Firm Heterogeneity and Worker Turnover

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Abstract

Previous empirical analyses of job mobility focus on worker rather than firm characteristics. This paper exploits a unique data set on enterprise employment. We describe sectoral differences in turnover rates and in the persistence of turnover. We also present evidence of persistent turnover differences at the level of the individual firms--a result that is expected if firms have managers with differing ability to screen workers. When we consider the consequences to the firm of such turnover, we discover that high turnover firms are less likely to survive.

Keywords: Labor turnover, job mobility, wage record data

I. Introduction

The empirical analysis of job mobility has focused on worker rather than firm characteristics--an approach that, by necessity, describes only half of the story. A unique data set allows us to concentrate on the other half of the story: the role of firm heterogeneity in the determination of worker turnover. We also explore the consequences for the firm of such turnover.

There is little empirical evidence about the magnitude of firm-specific turnover, its persistence, or its consequences.[1] However some theoretical clues are given by the hiring and training costs literature (e.g., Barron and Bishop, 1985, pp. 363-82) and the job-matching literature (e.g., Jovanovic, 1979, pp. 972-90). Much of this gap between the theoretical and the empirical literature has a simple explanation: firm-specific turnover and its persistence can be tracked only with a matched panel of firms and workers, and such data are difficult to come by. We take advantage of a suitable new database with precisely this virtue. It consists of quarterly establishment records of the employment and earnings of all individuals who worked in the state of Maryland from the third quarter of 1985 to the third quarter of 1993.

We use this data to explore three questions:

- What contributions do firm-specific characteristics make to worker turnover rates?
- Does turnover persist at the firm level?
- What are the firm-specific consequences of persistent turnover?

II. Background and Data

1. Theoretical Background

The literature has a great deal to say about the causes of industry differences in worker turnover. The level of turnover might differ across industries or across firms for several reasons. At the industry level, existing theoretical work focuses on turnover as an efficient response to different types of labor or product market conditions. High hiring and training costs may reduce turnover (Buechtemann, 1993), and such costs

can vary across industries due to differences in the production process and the nature of worker skill requirements. Implicit contracts may develop between firms and workers, and such contracts may vary with firm size and product demand (Rosen, 1985, pp. 1144-75). Hamermesh (1993) has stressed the role of adjustment costs, which of course generate autocorrelation in hiring or separations at the level of the firm. Another major strand of theory suggests that efficiency wages can reduce turnover (Akerlof and Yellen, 1986). Insider/outsider theories (Lindbeck and Snower, 1988) emphasize the role of insiders in increasing turnover costs for those firms where current employees possess monopoly power resulting from the acquisition of firm specific human capital. These approaches suggest that high turnover *per se* should not degrade firm performance: turnover is an optimal firm response to a number of different labor market phenomena. However each suggests that turnover is a response to differences in industry structure, or to the size of the firm per se.

That message is also consistent with the job matching literature.[2] In this literature, firms and workers engage in "job shopping". Matches form, are tested, and dissolve if they don't work. Poor matches cannot be avoided at hiring due to informational problems, and turnover is an efficient response to the information about worker productivity that emerges during employment.

Each of these stories suggests that turnover should be persistent at the industry level. The job matching literature can be extended to explain persistent turnover at the firm level. In this literature, the ability of the firm to anticipate worker productivity is a crucial determinant of its ex post satisfaction with a hiring decision. Turnover therefore depends on the ability of the firm to anticipate worker productivity. If a firm has a manager who screens potential hires poorly, then turnover will be higher at that firm than at a firm whose manager screens workers well. Since managerial competence clearly varies from firm to firm, one expected result is therefore persistent firm specific variation in turnover. Furthermore, if turnover is costly, then high turnover firms may

not survive as long as low turnover firms.

In order to see this more clearly, consider the following simple model. Jobs are bundled with a salary structure. A firm wishes to maximize the net profit it receives from filling a position. As suggested by the search literature, the firm interviews potential replacements when the productivity of the worker currently holding the job falls below a reservation level. (We refer to this as the reservation ex post productivity.) Search is sequential and costly: the costs may be conceived as the costs of advertising the position and interviewing candidates. As in the job matching literature, the perceived productivity of interviewees is their true productivity plus noise. However, we assume that the variance of the noise depends on managerial competence; it is therefore firm-specific. The firm will hire the first worker whose perceived productivity exceeds a reservation level. Upon employment, the worker's true productivity is revealed. Turnover occurs when this productivity falls below the firms reservation ex post productivity. The likelihood of turnover therefore depends on managerial competence, which is a persistent, firm-specific consideration.

