewer than 10 employees and, most important, ignore workers on short-term contracts, we still find a sligth difference of 0.3 percent per annum between

FIGURE 2*c*

Quit Rate by Growth of Employment



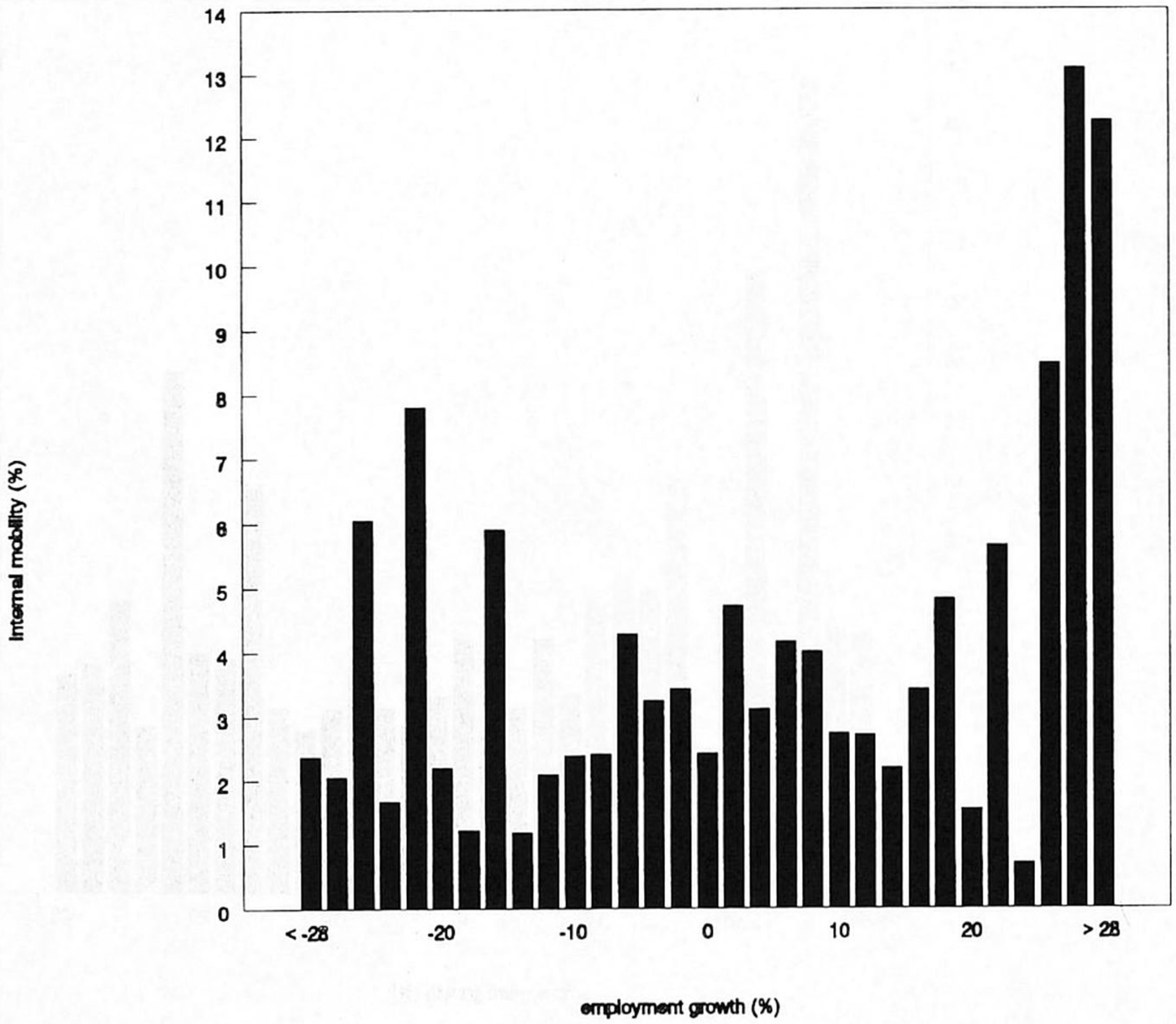
firms with fewer and more than 100 employees). We believe this is the first demonstration that the opportunities for promotion are actually greater in larger firms. One should note too that chances for advancement are larger for white- than for blue-collar workers: Those firms where $M > 0$ have a higher proportion of white-collar workers in total employment (32 percent) than do firms where $M = 0$ (28 percent).

