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JOB TURNOVER AND LABOR TURNOVER: A TAXONOMY OF EMPLOYMENT DYNAMICS

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ABSTRACT

We present 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. Job turnover is usually measured by comparing stocks of employment in each firm at two points in time and adding up the absolute employment changes. This measure is a just proxy for true job turnover because only net job changes are counted. In this paper we use information that allows us to compare this proxy with the correct measure. We compare both of these measures to a measure of labor turnover that counts movements of individuals into and out of jobs. We find that: 1) The proxy for job turnover does not differ substantially from actual job turnover; 2) There is a big difference between job turnover and labor turnover. Most mobility is into and out of existing jobs rather than to created or from destroyed jobs; 3) A large fraction of all hires are by firms where employment is declining, and a large fraction of all layoffs are by firms where employment is expanding; 4) Simultaneous hiring and firing is due to heterogeneity of the work force.
I. Introduction

Job creation, job destruction and employment dynamics are a recent focus of both theoretical and empirical research. This paper 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 the dynamics of labor demand, 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 an data set that allow: comprehensive measures of job creation and types of labor mobility to be constructed. Our analysis confirms well-known and less well-known results on employment dynamics a contributes important new facts.

II. Alternative Concepts of Demand Dynamics

Underlying the entire discussion are two fundamental issues: 1) What pattern changes in staffing at the firm level occur in the process of job and labor turnover? What microeconomic forces produce these changes? The latter issue has been analyzed in the considerable literature dealing with the nature and size of adjustment costs. Some interesting work has recently gone beyond standard models of convex adjustment.
analyze the possible existence of lumpy costs at the micro level (Hamermesh, 1989; Caballero et al., 1994) and their usefulness in explaining aggregate fluctuations (Caballero and Engel, 1993). Other research has attempted to tier what generates these costs (Hamermesh, 1995).

We do not consider the second issue. 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 where the net change in employment is positive (negative). That interfirm (or interplant) reallocation is important within an aggregate is useful for demonstrating how changes in the dispersion of demand shocks can affect macroeconomic adjustment.

Even assuming that labor is homogeneous, concentration on net employment changes ignores much of the potentially important adjustment costs that might be generated by

See Hamermesh (1993, Chapter 4) for a summary and critical discussion of this literature.
demand shocks. One can easily imagine a firm 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:

\[ (l) \Delta E = NH + R + TI - Q - F - D - TO, \]

where NH are new hires; R are rehires; TI are transfers to 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 Nickell (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) demonstrated that Belgium manufacturing firms have simultaneous hires and layoffs. We do not know, though, the extent to which establishments or firms can be classified using (1) into those that are growing and hiring, and declining and firing; or whether hiring and/or firing are activities that only loosely related to net employment changes. That is, does growth in employment •

²This is essentially the decomposition used in the establishment data collected by the U.S. Bureau of Labor Statistics from 1958 through 1981.
that the firm is in a “hiring regime” (Lockwood and Manning, 1993)? Does a drop in employment imply a “firing regime?” The first specific question we examine is 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. The “European approach” (e.g., Nickell, 1986) does treat the firm’s decision in terms of some of the gross flows in (1). 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 were 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 Cm-level net employment change.
Figure 1 offers a complete taxonomy of the dynamics of labor demand for a single-plant firm. Every worker in the firm fills a job. In Period $t$ 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. 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, $AE$, as in (1), which by definition equals $J_{t-1} - J_t$. The second concept is the firm-level net employment change, $A E^+ + AE^-$, 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. The third measure, which we denote by $JC + JD$ (jobs created plus jobs destroyed) and call job turnover, adds gross shifts in jobs within the firm to the second measure. Thus just as $A E^+ + AE^-$ departs from $AE$ by adding interfirm gross job creation and destruction within an aggregate of firms, $JC + JD$ departs from $A E^+ + AE^-$ by adding intrafirm gross job creation and destruction in the aggregate of jobs within individual firms.

