Firm Instability and Employee Quits: Evidence from Firm-Worker Matched Data*

Kim P. Huynh[†]   Yuri Ostrovsky[‡]   Marcel C. Voia[§]

August 10, 2011

Abstract

We consider the possibility that industry high firm turnout leads to higher job instability through increases not only in involuntary but also voluntary separations (quits) in survivng firms. The novelty of the study is that we are able to distinguish between voluntary and involuntary separations using information on reasons for separations provided by employers. Once controlling for observables and potential selection bias, we find that industry shutdown rates have a positive and significant effect on the probability of quits.

Key Words: Worker separations; Firm Survival; Bivariate Probit with Selection.
JEL Classification: J24; J31; J63; C35.

1 Introduction

A recent study by Quintin and Stevens (2005) suggests that industry high exit rates may lead to higher worker turnover related to higher layoff rates in surviving firms. We consider the possibility that high firm turnout also leads to higher job instability through increases in voluntary separations (quits). The intuition behind this hypothesis is that employees in industries with high firm instability may anticipate short employment spells and try to advance their careers (or minimize earnings losses from anticipated layoffs) not by acquiring human capital and improving their skills but by changing employers or occupations. Kambourov and Manovskii (2009) argue that many skills acquired by workers during their working careers are job-specific, so high job losses are especially detrimental to workers whose skills are not easily transferable from one job to another. If so, a high rate of voluntary separations related to high firm instability may have similarly negative consequences for working careers.

The novelty of the study is that we are able to distinguish between voluntary and involuntary separations using information on reasons for separations provided by employers. In Canada, employers are by law required to provide such information. We estimate a probit and bivariate probit with selection (BPWS) to gauge the effects of industry shutdown rates on the probability of voluntary separations. Once controlling for observables and potential selection bias, industry shutdown rates have a positive and significant effect on the probability of such separations. The results are particularly interesting since we are able to isolate the effects of worker characteristics, firm characteristics and labour market conditions. All these factors can all affect job instability, and each of these factors has to one degree or another been examined in the literature. Our data allow us to consider these effects simultaneously as they include information about firms (size, payroll) as well as individual characteristics (age, tenure, place of residence, etc.). We highlight the relative importance of each of these factors in the result section, and discuss the implications of our findings in the concluding section.

2 The Longitudinal Worker File & EUKLEMS Data

The data are from the Longitudinal Worker File (LWF), an administrative data set created by linking four different data sources. The first data source is the T4 Supplementary Tax File, which is a random sample of all individuals who received a T4 supplementary tax form and filed a tax return. A T4 supplementary tax form is issued by employees for any earnings that either exceed a certain threshold or trigger income tax, public pension plan contributions or unemployment insurance premiums. It contains information about the earnings received from an employer in a given year, tax deducted, pension contributions, union dues and other information. The second data source is the Record of Employment (ROE), which includes employer provided information on separations and their reasons. Canadian employers are by law required to provide a ROE for any separation that occurs in a firm. Reasons for separations include voluntary and involuntary separations such as the shortage of work, labor dispute, injury or illness, quit, pregnancy and parental leaves, retirement and other reasons. The third data source is the Longitudinal Employment Analysis Program (LEAP), which includes information about the size of the firm for which an employee works and makes it possible to track employees who move from one firm to another. The LEAP covers the entire Canadian economy and includes firms with at least one dollar in annual payroll. The key information that comes from the LEAP is the firm's size derived from its payroll. Finally, personal income tax files add demographic variables such as age, sex, family status and area of residence.

The LWF used in our analysis spans the period from 1992 to 2004 and is annual frequency. The LWF is a 10 percent random sample of all tax filers. We kept individuals living in the 10 Canadian provinces who were between 25 to 64 years of age. We define the annual industry specific shutdown rate as a ratio in which the numerator is the total number of firms in industry j with zero payroll in period $t+1$ that had positive payroll in period t, and the denominator is the total number of all firms with a positive payroll in industry j in period t. The summary of our sample, by industry, is given in Table 1. A voluntary separation is binary variable which takes the value of 1 if there is a switch in status, and 0 otherwise.