2.Data

The data source is a matched panel of workers and employers. It is derived from an archival file of the universe of quarterly employment and earnings records submitted by covered employers to the Unemployment Compensation unit, within Maryland's Department of Economic and Employment Development, over the period 1985:2-1993.3. Employers who are required to comply with the state's unemployment compensation law include virtually all employers of one or more paid employees. The principal excluded employers are the Federal government, self-employed individuals, some small agricultural enterprises, and philanthropic and religious organizations. Employment of individuals who receive no salary at all, who are totally dependent upon commissions, and who work on an itinerant basis with no fixed location or home base is not reported by covered employers.

Both single-establishment enterprises and multi-establishment entities are included. The precise unit of analysis is the *employing unit* as this is defined for businesses that are required to file a quarterly contribution and wage report in compliance with The Unemployment Insurance Law of Maryland. More than ninety percent of the legal business entities in Maryland that are required to submit quarterly reports are single-establishment enterprises.

Each quarter, covered employers report the social security number of every employee who worked during that quarter and received pay for these services. Employers who maintain more than one business location in the state are permitted to report all of their employees using a single reporting address. In such cases we cannot fully disaggregate the reported employment to individual work sites. While this masks internal flows among establishments within the firm, such internal flows are peripheral to our study. In contrast, non-reporting and erroneous reporting of individual employee's affiliation could have important effects on our estimates. Fortunately compliance is very high--as would be expected in any mandatory reporting situation that involves recurring and unpredictable access of the records for eligibility and payment determination purposes--since these administrative records are used in the day-to-day management of the state's unemployment compensation program. Finally, due to difficulties in complying with the quarterly timing of required submission, late reporting does occur. However, this does not affect the archival records because they are routinely updated to reflect such cases. These are confidential records. The identities of individual firms and employees cannot be revealed to the public. A fuller description is given in the appendix.

Our estimates of worker and job reallocation, which are calculated in the subsequent section, have been compared by Davis and Haltiwanger (1994, Table 1, p. 39) to estimates in other datasets--including the Longitudinal Research Database, the Continuous Wage and Benefit History, Manufacturing Turnover Data, and the

Unemployment Insurance database for Wisconsin. Our estimates are firmly within the range established by these earlier datasets, both for manufacturing and non-manufacturing (where the latter data are available).

III. Worker Turnover and Churning

There are two components to worker turnover: that dictated by job creation and destruction and that which is a result of a poor fit between worker and firm.[3] The standard measures of job and worker turnover are well known (Davis and Haltiwanger, 1994, pp.1-8). We define the firm's job flow rate at time t as the difference between its hires and exits divided by the average of its employment at time t and t-1. Its job reallocation rate is the absolute value of this term. Firm worker flow rates are the sum of hires and exits (also divided by average employment). We define firm "churning rates" as the difference between firm worker flows and job reallocation rates.

Davis and Haltiwanger (1994, pp 1-31) have contributed a great deal to our knowledge about job reallocation. However, little is known about worker turnover in excess of job reallocation (churning). Workers who exit as a result of a firm's need to contract employment are leaving for a reason conceptually different from a poor match. Our definition of “churning” accounts for this: if the exit rate is 5% but employment contracts by 5% (so that the job reallocation rate is 5%), then the churning rate would be 0%. If the employment contraction were the same but the exit rate were higher, then we would attribute the excess to poor matches and churning would be positive. That is, any exits in a firm with positive growth would be attributed to churning.

INSERT FIGURES 1a AND 1b HERE

When hiring and screening procedures vary by sector, we expect sectoral differences in worker flow rates and churning rates. Sectoral differences in turnover are consistent with any of the theories described in section 1 as well. Figure 1a in the

Appendix[4] illustrates these differences. Retail trade and other services show the highest rate of churning; manufacturing and professional services the lowest. More closely tied to the managerial competence model is the variation across firms within each sector. Figure 1b displays this idiosyncratic variability (as measured by the standard deviation). Retail trade and other services are the two sectors where there is the greatest amount of idiosyncratic variation across firms; wholesale trade and professional services display the least.