All three of these measures ignore workers’ identity. All, including the third, which is novel here, are based on positions, not people. The fourth measure is labor turnover, based

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).
on total hires $H$ and separations $X$. If twice the internal mobility flow ($IM$) is added to the fourth term then the relations among the four terms are:

$$AE \leq AE^- + \Delta E^i \leq J^c + J^p \leq H + X.$$ \(^4\)

Obviously, net employment change is the same no matter which concept it is based on:

$$\Delta E = \Delta E^* - \Delta E' = J^c - J^p = H - X.$$  

The second specific question is whether the traditional measure of job turnover is a good approximation for actual job turnover. 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 workers, and vice-versa. That assumption is required by profit maximization in the presence of the homogeneous work force that the models always assume. In a world of heterogeneous labor simultaneous hiring and firing is possible in response to relative demand or cost shocks. Whether this simultaneity is empirically important is the third specific question investigated in the next section. We analyze both the simultaneity of hiring and firing and the extent to which heterogeneity causes $J^c + J^p$ to exceed $\Delta E^* + \Delta E'$.

The possible coexistence of hiring and firing in 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

\(^4\)One might add the term $2IM$ to $H + X$, as to reflect simultaneous creation and destruction of jobs within the firm without any hiring or separations occurring.
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.

III. Estimates of the Component Flows of Labor Demand

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.

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. Two studies (Cramer and Koller, 1988; Lane et al., 1993) 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. There have also been efforts to draw inferences from the longitudinal panels of establishments in conjunction with data on workers from household surveys (e.g., Boen, 1992).
(including government and education) in the Netherlands in 1988 and 1990. The samples are stratified according to area of economic activity and size of the firm (10-49, 50-99, and 100-t employees), with firms of fewer than 10 employees excluded. 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 factor-demand dynamics that are restricted to the small and decreasingly important manufacturing sector, covers the entire economy.

Each survey uses two questionnaires. The first, which is administered by enumerators, concerns qualitative characteristics and financial data; the second concerns administrative information. The mail responses to this second questionnaire come some time after the first questionnaire is answered and have a nonresponse rate of 20-25 percent. In 1988 the sample consists of 2041 firms, in 1990 of 2017 firms. The firms included in each survey contain 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 This left 1190 firms that responded in both years.

Removing those firms that lack essential information (for example, answers on the second questionnaire) leaves a sample of 1159 firms from the 1988 survey and 1045 firms from the 1990 survey. Tables 1 and 2 (illustrating Figure 1) are based only on data for 1158 firms of 1990, which differs from the data set of 1990 above. The results in Tables 3, 4,
6 and 7 and Figures 2 are based on the pooled sample of the 2204 observations. The panel of 558 firms with complete responses is the basis for Table 5. Other than in Tables 1 and 2 the information we present is weighted by sector and firm size to be representative of all Dutch firms having at least 10 employees.

Employment is calculated as the number of employed workers, irrespective of the number of hours worked. Temporary workers are excluded. The number of hires is defined as the number of employees who entered the organization during the year, including employees with a probationary period and excluding employees with a temporary contract shorter than one year. Total outflow of workers is defined in a similar way using the number of separations. Here we distinguish with respect to the reason of separation. Internal mobility is defined as the number of employees 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. Definitions of the main variables are presented in Appendix A.

A. Job Flows and Flows of Workers

Table 1 presents estimates of the flows in Figure 1. For each firm, if there had been any internal mobility, hiring or separation of workers during the year, 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 IM), or whether the worker went to a (newly) created job or existing job (in case of H and IM). Aggregation of information on employment levels across the firms gives estimates of the relevant
fractions, which after multiplication by $H$, $X$ or $M$ gives the size of each of the subflows. The information is not weighted, because weighting would bias the estimates of the fractions.’

Table 1 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 observations. Most important, the very large majority of mobility is to and from existing jobs. Most outflows, inflows and internal flows represent reshuffling of people into and out of positions that continue in existence.

The most important use of the taxonomy in Figure 1 is its illustration of the inequalities in (2). This is presented in Table 2, again with unweighted data. As in all other studies the proxy measure for job turnover, the firm level absolute net employment change, dwarfs average net employment change (6.2 versus 1.8 percent). Including intrafirm gross job creation and destruction to allow the calculation of $J^c + J^p$ raises the estimate of job turnover to 7.0 percent, roughly 15 percent above what the standard measure, $\Delta E^+ + \Delta E^-$, would suggest. 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 about one third of labor turnover.