The information on the industry price indexes needed to construct the real exchange rate variable is taken from EUKLEMS database, which is a collection of growth and productivity indicators from 30 countries, including the United States and Canada. The EUKLEMS data are aggregated at the level of 32 industries defined to be consistent across all countries in the database. We selected 17 of the 32 industries excluding industries that are most likely to be represented by the public sector. We also exclude industries in which separation rates are highly correlated with other industries; for instance, we excluded the wholesale trade but retained the retail trade industry. The concordance between EUKLEMS and NAICS industries is provided by Statistics Canada.

3 Empirical Methodology

We use the shutdown rate in industry j as a measure of firm instability in that industry. A shutdown in period t is defined as a transition from a positive payroll in year t to a zero payroll in year $t + 1$. A shutdown does not imply a firm's exit; it is possible that the firm will have a positive payroll in some future period. Our choice of shutdown rates as a measure of firm instability is motivated by our focus on anticipated separations. As the absence of a positive annual payroll in year t signals at least a year-long closure, from the worker's point of view, it makes little difference whether the firm will reopen in some future year or not. In either case, firm employees will anticipate prolonged separations and their labor market decisions can expected to be similar. Another reason for focusing on shutdowns is that shutdowns are also more easily identified than exits since they only require the knowledge of the firm's payroll in two consecutive periods.

Our benchmark model is a reduced form probit model of separations in which the latent dependent variable defined by

$$\text{Worker Quit}^*_{ijkt} = \alpha + \beta X_{jt} + \gamma B_{it} + \sum_{k=1}^{K} \varphi_k C_{kt} + \sum_{j=1}^{J} \psi_j I_{jt} + \delta D_t + u_{ijkt}, \tag{1}$$

where X_{jt} is the annual shutdown rate in industry j in period t. The model specification includes individual, firm and industry specific control variables: (i) B_{it} is a set of worker-specific variables, such as an age polynomial, interactions of a female dummy variable with age variables, marital status, tenure, region of residence and earnings in period year $t-1$, union membership and interactions with the shutdown rates, (ii) C_{kt} are firm size dummy variables, (iii) I_{jt} are industry-specific dummy variables, and (iv) D_t is a set of period-specific dummy variables.

In our benchmark model, only quits from firms that remain active in year t can be observed. To deal with the potential sample selection bias due to non-random firm exit, we consider a BPWS model, in which the selection equation describes the probability of a firm's shutdown and outcome equation describes the probability of a quit:

$$\text{Firm Active}^*_{ijkt} = \alpha^S + \beta^S X_{jt} + \gamma^S B_{it} + \sum_{k=1}^{K} \varphi_k^S C_{kt} + \sum_{j=1}^{J} \psi_j^S I_{jt} + \delta^S D_t + \lambda RER_{jt} + v_{ijkt} \quad (2)$$

$$\text{Worker Quit}^*_{ijkt} = \alpha^Q + \beta^Q X_{jt} + \gamma^Q B_{it} + \sum_{k=1}^{K} \varphi_k^Q C_{kt} + \sum_{j=1}^{J} \psi_j^Q I_{jt} + \delta^Q D_t + u_{ijkt}. \quad (3)$$

In the remainder of the paper we will refer to *surviving* firms to indicate that the firms did not experience a shutdown in period t.

To strengthen identification the industry-level US-Canada real exchange rate (RER_{jt}) is included in the survival equation as an exclusion restriction. The choice of RER_{jt} as the exclusion restriction is motivated by the fact that the United States is the major trading partner of Canada, and the probability of a firm's shutdown in our sample is likely to be affected by the real exchange rates dynamics. We further assume that the probability that a worker will experience a separation is unaffected by real exchange rates contemporaneously. Evidence from Campa and Goldberg (2001) shows that movements in RER has an effect on wages but negligible effect on employment and number of jobs. The RER_{jt} variable is constructed according to the following formula $RER_{jt} = P_{jt}^{US}/P_{jt}^{CDN} \times e_t$, where P_{jt}^{US} is the US industry gross output price index, P_{jt}^{CDN} is the Canada industry gross output price index and e_t is the nominal bilateral exchange rate between Canadian and US in year t.