INSERT FIGURES 2a AND 2b HERE

Other firm characteristics may help us glean information about the causes of turnover. Both implicit contract and efficiency wage theories suggest that size may be a factor influencing turnover. Figures 2a and 2b, which describe differences in the mean and standard deviation of our various measures by size class, provide some confirmation of this. In general, both the mean and the variability of churning decline with size. If firms develop more effective screening devices as they age, turnover should decline monotonically with age; this is clearly shown in Figures 3a and 3b. Both the average levels of turnover and the variability of such turnover decline systematically.

INSERT FIGURES 3a AND 3b HERE

This section thus broadly answers the first question raised in the introduction: both the age and the size of the firm appear to affect worker turnover and churning rates. These rates are also affected by the sector within which the firm produces. As the variation in turnover and churning across firms is quite marked, we now address the second question: does turnover persist at the firm level?

IV. Firm Specific Effects and Churning Persistence

The development of the empirical model follows from the theoretical description developed above. We are particularly interested in the firm-specific determinants of churning. Industry factors partially determine the optimal amount of churning, but firm characteristics also contribute to the likelihood of bad matches. The firm may be able to refine its screening process as it accumulates experience in the hiring process, so age (AGE_{ft}) should be a factor determining churning rates (c_{ft}). Similarly, if there are economies of scale in developing screening devices, then larger firms ($SIZE_{ft}$) should have lower churning rates. Firm-specific hiring and training costs (C_f) may also affect churning rates.

The random component captures unusual "draws" from the pool of workers available to hire. Firms lay off workers or encourage them to quit when the match between the worker and firm is poor. However, pure bad luck unrelated to firm or industry characteristics should not display persistence. Finally, and possibly most importantly in distinguishing individual firms within a sector, there is the possibility of firm-specific differences in the ability of managers to screen applicants. This leads us to expect firm-specific persistence in poor matchmaking, since even in the presence of learning managerial competence is likely to display considerable inertia. We capture this persistence by including lagged churning rates as explanatory variables.[5]

All these theoretical considerations thus suggest the following empirical model:

$$c_{ft} = \beta_0 + \Sigma_{i=1 \text{ to } 4} \beta_i c_{ft-i} + \beta_5 SIZE_{ft} + \beta_6 AGE_{ft} + \beta_7 C_f + \varepsilon_{ft} \quad (1)$$

We estimate the model for each of the different sectors to control for industry effects. Furthermore, since the hiring and firing costs of the firm may be regarded as a fixed effect, and there may be other unobservable fixed effects for each firm, the model is estimated using standard fixed effects estimation techniques (Hsaio, 1986). Controls were also included (but not reported) for quarterly variations. The results are reported

in Table 1.

INSERT TABLE 1 HERE

An analysis of Table 1 reveals a number of important points. The persistence of firm churning is evident from the significant and positive coefficients on the lagged dependent variable observable for each of the sectors.[6] The coefficients on age and size confirm the visual evidence presented in Figures 1a-3a, namely that churning declines as firms age, but that the effect of size of firm is mixed. Finally, F-tests performed for each sector to determine whether a fixed effects estimation framework is appropriate also confirms the substantial variation evident in Figures 1b-3b, namely suggesting that there are marked firm-specific variations in churning rates. Even within an industry, individual firms are characterized by differences in churning that persist over time.

In order to test the robustness of these results, we evaluate the persistence in churning using the following alternative method. We classified firms by their relationship to the median churning rate in 1985:3. We call those which were above the median high churning firms; those below the median are low churning firms. We omit firms which are exactly at the median. We also classified firms in 1986:3 (one year later) in the same way and compared changes in the relative positioning of these firms. Table 2 summarizes the results of this classification.

INSERT TABLE 2 HERE

This table reveals some very interesting results. Most low churning firms are still low churning a year later (roughly twice as many as those which have become high churning). Similarly, most high churning firms are high churning a year later (again, not quite twice as many as those which become low churning). This reinforces the idea of persistence: if churning were a random event, there should be an equal distribution

across the cells. Standard tests reject the hypothesis of equal distribution across cells: Pearson's χ^2 and Kendall's tau-b are both greater than the critical values at the 1% level of significance.