Figure 2 presents more detail about the relationships between rates of flows of workers and employment growth. Firms are classified into growth categories ranging in steps of two percentage points from -28 percent to $+28$ percent. The left- and right-most bars represent the average rates from the tails and contain 0.6 percent and 1.5 percent of the (employment-weighted) firms respectively. Figure 2*a* shows that hires occur even at large negative employment growth. The hiring rate is roughly stable between 5 and 8 percent where employment is declining, regardless of the size of the decline. Among expanding firms there is a clear positive correlation between employment growth and the hiring rate.

Figure 2*b* shows that the relationship between the firing rate and employment growth is the mirror image of Figure 2*a*. The firing rate is quite stable at about 1 percent where employment is growing. Where

FIGURE 2*d*

Internal Mobility Rate by Growth of Employment



employment is declining, the firing rate is greater the larger is the drop in employment.

Figure 2*c* graphs the quit rate by employment change. As was obvious in Table 3, there is no strong correlation between the two. Figure 2*d* shows that the average internal mobility rate also does not vary much with employment growth. If internal mobility were important in the reshuffling of employment, we would see a U-shaped relationship between it and employment growth. Figure 2*d* gives at most only a very slight hint of this. Where employment is growing very rapidly, though, reshuffling is substantial: The internal mobility rate is highest among firms growing at least 24 percent per year.

Table 3-5 and Figure 2 produce several novel conclusions. Most important, flows of workers are large even in firms where net employment changes are small. Hiring is not restricted to firms with expanding employment (mostly because of the very high rate of quitting). Firing is not restricted to firms with declining employment. Internal mobility is low, below the average hiring rate, even in firms with declining employment, though it is higher in larger firms. This fairly low rate suggests that most workers enter their jobs directly from outside the firm, while internal

TABLE 5

Internal Mobility by Firm Size, 1988 and 1990 (percent of firms)

	$E < 100$	$E \geq 100$	Total
$M = 0$	57.2	2.7	59.9
$M > 0$	32.4	7.7	40.1
Total	89.6	10.4	100.0

mobility chains, movements along Dunlop-type [1957] job ladders, are relatively few.

3.3. Simultaneous Hiring and Firing

Table 6 groups firms according to hiring and firing status and whether employment is growing, stable and declining. It shows that one quarter of the firms in our sample did not alter employment in a given year. The fractions of firms with decreasing or increasing employment are about the same. Most of the firms (83 percent) are hiring, either with (21.6 percent) or without (61.3 percent) firing. Together with the observation that only 2.6 percent of firms without hiring, this demonstrates that most firing is done by firms that are also hiring.

TABLE 6

Hires (H)***, Fires*** (F) ***and Annual Employment Change*** (ΔE)***, 1988 and 1990 (percent of firms)***

	$\Delta E < 0$	$\Delta E = 0$	$\Delta E > 0$	Total
$H = 0,\ F = 0$	9.9	4.6	0.0	14.5
$H = 0,\ F > 0$	2.6	0.0	0.0	2.6
$H > 0,\ F = 0$	16.6	17.5	27.2	61.3
$H > 0,\ F > 0$	9.5	4.0	8.1	21.6
Total	38.6	26.1	35.3	100.0

The remaining tables consider to what extent this apparent simultaneity of hiring and firing can be attributed to observable worker heterogeneity. One proxy for such heterogeneity is the size of the firm, since larger firms will generally employ workers in more skill groups. Table 7 relates the four possible combinations among hires and fires to firm size. 45 percent of the large firms (at least 100 employees) simultaneously fire and hire, substantially more than the 19 percent of small firms. The table demonstrates that with more heterogeneity of workers (greater firm size), there is also more simultaneous hiring and firing. This evidence suggests (albeit only indirectly) that some of the simultaneity arises from firms' altering the mix of workers of different observable types in response to various shocks.