\footnote{The raw estimates imply $J^c - J^p = 2.6$ percent, which does not satisfy the identity (3). To obtain the identity we adjusted $H_1$ and $X_2$ by adding respectively $\delta_1 H_1$ and $\delta_2 X_2$. The optimal weights $\delta_i$ are those that minimize the quadratic loss function $\delta_1^2 + \delta_2^2$, subject to $(1 + \delta_1) H_1 - (1 + \delta_2) X_2 = H - X + IM_3 - IM_4$.}
B. Net Employment Changes and Flows of Workers

Table 3 presents summary statistics for the pooled sample. The information in the table is weighted to reflect the industrial and size distribution of Dutch firms. For this reason and because the data cover only 1990 the estimates do not correspond to their counterparts in Table 1. The average annual hiring rate is 12.4 percent. The outflow rate is 11.8 percent, of which the firing rate is 1.5 percent and the quit rate is 8 percent (and the rest miscellaneous outflows). The average annual internal mobility rate is 3.3 percent.

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.

Quit rates in firms with growing employment are somewhat below those in firms with decreasing or stable employment, but the differences in these average 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.
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 firms respectively. Figure 2a shows that hires occur even at large negative employment growth. The hiring rate is roughly stable at 5 to 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 2b shows that the relationship between the firing rate and employment growth is the mirror image of Figure 2a. The firing rate is quite stable at about 1 percent where employment is growing. Where employment is declining, the firing rate is greater the larger is the drop in employment.

Figure 2c graphs the quit rate by employment change. As was obvious in Table 1, there is no strong correlation between the two. Figure 2d 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 2d 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 and Figures 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. Most workers enter their jobs directly from outside the firm, while internal mobility chains, movements along Dunlopian (1957) job ladders, are relatively few.

C. Simultaneous Hiring and Firing

Consider the issues of simultaneous hiring and firing in more detail. Table 4 groups firms according to hiring and firing status and whether employment is growing, stable and declining. The table 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 fire without hiring, this demonstrates that most firing is done by firms that are also hiring.

Table 5 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 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 employment in both years that are hiring in the first year are also hiring in the second year is only .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, even they vary their hiring greatly. The implied on-off behavior may reflect the existence of nonconvex costs of hiring, though with annual data this cannot be explored in detail.

The remaining Tables consider to what extent the simultaneity of hiring and firing can be attributed to worker heterogeneity. A good proxy for such heterogeneity is the size of the firm. Table 6 relates the four possible combinations among hires fires and quits to firm size. Obviously, large firms with more than 100 employees have more relatively more simultaneous fires and hires than small firms. The table demonstrates that with more heterogeneity of workers (greater firm size), there is also more simultaneous hiring and firing.

Table 7 examines whether the classification into white-collar (WC) and blue-collar (BC) workers also disentangles 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). Table 7 shows clearly that heterogeneity across broadly defined occupation accounts for only a small part of the surprisingly common observation of firms that are hiring and firing in the same year.
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 possibility consistent with the data is that most of the 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 created or from destroyed jobs. Labor turnover is to a large extent a self-driven process which is only loosely connected to job creation and job destruction.

IV. Conclusions

We have investigated the phenomena of job creation and job destruction and of hiring and firing workers using a set of establishment data on employment levels and types of worker flows to, from and within firms. The terms job creation/destruction and hiring/firing are definitely not interchangeable. 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. Obviously this conclusion depends on how one defines jobs: We 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. Nonetheless,
using the job classifications 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.

It is clear that jobs are being destroyed by firms doing substantial hiring, and that they
are being created by firms that are firing. This result can be explained by worker
heterogeneity if that is related to firm size, though it does not hold for the categorization into
blue-collar and white-collar workers. That hiring and firing occur simultaneously within the
same firm suggests that a fundamental problem exists with all studies of dynamic labor
demand based on homogeneous labor. The heterogeneity of jobs implied by this simultaneity
means that we cannot infer adjustment costs by examining patterns of adjustment of
aggregates of all workers. Even if employment is unchanged (in the context of models based
on levels), and even if we observe hiring (in the context of the models based on flows of
workers), we must take into account the frequently simultaneous existence of employer-
initiated layoffs that themselves add to adjustment costs.