Another noteworthy fact displayed in Table 2 concerns firms dying between 1985:3 and 1986:3 (that is, firms existing in 1985:3 but not in 1986:3). More than 8% of high churning firms had died a year later, whereas 4.7% of low churning firms had died in the same period. This result leads naturally to the final question raised in the introduction: what are the firm-specific consequences of persistent turnover?

V. The Consequences of Churning

The final question raised in the introduction concerns the effect of churning on firms. It will be recalled that theory readily suggests that turnover is an efficient response to different industry characteristics. However, we have documented firm-specific variation and persistence in churning even within industries, and the existing theoretical literature does not address itself to this possibility. We therefore suggest the need for models that emphasize firm-specific differences as an explanation of churning patterns. For example, managerial competence in screening job applicants is likely to be idiosyncratic and persistent. This perspective highlights churning as a firm-specific cost. A prediction is that high turnover firms will have lower survival rates. In order to test this prediction, we model the survival probabilities using a Weibull distribution

$$l_f(t) = a\ t^{a-1} \exp(b' X_{ft})$$

(Lancaster, 1990), in which the firm's hazard function takes the form:
Since we are particularly interested in the effect of persistent churning on firm survival, we include the lagged churning rate of the firm (with various lags) and industry dummies as explanatory variables (X_{ft}). Since the time to failure is truncated by the end of the observation period, the log likelihood function derived from equation (2) is

modified appropriately (Stuart and Ord 1987).[7] The results of using several different lag structures specifications are presented in columns 1-5 of Table 3.
INSERT TABLE 3 HERE

The coefficients of greatest interest are those associated with firm churning rates. In each column the results are strongly supportive of the view that firms with high churning rates are less likely to survive than firm with lower churning rates, as indicated by the consistently negative and significant coefficient on churning rates lagged as much as three quarters. Column (6) reports very similar regression results, despite the use of the churning rate of the 3-digit industry as an independent variable rather than the major sector dummies reported in the other columns.

Of course, causality may run the other way. For example, workers may be more likely to quit if they think a firm will go bankrupt.[8] For this to explain churning, which is worker turnover *in excess of* reductions in force, would require a combination of eager applicants and fleeing employees that we find rather implausible.[9] Nevertheless, we hope the emerging data in this area will eventually allow finer discrimination among causal stories.

The coefficients on the other variables largely confirm the results visually presented in Figures 1-3. The scale parameter is uniformly less than one, suggesting duration dependence: older firms are less likely to fail than younger ones. The variation in the magnitude of industry dummies is also worthy of comment. Firms in all sectors except transportation, communication and utilities are more likely to survive (once their churning rates are controlled for) than the baseline (omitted) category of other services. Firms in the finance insurance and real estate sector and firms in the wholesale trade sector have the highest probability of survival. Large firms are more likely to survive than small ones.

VI. Summary and Conclusions

We view our primary contribution in this paper to be the discovery of a number of "stylized facts" about turnover at the firm level. These have not been found in other research which uses data on workers only. As a corollary, our results highlight gaps in the theoretical literature: the lack of models of persistent firm-specific variation in turnover rates, and the corresponding lack of models of the effects of this variation on firm survival. While the existing theoretical literature suggests a number of possible reasons for an individual firm's labor turnover to be high in a given period, it does not imply persistent firm-specific variation. We suggest that poor matches may be a result of firm-specific competence in worker screening. Our finding of a negative turnover effect on the firm survival probabilities suggests this turnover is costly, although the magnitude of the cost depends on the sector in which the firm is located.

Firm-specific and sectoral variations in churning may deserve the attention of policy makers. Workers with identical human capital may end up with matches of different quality simply because of difference in the screening abilities of managers of firms. Furthermore, firms with poor screening techniques are likely to make many more offers over time, simply because their turnover is higher. These results suggest that the evaluation of programs designed to target young, disadvantaged, or recently retrained workers should include an analysis of the type of firm which hires the targeted group. This may be as important as examining either the workers' human capital characteristics or the effectiveness of training programs [Lane and Stevens (1995) pp 266-270; GAO report (1995); Hartog (1986), pp. 1291-1309]. At the level of the individual firm, an emphasis on managerial competence in making matches suggests a new reason to expect gains from improving the quality of the signals that applicants can provide to potential employers.