Table 8 examines whether classification by one observable distinction – white-collar (WC) and blue-collar (BC) workers – can account for the

TABLE 7

Hires and Fires by Firm Size, 1988 and 1990 (percent of firms)

	$E < 100$	$E \geq 100$	Total
$H = 0,\ F = 0$	14.2	0.3	14.5
$H = 0,\ F > 0$	2.3	0.2	2.6
$H > 0,\ F = 0$	56.1	5.2	61.3
$H > 0,\ F > 0$	17.0	4.7	21.6
Total	89.6	10.4	100.0

TABLE 8

Blue-collar (BC) and White-collar (WC) Hires and Fires, 1988 and 1990 (percent of firms)

	Hires				
Fires	$BC = 0$ $WC = 0$	$BC > 0$ $WC = 0$	$BC = 0$ $WC > 0$	$BC > 0$ $WC > 0$	Total
$BC = 0$ $WC = 0$	14.5	26.5	6.4	28.4	75.8
$BC > 0$ $WC = 0$	1.8	5.8	0.6	7.6	15.8
$BC = 0$ $WC > 0$	0.5	0.5	0.7	3.5	5.2
$BC > 0$ $WC > 0$	0.3	0.6	0.1	2.2	3.2
Total	17.1	33.4	7.8	41.7	100.0

apparent simultaneous hiring and firing. If, for example, employment declines among white-collar workers while quitters are blue-collar workers who must be replaced, we would observe both hiring and firing at the firm level. Among the 21.6 percent of firms that are hiring and firing, only 1.1 percent of all firms are firing only one type of worker and hiring only the other. By far the most common pattern among this 21.6 percent of firms is simultaneous hiring and firing of blue-collar workers (13.4 percent of firms). The table shows clearly that heterogeneity across boradly-defined occupational lines accounts for only a small part of the surprisingly common observation of firms that are hiring and firing in the same year. The apparent simultaneity even within a (broad) occupation suggests that much of what we observed are failed job matches that are replaced by new ones with a different worker in the same job.

Another possibility is that the apparently simultaneous hiring and firing is an artifact of the temporal aggregation in our annual data. One might reasonably question whether such simultaneity is even possible: If we observed each firm every second we would never observe simultaneous hiring and firing. No doubt annual observations are not the most desirable

for this purpose, any more than are observations every second (or even minute). Evidence from comparisons of quaterly and annual data on firm-level net employment changes (e.g., DAVIS and HALTIWANGER [1990]) shows, however, that the sum of these net changes in quarterly data is at least 50 percent of the sum when the calculation is based on annual data. With a finer temporal aggregation, perhaps to quarterly or even to monthly observations, we believe that simultaneous hiring and firing would still be observed fairly frequently. This analogy, though by no means resolving the issue, at least hints that this phenomenon is not purely an artifact of our data set.

How can we rationalize this subsection's finding that most of the firms that are firing are also hiring with the result of the first subsection that simultaneous destruction and creation of jobs within the firm is small? One compelling possibility consistent with the data is that, as we showed in Table 1, most jobs that are vacated by fired workers are filled by workers who are hired to replace them in jobs that continue. Apparently most mobility of workers is into and out of existing jobs rather than to newly created or from destroyed jobs. Labor turnover is to a large extent a self-driven process that is only loosely connected to job creation and job destruction.

4 Conclusions

We have investigated the phenomena of job creation and job destruction and of hiring and firing workers using a set of data on employment levels and types of flows of workers to, from and within firms. The terms job creation/destruction and hiring/firing are definitely not intercheangeable. There is substantial hiring to existing jobs. Hiring is not restricted to firms with expanding employment; over 40 percent of hiring is done by firms that are not growing. Firing is not restricted to firms with declining employment; the majority of firing is done by firms that are not declining.

The huge difference between aggregate net employment change and firm-level net employment change that has been noted frequently in the recent literature is enlarged only somewhat when simultaneous job creation and destruction within firms is accounted for. Using the job classfications that employers themselves use, our results suggest that ignoring the heterogeneity arising from job creation/destruction within firms does not detract greatly from our ability to analyze macroeconomic fluctuations that are related to interfirm heterogeneity.

The demonstration over the last decade that heterogeneity in employment growth among firms and establishments within narrowly-defined industries is immense has been a fundamental contribution to our understanding of the microeconomic bases of macroeconomic change. Here we have demonstrated that there is a concomitant heterogeneity in flows of workers into and out of the firm, and through and between jobs, among firms whose employment is changing at identical rates. Moreover, these flows

are substantial. These facts suggest that further empirical work requires data on both job and labor turnover. Only then will be able to understand and analyze the complexity of employment dynamics and labor mobility to the appropriate extent and be able to apply that analysis to enhance our understanding of change at the macro level.