4 Results

The results in Table 2 show that controlling for individual and firm-specific characteristics, industry shutdown rates have a positive and significant effect on the probability of a quit; the marginal effects are 0.024 in the probit and 0.047 in BPWS, respectively. However, the results are different for unionized firms: higher industry shutdown rates reduce the probability of quits in unionized firms (-0.142 for BPWS). The marginal effect of union membership alone is positive and significant albeit quite small in magnitude, around 0.008-0.009 in both models. The estimated effects of individual characteristics (age, sex, marital status, tenure and lagged earnings) are in line with other studies on job separations. Individuals are substantially more likely to quit secondary employment (0.085 for BPWS). With respect to firm characteristics, the probability of a quit increases with firm size for small and mid-size firms (<200 employees). For larger firms, the opposite is true. The industry-specific marginal effects are available on request.

5 Conclusions

Our findings underscore the complexity of the issue of individual job stability: whereas much of the attention in the literature has been paid to the likelihood and consequences of involuntary separations, we highlight a less obvious but also important relationship between firm instability and quits. The results of our analysis are consistent with our hypothesis that higher industry shutdown rates can lead to greater worker turnover in firms that remain active not only because workers in such firms are more likely to be laid off but also because they are more likely to quit in anticipation of future layoffs. Such separations are "voluntary" in a narrower sense than is usually assumed, and their long-run effects on individual earnings may be similar to the effects of layoffs. Such possibility is the subject of our future research.

References

CAMPA, J. M., AND L. S. GOLDBERG (2001): "Employment Versus Wage Adjustment and the U.S. Dollar," *The Review of Economics and Statistics*, 83(3), 477–489.

KAMBOUROV, G., AND I. MANOVSKII (2009): "Occupational Specificity of Human Capital," *International Economic Review*, 50(1), 63–115.

QUINTIN, E., AND J. J. STEVENS (2005): "Raising the Bar For Models of Turnover," Finance and Economics Discussion Series 2005-23, Board of Governors of the Federal Reserve System (U.S.).

Table 1: Summary Statistics

Industries	NAICS	Age	Gender	Tenure	Earnings	quit rate	# of firms	# of jobs
Mining and quarrying	21	41.5	1.2	6.41	57360	0.056	2,330	16,355
Food products, beverages and tobacco	311-312	40.7	1.4	6.13	31290	0.066	3,245	29,790
Textiles, textile products, leather and footwear	313-316	41.7	1.6	5.56	21110	0.076	3,045	14,855
Wood and products of wood and cork	321	40.6	1.1	6.63	38460	0.060	2,195	14,725
Coke, refined petroleum and nuclear fuel	324	42.0	1.3	8.78	61450	0.041	85	2,320
Chemical and chemical products	325	40.7	1.4	6.06	48760	0.051	965	8,765
Rubber and plastics products	326	39.5	1.3	6.00	35280	0.075	1,430	12,015
Basic metals and fabricated metal products	331-332	41.6	1.2	7.02	41990	0.052	4,805	25,505
Machinery, nec	333, 3352	40.4	1.2	5.82	42290	0.065	2,775	13,285
Electrical and optical equipment	334, 3351, 3353, 3359	40.0	1.3	6.47	52070	0.049	1,595	17,040
Transport equipment	336	41.2	1.2	8.14	51560	0.038	1,160	24,150
Construction	23	40.7	1.1	4.23	25070	0.046	35,620	64,580
Sale, maintenance and repair of motor vehicles	415, 441, 447, 8111	39.9	1.3	5.27	29160	0.086	17,555	34,180
Retail trade, except of motor vehicles	44-45, 8112-8114	39.8	1.6	5.02	19830	0.102	35,655	106,690
Hotels and restaurants	72	38.2	1.6	3.48	11330	0.117	31,195	66,140
Transport and storage	48, 493, 5615	41.7	1.3	5.91	32350	0.063	15,100	53,930
Real estate activities	531	42.7	1.5	4.77	26600	0.069	7,120	15,950

Note: Age and Tenure are measured in years while Gender is equal to one if male and two if female. Earnings are measured in Canadian dollars deflated to the Consumer Price Index. The quit rates are in proportions.