REFERENCES

Akerlof, George, and Janet Yellen (1986) Efficiency Wage Models of the Labor Market, Cambridge: Cambridge University Press.

Anderson, P and B. Meyer (1994) "The Extent and Consequences of Job Turnover", Brookings Papers on Economic Activity, pp 177-236.

Barron, John, and John Bishop (1984) “Extensive Search, Intensive Search, and Hiring Costs: New Evidence on Employer Hiring Activity”,Economic Inquiry, pp363-82.

Buechtemann, Christoph (1993) Employment Security and Labor Market Behavior, Ithaca, NY: Industrial Relations Press.

Burgess, Simon, Julia Lane, and David Stevens (1995) “Job Flows, Worker Flows, and Churning”, CEPR discussion paper 1125, London UK.

Davis, Steven and John Haltiwanger (1994) “Measuring Gross Worker and Job Flows”, mimeo, presented at the NBER Conference on Research in Income and Welath, Labor Statistics Measurement Issues, December 15 and 16.

Hamermesh, Daniel S (1993) Labor Demand, Princeton, NY: Princeton University Press.

Hartog, Joop (1986) "Earnings Functions: Beyond Human Capital", Applied Economics, pp. 1291-1309.

Hsiao, Cheng (1986) Analysis of Panel Data, Cambridge, UK: Cambridge University Press.

Jacobson, Louis, Robert LaLonde and Daniel Sullivan (1993) “Earnings Losses of Displaced Workers”, The American Economic Review, September 1993, pp. 685-709.

Jovanovic, B. (1979) “Job Matching and the Theory of Turnover”, Journal of Political Economy, pp. 972-90.

Lane, Julia and David Stevens (1995) “Family, Work, and Welfare History: Work and Welfare Outcomes”, American Economic Review, pp. 266-270.

Lancaster, Tony (1990) The Econometric Analysis of Transition Data, Econometric Society Monograph No. 17, Cambridge: Cambridge University Press.

Lindbeck, Assar and Dennis Snower (1988) The Insider-Outsided Throry of Employment and Unemployment Cambridge, Mass: MIT Press.

McLaughlin, Kenneth (1991) "A Theory of Quits and Layoffs with Efficient Turnover", Journal of Political Economy, pp 1-29.

Rosen, Sherwn (1985) "Implicit Contracts: A Survey" Journal of Economic Literature, pp. 1144-1175.

Stuart A. and J.K. Ord (1987) Kendall's Advanced Theory of Statistics Vol 1, 5th ed. Oxford: Oxford University Press.

United States General Accounting Office (1995) Welfare to Work: Most AFDC Training Programs Not Emphasizing Job Placement, report B-254614 to Senator Daniel P. Moynihan, May 19.

Data Appendix

1. *Data Structure*

The data are a matched panel of workers and reporting units from 1985:3 to 1993:3. The micro records used in this paper represent both single-establishment firms, multiple-establishment firms that report each of the subordinate establishment's information separately, and multiple-establishment firms that combine all of the subordinate unit information into a single entity. Ninety percent of the reporting units are single establishment firms, which pose no interpretive problems of any kind. For the other ten percent of the firms, employee mobility among subsidiary establishments is hidden. This means that our churning estimates are conservative, because we are omitting between establishment mobility within multiple establishment firms. These multi-establishment firms are concentrated in the retail trade and services sectors. It does raise issues about the differences between firms and establishments and the consequences of firm changes in the employer identification number. Neither of these attributes of the database affects the findings that are reported here. Many of these issues are clearly addressed in Anderson and Meyer (1994) and have also been addressed in Burgess, Lane and Stevens (1995).

Errors that might arise from late reporting are minimized by acquiring each quarter of Maryland data twice: when it first becomes available three months after the end of the reference quarter, and then again two quarters later. Non-reporting and erroneous reporting of individual employee's affiliation do affect the estimates that are reported here. However, these administrative records are used in the day-to-day management of the state's unemployment compensation program. This results in a high rate of compliance, as is the case in any mandatory

reporting situation that involves recurring and unpredictable accessing of the records for eligibility and payment determination purposes. Late reporting occurs, because of the quarterly timing of required submission. This does not affect the archival records because they are routinely updated to reflect such cases.

