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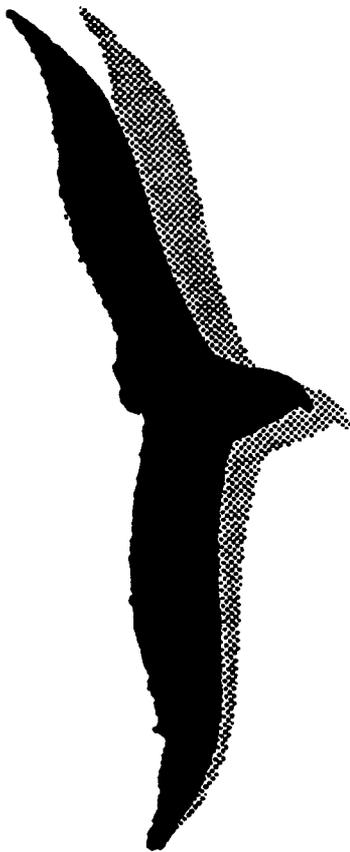
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JOB TURNOVER AND LABOR TURNOVER: A TAXONOMY OF EMPLOYMENT DYNAMICS

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JOB TURNOVER AND LABOR TURNOVER: A TAXONOMY OF EMPLOYMENT DYNAMICS

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 and contributes important new facts.

II. Alternative Concepts of Demand 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? 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 of the most 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).¹ 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

¹See 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:

$$(1) \Delta E \equiv NH + R + TI - Q - F - D - TO,$$

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 **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 **growi** 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 L 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**.³ 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, 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. The third measure, which we denote by $J^C + J^D$ (jobs created plus jobs destroyed) and call 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 job 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' 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:

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

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

$$(3) \quad \Delta E \equiv \Delta E^+ - \Delta E^- \equiv J^C - J^D \equiv H - X.$$

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 $J^C + J^D$ 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

⁴One 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**.⁵ The surveys are of organizations, which we refer to as firms, and are representative of all industries

⁵Two 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., **Boeri**, 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**.⁶ The results in Tables 3, 4,

⁶For the **first** data set those **firms** are selected which have information available on the worker flows and the categorization of white-collar and blue-collar workers. The data set **illustrating** Figure 1 contains **firms** which responded to the questions about the flows and the individual workers.

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 IM 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 $J^C + J^D$ 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.

‘The raw estimates imply $J^C \cdot J^D = 2.6$ 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 $(1 + \delta_1)H1 - (1 + \delta_2)X2 = H - X + IM3 - IM4$.

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 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.

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 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 (2 1.6 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.

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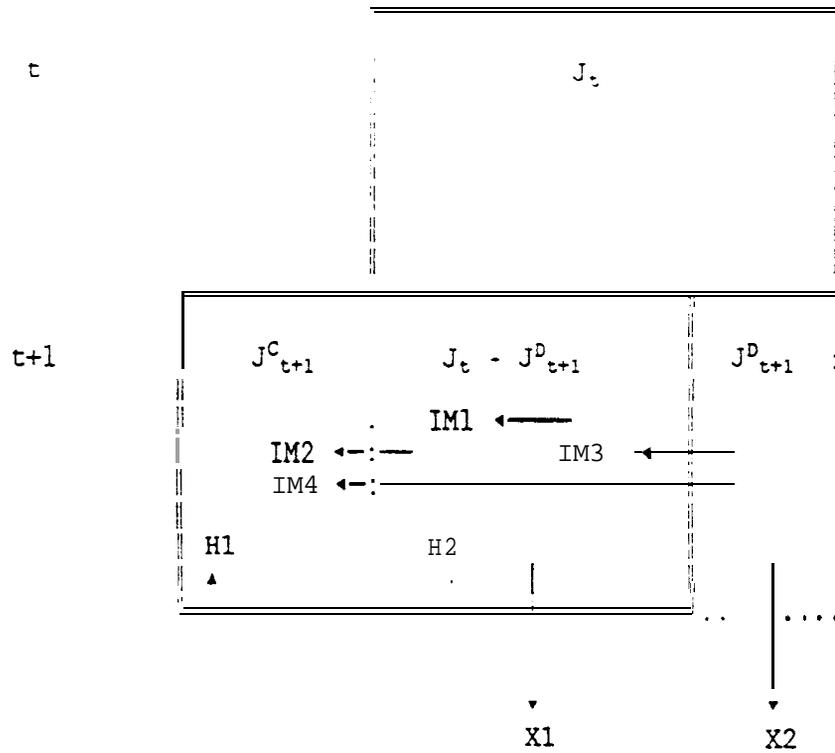
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Appendix A. Definition of Variables