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 needs data on both job and labor turnover. Only then will we be able to understand and analyze the complexity of employment dynamics and labor mobility to the appropriate extent.
REFERENCES


Julia Lane, David Stevens and Alan Isaac, “How Do Firms Treat Workers? Worker Turnover at the Firm Level,” unpublished paper, American University, October 1993.

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Appendix A. 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 outflow (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 > one year.

IM: “How many employees changed function and/or changed department within the organization?”
Figure 1. Heterogeneous Jobs and Workers in the Firs

Stocks

\( J \) = jobs
\( J^C \) = (newly) created jobs
\( J^D \) = destroyed jobs

Flows

\( H1 \) = hires to (newly) created jobs
\( H2 \) = hires to existing jobs
\( X1 \) = outflow from existing jobs
\( x2 \) = outflow from destroyed jobs
\( IM1 \) = internal mobility between existing jobs
\( IM2 \) = internal mobility from existing jobs to (newly) created jobs
\( IM3 \) = internal mobility from destroyed jobs to existing jobs
\( IM4 \) = internal mobility from destroyed jobs to (newly) created jobs
Table 1. Estimates of the Flows in Figure 1, Netherlands, 1990 (percent of employment)

<table>
<thead>
<tr>
<th></th>
<th>HI</th>
<th>Intd</th>
<th>Flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI</td>
<td>3.2</td>
<td></td>
<td>8.2</td>
</tr>
<tr>
<td>HI</td>
<td>8.7</td>
<td></td>
<td>1.9</td>
</tr>
<tr>
<td>HI</td>
<td>1.8</td>
<td></td>
<td>0.9</td>
</tr>
<tr>
<td>HI</td>
<td>0.4</td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>11.9</td>
<td>10.1</td>
<td>3.4</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Positive Part</th>
<th>Negative Part</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔE</td>
<td>4.0</td>
<td>2.2</td>
<td>6.2</td>
</tr>
<tr>
<td>ΔE^+ + ΔE^-</td>
<td>4.4</td>
<td>2.6</td>
<td>7.0</td>
</tr>
<tr>
<td>H + X</td>
<td>11.9</td>
<td>10.1</td>
<td>22.0</td>
</tr>
</tbody>
</table>

a) \( E \) = number of workers; \( F \) = number of created jobs; \( J \) = number of destroyed jobs; \( H \) = number of hires; \( X \) = number of outflows.

Table 3. Means and Standard Deviations of Hires (H), Outflows (X), Fires (F), Quits (Q) and Internal Mobility (IM), 1988 and 1990 (annual percentages of employment at the start of the year)*

<table>
<thead>
<tr>
<th></th>
<th>H1</th>
<th>X1</th>
<th>F1</th>
<th>Q1</th>
<th>IM1</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔE &gt; 0</td>
<td>20.3</td>
<td>9.8</td>
<td>11.0</td>
<td>7.0</td>
<td>4.2</td>
<td>890</td>
</tr>
<tr>
<td>ΔE = 0</td>
<td>11.3</td>
<td>11.3</td>
<td>0.8</td>
<td>8.6</td>
<td>2.4</td>
<td>367</td>
</tr>
<tr>
<td>ΔE &lt; 0</td>
<td>5.9</td>
<td>13.9</td>
<td>2.3</td>
<td>8.4</td>
<td>3.0</td>
<td>947</td>
</tr>
<tr>
<td>Total</td>
<td>12.4</td>
<td>11.8</td>
<td>1.5</td>
<td>8.0</td>
<td>3.3</td>
<td>2204</td>
</tr>
</tbody>
</table>

a) \( N \) = number of firms; \( ΔE \) = annual employment change.
Figure 2a. Hiring Rate by Growth of Employment
Figure 2b. Firing Rate by Growth of Employment
Figure 2c. Quit Rate by Growth of Employment
Figure 2d. Internal Mobility Rate by Growth of Employment
Table 4. Hires (H), Fires (F) and Annual Employment Change (AE), 1988 and 1990 (percent of firms)