First quarter data reflect accumulated "non-economic" changes that can be traced to such origins as industry coding changes that occurred during the most recent of the three-year recurring updates of employer-specific Standard Industrial Classification codes; changes associated with predecessor and successor linkages of unemployment compensation account identification codes; and routine purging practices for business entities that have not self-described themselves as having "died", but which have not reported actual employee earnings for multiple sequential quarters. The fourth quarter data reflect cyclically sensitive seasonal factors (holiday consumer spending and related hiring practices) and end-of-year legal/accounting transactions that would be expected to be sensitive to tax law and regulatory changes.

The records are confidential. The agreement between the University of Baltimore and Maryland's Department of Economic and Employment Development specifies the uses that can be made of these data and stipulates that the identities of individuals and firms cannot be revealed to the public. The data are encrypted upon arrival and then stored and processed in a secure facility. Staff members who have access to the data sign an oath indicating their awareness of the law's requirements and their personal intention to abide by these stipulations.

2 Construction of Data Set

We are primarily interested in this paper in looking at employment spells which exist for at least a quarter. We therefore define people as employed for a full quarter by making quarter-to-quarter

matches of employer/employee pairs for three consecutive quarters. We assume that a worker who shows up as working for the same employer for three consecutive quarters is employed for the entire middle quarter. We define hires as people who were not with the firm in the preceding quarter (in the above definition) but who were there in the current quarter and exits analogously (this requires five quarters of data). The coding error rate of social security numbers is .003% which will result in incorrect identification of hires and exits in a commensurate number of cases.

3. Representativeness

Appendix Table 1 compares the industrial distribution of employment in Maryland to the nation's industry mix of employment in 1990 and as projected by the Bureau of Labor Statistics for the Year 2005. Maryland's employment mix is more like that projected for the turn of the Century, which makes the analysis reported here of particular interest from a policy importance and replication standpoint. In particular, it is evident that the move from manufacturing to non-manufacturing, which has been so marked in the 1980's, is projected to continue into the next century. This would suggest that studies which focus only on the manufacturing sector will be of less interest to policy makers than studies which provide data on every sector of the economy.

INSERT APPENDIX TABLE 1 HERE

Appendix Table 1: Employment by Sector

	US(1990)	US(2005)	Maryland
Agriculture, Mining, Construction	8.1 %	7.2%	9.9%
Manufacturing	16.9 %	13.6%	10.4%
Transportation, Communication	5.2 %	4.9%	5.7%
Wholesale, Retail Trade	22.3 %	23.6%	27.5%
Finance, Insurance, Real Estate	6.0 %	6.0%	6.5%
Services	24.5 %	28.8%	33.1%
Government	16.3 %	15.9%	6.9%

Source: Monthly Labor Review, November 1991 (moderate); Authors' Tabulations

Table 1: The Determinants of Churning (Dependent variable is the churning rate)

	Manufacturing	TCU	Wholesale Trade	Retail Trade	FRE	Professional Services	Other Services
Churning rate lagged one period	0.1958** (47.66)	0.1606** (41.74)	0.1759** (76.19)	0.2267** (135.77)	0.1647** (61.38)	0.1379** (82.32)	0.1951** (120.78)
Churning rate lagged two perriods	0.1312** (30.99)	0.1297** (33.08)	0.1279** (54.62)	0.1625** (95.33)	0.1130** (41.05)	0.0921** (54.05)	0.1387** (83.47)
Churning rate lagged three periods	0.0829** (20.27)	0.0751** (19.50)	0.0813** (34.94)	0.0870** (52.08)	0.0638** (23.78)	0.0583** (34.55)	0.0763** (47.04)
Churning rate lagged four periods	0.0635** (15.67)	0.0614** (15.95)	0.0697** (30.49)	0.0818** (50.53)	0.0523** (19.81)	0.0474** (-9.17)	0.0617** (39.06)
Age of firm	-0.0001** (-7.47)	-.00881** (-3.39)	$-.00174^{4}$ (-1.57)	$-.0002^{-2}$** (-15.66)	-.00014** (-8.35)	-.00012** (-9.17)	-.00017** (-12.10)
Size of firm	$.00339^{-6}$ (0.08)	$-.00971^{6}$** (-0.30)	1.2** (14.72)	-1.1** (23.68)	$.416^{-4}$** (6.64)	.970 (0.69)	.23** (33.68)
n (firms)	5,551	7,544	18,660	37,445	12,318	30,422	49,487
n (observations)	59,768	65,438	176,704	348,001	134,692	349,379	681,936
R^2	.178	.112	.119	.200	.089	.061	.176

() indicate 't' value *p < .05 **p < .01; Regressions include fixed effects for time and firm.