• References

ANDERSON, P., MEYER, B. (1994). – "The Extent and Consequences of Job Turnover", *Brookings Papers on Economic Activity, Microeconomics*, pp. 177-248.

BURGESS, S., NICKELL, S. (1990). – "Turnover in U.K. Manufacturing", *Economica*, 55, pp. 295-318.

BURGESS S., LANE J., STEVENS D. (1994). – "Job Flows, Worker Flows and Churning", *Unpublished paper*, Center for European Policy Research.

CABALLERO, R., ENGEL, Ed., HALTIWANGER, J. (1995). – "Aggregate Employment Dynamics: Building from Microeconomic Evidence", National Bureau of Economic Research, *Working Paper No. 5042*.

CRAMER, U., KOLLER, M. (1988). – "Gewinne und Verluste von Arbeitsplätzen in Betrieben – der Job-Turnover" Ansatz, *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, 21, pp. 361-377.

DAVIS, S., HALTIWANGER, J. (1990). – "Gross Job Creation and Destruction: Microeconomic Evidence and Macroeconomic Implications", *NBER Macroeconomics Annual*, 5, pp. 123-168.

DAVIS, S., HALTIWANGER, J. (1992). – "Gross Job Creation, Gross Job Destruction and Employment Reallocation", *Quaterly Journal of Economics*, 107, pp. 819-863.

DUNLOP, J. (1957). – "The Task of Contemporary Wage Theory" in George Taylor and Frank Pierson, eds., *New Concepts in Wage Determination*, New York, McGraw Hill.

DUNNE, T., ROBERTS, M., SAMUELSON, L. (1989). – "The Growth and Failure of U.S. Manufacturing Plants", *Quaterly Journal of Economics*, 104, pp. 671-698.

HAMERMESH, D. (1989). – "Labor Demand and the Structure of Adjustment Costs", *American Economic Review*, 79, pp. 674-689.

HAMERMESH, D. (1993). – *Labor Demand*. Princeton University Press.

HAMERMESH, D. (1995). – "Labor Demand and the Source of Adjustment Costs", *Economic Journal*, 105, pp. 620-634.

HASSINK, W., van OURS, J., RIDDER, G. (1994). – "The Role and Prevalence of Internal Labour Markets: An Empirical Investigation, Vrije Universiteit Research Memorandum, pp. 1994-44.

JOVANOVIC, B. (1979). – "Job Matching and the Theory of Labor Turnover", *Journal of Political Economy*, 87, pp. 972-990.

LEONARD, J. (1987). – "In the Wrong Place at the Wrong Time", in Kevin Lang and Jonathan Leonard, eds., *Unemployment and the Structure of Labor Markets*, New York, Basil Blackwell.

LEONARD, J., van AUDENRODE, M. (1993). – "Corporatism Run Amok: Job Stability and Industrial Policy in Belgium and the United States", *Economic Policy*, 17, pp. 355-400.

LOCKWOOD, B., MANNING, A. (1994). – "The Importance of Kinked Adjustment Costs: Some Evidence from U.K. Manufacturing", in Jan van Ours, Gerard Pfann and Geert Ridder, eds. *Labor Demand and Equilibrium Wage Formation*, Amsterdam, North-Holland Press.

NICKELL, S. (1986). – "Dynamic Models of Labour Demand", in Orley Ashenfelter and Richard Layard, eds., *Handbook of Labor Economics*, Amsterdam, North-Holland Press.

SARGENT, Th. (1978). – "Estimation of Dynamic Labor Demand Schedules under Rational Expectations", *Journal of Political Economy*, 86, pp. 1009-1044.

APPENDIX

Definition of Variables

E: "How many workers were employed in your organization in December 1988 (1990) (no temporary workers)? This concerns the number of employees irrespective of the number of hours worked". In the 1988 wave E is observed for 1988 and 1986. Employment for December 1987 and December 1989 are constructed by means of the hires (H) and the separation (X) of employees in the next year: $E_{t-1} = E_t - H_t + X_t$.

H: "How many employees entered your organization in 1988 (1990), including employees with a probationary period, excluding employees with a temporary contract shorter than one year?"

X: "How many employees left your organization in 1988 (1990), excluding employees with a temporary contract shorter than one year?" X is divided into the number of employees who left the organization for the following reasons: Pension, early retirement, death; outflow because of disability; firing; quit; end of temporary contract with a duration of more than one year.

M: "How many employees changed functions and/or changed department within the organization?"