<table>
<thead>
<tr>
<th></th>
<th>ΔE &lt; 0</th>
<th>AE = 0</th>
<th>ΔE &gt; 0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>H=0, F=0</td>
<td>9.9</td>
<td>4.6</td>
<td>0.0</td>
<td>14.5</td>
</tr>
<tr>
<td>H=0, F&gt;0</td>
<td>2.6</td>
<td>0.0</td>
<td>0.0</td>
<td>2.6</td>
</tr>
<tr>
<td>H&gt;0, F=0</td>
<td>16.6</td>
<td>17.5</td>
<td>27.2</td>
<td>61.3</td>
</tr>
<tr>
<td>H&gt;0, F&gt;0</td>
<td>9.5</td>
<td>4.0</td>
<td>8.1</td>
<td>21.6</td>
</tr>
<tr>
<td>Total</td>
<td>38.6</td>
<td>26.1</td>
<td>35.3</td>
<td>100.0</td>
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</table>

Table 5. Persistence in Employment Adjustment (percent of firms)

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>1988</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
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<tr>
<td></td>
<td>ΔE &lt; 0</td>
<td>H=0</td>
<td>H&lt;0</td>
<td>ΔE = 0</td>
<td>H=0</td>
<td>H&gt;0</td>
</tr>
<tr>
<td>H=0</td>
<td>1.3</td>
<td>1.8</td>
<td>0.0</td>
<td>2.3</td>
<td>2.3</td>
<td>7.7</td>
</tr>
<tr>
<td>H&gt;0</td>
<td>4.8</td>
<td>6.0</td>
<td>0.0</td>
<td>4.9</td>
<td>9.2</td>
<td>24.9</td>
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<tr>
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<td>0.0</td>
<td>5.7</td>
<td>3.5</td>
<td>9.8</td>
</tr>
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<td>4.8</td>
<td>0.0</td>
<td>6.8</td>
<td>8.1</td>
<td>23.1</td>
</tr>
<tr>
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<td>8.0</td>
<td>0.0</td>
<td>8.6</td>
<td>14.3</td>
<td>34.5</td>
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<td>Total</td>
<td>13.7</td>
<td>20.6</td>
<td>0.0</td>
<td>28.3</td>
<td>37.4</td>
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Table 6. Hires and Fires by Firm Size, 1988 and 1990 (percent of firms)

<table>
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<tr>
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<th>E &lt; 100</th>
<th>E ≥ 100</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>H=0, F=0</td>
<td>14.2</td>
<td>0.3</td>
<td>14.5</td>
</tr>
<tr>
<td>H=0, F&gt;0</td>
<td>2.3</td>
<td>0.2</td>
<td>2.6</td>
</tr>
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<td>H&gt;0, F=0</td>
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<td>61.3</td>
</tr>
<tr>
<td>H&gt;0, F&gt;0</td>
<td>17.0</td>
<td>4.7</td>
<td>21.6</td>
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<tr>
<td>Total</td>
<td>89.6</td>
<td>10.4</td>
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</tbody>
</table>
Table 7. Blue-collar (BC) and White-collar (WC) Hires and Fires, 1988 and 1990 (percent of firms)

<table>
<thead>
<tr>
<th>Fires</th>
<th>BC=0 WC=0</th>
<th>BC&gt;0 WC=0</th>
<th>BC=0 WC&gt;0</th>
<th>BC&gt;0 WC&gt;0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC=0</td>
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<td>26.5</td>
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<td>75.8</td>
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<td>5.8</td>
<td>0.6</td>
<td>7.6</td>
<td>15.8</td>
</tr>
<tr>
<td>BC=0</td>
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<td>0.5</td>
<td>0.7</td>
<td>3.5</td>
<td>5.2</td>
</tr>
<tr>
<td>WC&gt;0</td>
<td>0.3</td>
<td>0.6</td>
<td>0.1</td>
<td>2.2</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td>17.1</td>
<td>33.4</td>
<td>7.8</td>
<td>41.7</td>
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