Table 2: High and Low Churning Firms - 1985:3 and 1986:3

		1986:3			
1985:3		Low Churning	High Churning	Deaths	Total
	Low Churning	19,234 (24.92)	9,866 (12.78)	3,633 (4.71)	32,733
	High Churning	10,205 (13.22)	16,377 (21.22)	6,488 (8.41)	33,070
	Births	3,720 (4.82)	7,666 (9.93)	0	11,386
	Total	33,159	33,909	10121	77.189

Table 3: Survival Probabilities

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	8.18* (.06)	8.16* (.06)	8.08* (.06)	8.29* (.06)	8.28* (.07)	8.79* (.06)
Churning Rate lagged one period	-.966* (.05)	-	-	-1.01* (.07)	-1.00* (.07)	-.87* (.08)
Churning Rate lagged two periods	-	-.74* (.05)	-	-.45* (.06)	-.54* (.07)	-.44* (.08)
Churning Rate lagged three periods	-	-	-.63* (.05)	-	-.21* (.07)	3* (.07)
Industry churning rate	-	-	-	-	-	-1.65* (.15)
Manufacturing dummy	.24* (.05)	.27* (.05)	.27* (.05)	.18* (.05)	.13* (.05)	-
Transportation, Communications and Utilities dummy	.08 (.06)	.08 (.07)	.08 (.06)	.03 (.07)	-.002 (.07)	-
Wholesale Trade dummy	.63* (.05)	.65* (.05)	.64* (.05)	.56* (.05)	.51* (.05)	-
Retail Trade dummy	.14* (.04)	.13* (.04)	.18* (.04)	.16* (.04)	.22* (.04)	-
FIRE dummy	.54*	.57*	.57*	.49*	.43*	-

Table 3: Survival Probabilities						
	(.06)	(.06)	(.06)	(.06)	(.06)	
Professional Services	.44* (.05)	.47* (.05)	.46* (.05)	.40* (.05)	.34* (.05)	-
Size of firm	.0004* (.0001)	.00005* (.0001)	.00006* (.0001)	.00006* (.0001)	.00008* (.0001)	.0007* (.001)
scale parameter	.90 (.01)	.91 (.01)	.90 (.01)	.90 (.01)	.88 (.01)	.88 (.01)

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1.In contrast, Jacobson, LaLonde, and Sullivan (1993), among others, have documented the cost to workers of involuntary separations.

2.See especially Jovanovic (1979, pp. 972-90). A good survey is given by McLaughlin (1991, pp. 1-29).

3.There will be some constant amount of attrition due to retirement or death: since this should be constant and not firm specific it is not explicitly modelled in this paper. Exits may be worker or firm initiated: either indicates a poor match so we do not distinguish between the two.

4.These are constructed as a mean of the rates for individual firms for a representative quarter: 1985:3. Time series plots of the same measures for each sector show the same relative relationships.

5.This specification using four lagged quarters means that the model is estimated for firms who live at least 5 quarters. Similarly, data for longerlived firms are only estimated for the period exclusive of the 5 quarters subsequent to birth. This has the obvious advantage of enabling us to focus on the churning behavior of established firms. The dataset includes both continuing and expiring firms.

6.The results presented here are robust with respect to the number of lags included and to grouping by size and age classes, rather than including size and age as independent variables.

7.We are fortunate in knowing the actual date when the firm filed its first UI report: some firms in the sample began filing in 1938, the year the unemployment insurance system was established. Hence the data are not left truncated to any degree of consequence

8.We thank an attentive referee for this suggestion.

9.Note that any firm contraction that is a result of previous poor matching performance will result in exits which will not be included in our definition of churning, which is therefore a conservative measure of the amount of turnover due to poor matches.