- 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 Firms



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
 $rM4$ = internal mobility **from** destroyed jobs to (newly) created jobs

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

Hires		outflows		Internal Flows	
H1	3.2	X1	8.2	IM1	1.8
H2	8.7	x 2	1.9	IM2	0.9
				IM3	0.4
				IM4	0.3
Total	11.9		10.1		3.4

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

a) E = number of workers; J^c = number of created jobs; J^d = 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)'

	H_t	X_t	F_t	Q_t	IM_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

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

Figure 2a. Hiring Rate by Growth of Employment

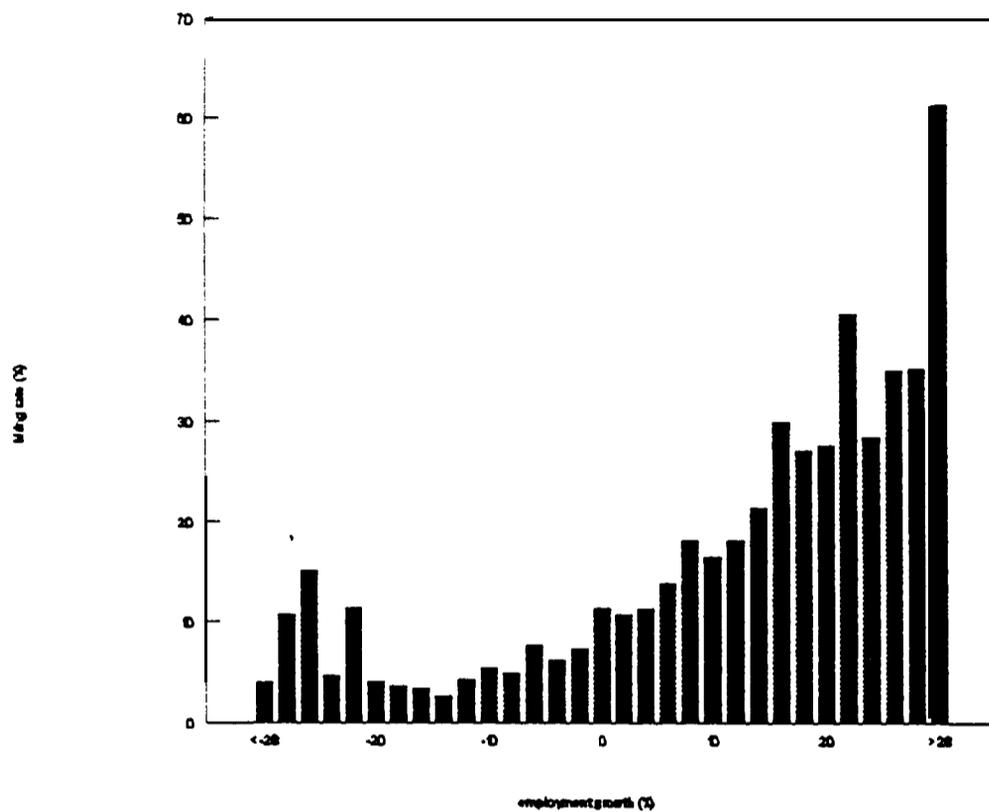


Figure 2b. Firing Rate by Growth of Employment

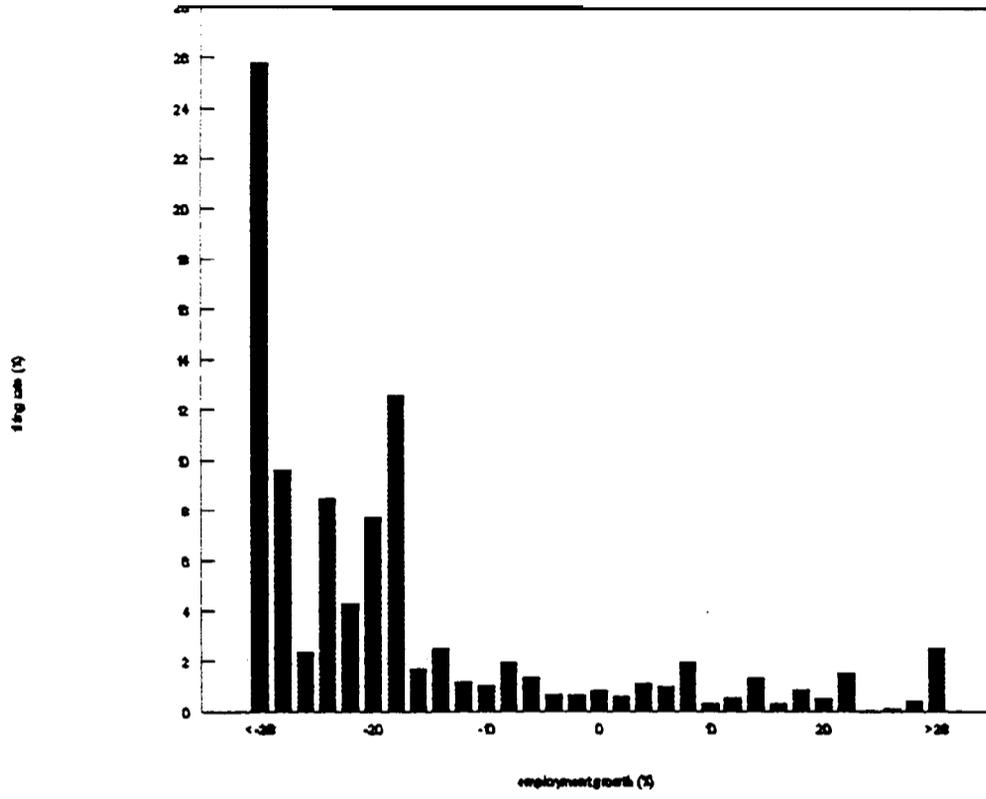


Figure 2c. Quit Rate by Growth of Employment

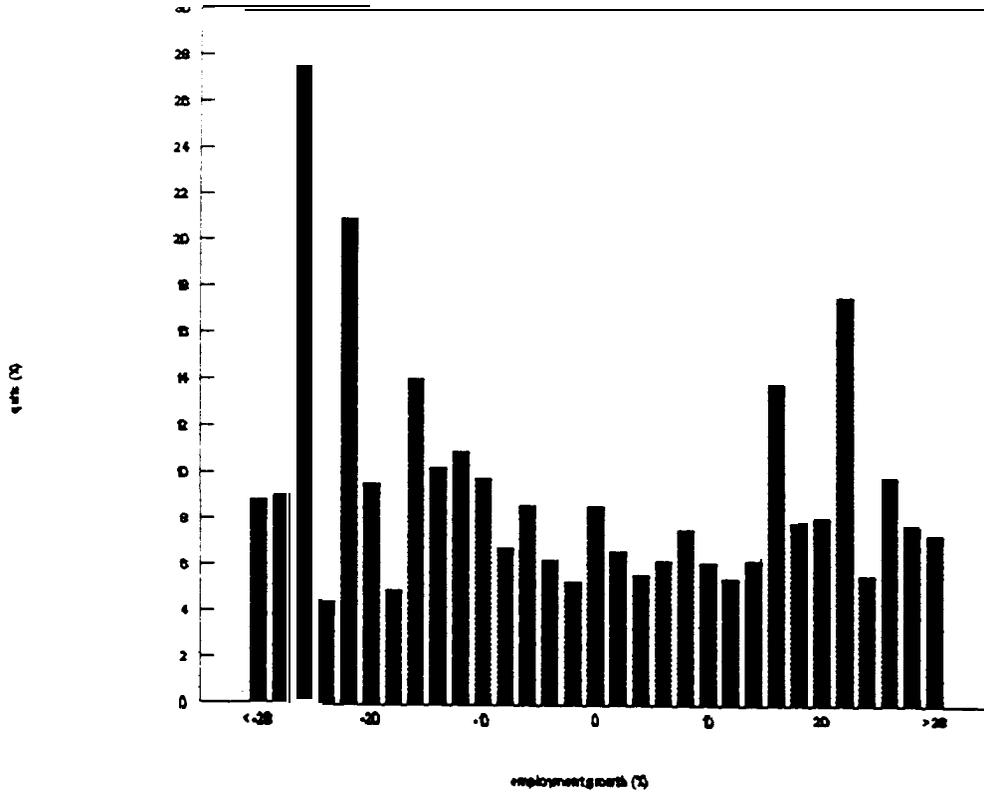


Figure 2d. Internal Mobility Rate by Growth of Employment

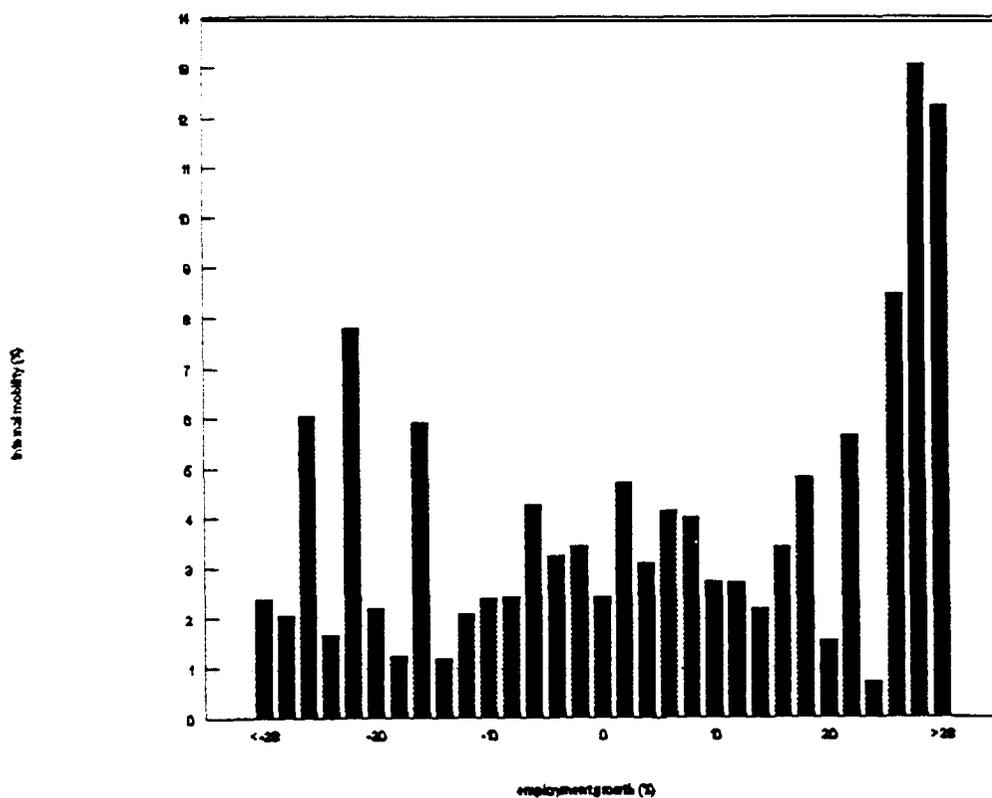


Table 4. Hires (H), Fires (F) and Annual Employment Change (AE), 1988 and 1990 (percent of firms)

	$\Delta E < 0$	$AE = 0$	$\Delta E > 0$	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

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

	1990					Total
	$\Delta E < 0$ H=0	$\Delta E < 0$ H>0	$\Delta E = 0$ H=0	$\Delta E = 0$ H>0	$\Delta E > 0$ H>0	
1988						
$\Delta E < 0, H=0$	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

Table 6. 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 7. Blue-collar (BC) and White-collar (WC) Hires and Fires, 1988 and 1990
(percent of firms)

Fires	Hires				Total
	BC=0 WC=0	BC>0 WC=0	BC=0 WC>0	BC>0 WC>0	
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