Table 2: Probability of a Quit or Voluntary Separation

| | Probit | | BPWS: Bivariate probit with selection | | |
| | *Worker quit* | | *Firm active* | *Worker quit* | |
Variable	Coef.	A.M.E.	Coef.	Coef.	A.M.E.
Age	0.086***	*0.010*	-0.055*	0.088***	*0.011*
Age^2/10	-0.030***	*-0.004*	0.016	-0.031***	*-0.004*
Age^3/100	0.004***	*4.8E-04*	-0.002	0.004***	*0.001*
Age^4/1000	-2.0E-04**	*-2.4E-05*	7.0E-05	-2.0E-04**	*-2.5E-05*
Total Age		-0.00145			-0.00148
Female×Age	0.023***	*0.003*	-0.008**	0.024***	*0.003*
Female×Age^2/10	-0.017***	*-0.002*	0.005*	-0.017***	*-0.002*
Female×Age^3/100	0.004***	*4.8E-04*	-0.001	0.004***	*5.0E-04*
Female×Age^4/1000	-2.9E-04***	*-3.5E-05*	4.0E-05	-2.9E-04***	*-3.6E-05*
Total Female×Age		0.00162			0.00169
Married	-0.048***	*-0.006*	0.030***	-0.049***	*-0.006*
Second job	0.577***	*0.082*	-0.294***	0.586***	*0.085*
Tenure	-0.033***	*-0.004*	0.001	-0.033***	*-0.004*
Tenure^2	-0.001***	*-1.4E-04*	0.001***	-0.001***	*-1.5E-04*
Total Tenure		-0.00486			-0.00503
Lagged earnings	-0.068***	*-0.008*	0.002**	-0.068***	*-0.008*
Atlantic	-0.211***	*-0.023*	0.056***	-0.212***	*-0.023*
Quebec	-0.038***	*-0.005*	0.029***	-0.039***	*-0.005*
Prairies	0.147***	*0.019*	0.070***	0.144***	*0.019*
British Columbia	-0.013***	*-0.002*	0.054***	-0.015***	*-0.002*
Firm size <5	-0.564***	*-0.052*	-1.004***	-0.486***	*-0.049*
Firm size 5-19	-0.260***	*-0.028*	-0.393***	-0.239***	*-0.027*
Firm size 20-49	-0.082***	*-0.009*	-0.148***	-0.075***	*-0.009*
Firm size 100-199	0.036***	*0.004*	0.072***	0.034***	*0.004*
Firm size 200-499	0.024***	*0.003*	0.136***	0.019***	*0.002*
Firm size >500	-0.022***	*-0.003*	0.684***	-0.036***	*-0.004*
Union membership	0.067***	*0.008*	-0.147***	0.073***	*0.009*
Shutdown rate	0.203***	*0.024*	-4.486***	0.375***	*0.047*
Union × shutdown	-1.106***	*-0.133*	0.924***	-1.144***	*-0.142*
Real exchange rate			-0.107***		
Constant	-1.634***		3.209***	-1.660***	
$\rho(u^{outcome}, u^{selection})$			-0.268***		
log pseudolikelihood		-1555918.2		-2443139	
Observations	6,938,860	Total:	7,186,44	Uncensored:	6,938,860

Note: Coef. and A.M.E. denote the coefficients and average marginal effects, respectively. Statistical significance level at the 10%, 5% and 1% levels are indicated by *, **, and ***, respectively. Time dummies for 1993-2004 are suppressed for brevity.