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Job security and employee well-being: Evidence from matched survey and register data

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ABSTRACT

We examine the effects of establishment- and industry-level labor market turnover on employees' well-being. The linked employer-employee panel data contain both survey information on employees' subjective well-being and comprehensive register-based information on job and worker flows. We test for the existence of compensating wage differentials by explaining wages and job satisfaction with average uncertainties, measured by an indicator for a high excessive turnover (churning) rate. The results are consistent with the theory of compensating wage differentials, since high uncertainty increases real wages, but high uncertainty has no effect on job satisfaction while not controlling for wages.

1. Introduction

Firm dynamics—creative destruction—accounts for 20–30% of the observed productivity growth in economies around the world (e.g. Foster et al., 2001; Bartelsman et al., 2004). The creative destruction process entails simultaneous job creation and destruction and worker flows. This implies that there is a positive correlation between the turnover in the labor market and productivity growth.

Empirical research has also shown that various policy measures can speed up productivity growth through deregulation that facilitates firm dynamics. There is evidence of positive effects on productivity growth from deregulation of product markets (e.g. Nicoletti and Scarpetta, 2003), the removal of employment protection legislation (EPL) (e.g. Autor et al., 2007; Bassanini et al., 2009), and capital market reforms (e.g. Aghion et al., 2007).

Does this productivity-enhancing creative destruction process, however, come at the expense of lower employee well-being in the form of reduced job satisfaction? Indeed, one can easily envisage that a job in an establishment characterized by rapid hiring and firing may be considered to be worse than a job in an establishment characterized by slower worker turnover, because rapid turnover means more uncertainty regarding the future. Also, it is reasonable to assume that the whole idea of EPL is to decrease uncertainty about future job prospects, because such uncertainty is generally perceived as an unpleasant thing.[1] In this paper, we ask whether changes in wages are enough to counterbalance these negative direct effects of turnover on employees.

A faster pace of creative destruction is also associated with fiercer competition in the economy. This can have a direct negative impact on the welfare of those individuals with low bargaining power (Fischer, 2008). Thus, a negative correlation between employee well-being and the pace of creative destruction may indirectly exist owing to the negative effects on job satisfaction from a high pace of work. Indeed, there is evidence that job satisfaction has declined slightly over time in Britain and Germany (Green and Tsitsianis, 2005) and, at least in Britain, the authors ascribe part of this decline to "the intensification of work effort" (Green and Tsitsianis, 2005, p. 423).

The potential effects of labor market turnover on employee well-being are particularly important because job dissatisfaction has been found to be associated with 'negative' activities (see e.g. Warr, 1999). These include lower job performance, an increase in absenteeism, more actual and intended job switching, as well as various

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[1] EPL does not reduce uncertainty if it also reduces the future hiring rate for those employees who do end up losing their jobs (e.g. Boeri and van Ours, 2008; Skedinger, 2010).

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discretionary activities, like less voluntary overtime, less prosocial activity and less adaptive behavior. All these are likely to increase the firms' costs. From the society's point of view, job dissatisfaction is costly also if it leads to early retirement or withdrawal from the labor market. These effects can erode the positive effects of reforms on performance through the increase in labor market turnover.

In this paper, we examine empirically whether a faster pace of creative destruction negatively affects job satisfaction. The results of this study also have a bearing on the debate regarding the existence of compensating wage differentials. If the wage fully compensates for the negative effects of uncertainty in establishments or industries that have a high turnover of employees, then the uncertainties should have no effect on job satisfaction in a regression of job satisfaction on the measures of job uncertainty. This is because the wage fully compensates for the unfavorable job characteristics (Böckerman and Ilmakunnas, 2006; Stutzer and Frey, 2008).

The unique data set comes from a merger of two data sets. The first one is the Finnish part of the European Community Household Panel (ECHP) for the years 1996–2001. It contains information on individual job satisfaction and various aspects of it. The panel dimension of the data allows us to eliminate the bias stemming from unobservable time-invariant individual characteristics, such as positive personality. The results would be biased if personality were related to willingness to take an insecure job and if personality were correlated with job satisfaction as well.

The other data set that we use is the Finnish Linked Employer-Employee Data (FLEED). This data set contains comprehensive administrative records of all labor force members as well as all employers/enterprises, including information also on their establishments with near-perfect traceability of employers and employees across time. We connect the data on establishments to the data on individuals and merge this data set with ECHP. Clark et al. (2009) have used a similarly constructed Danish data set.

With the FLEED data, we construct measures of gross job and worker flows at the establishment level and merge it with the individual data from FLEED and ECHP. We then estimate models for job satisfaction using these measures of labor market turnover as the main explanatory variables. This allows us to produce information about the objective determinants of employees' subjective well-being. In contrast, as Hamermesh (2004) observes, much of the literature on well-being has previously correlated subjective measures of well-being with subjective responses.

As far as we know, no previous study has examined the connection between creative destruction and employees' well-being by using a nationally representative panel data set. However, there exists research that tackles closely related issues. For example, Clark and Postel-Vinay (2009) directly investigate the effect of EPL and unemployment insurance benefits on satisfaction with job security for a number of European countries using ECHP. They report that satisfaction with job security is negatively related to EPL but positively affected by generous unemployment insurance benefits.[2]

The article is structured as follows. The next section provides a theoretical framework, based on compensating wage differentials. Section 3 introduces the data. Section 4 describes the hypotheses and empirical specifications. Section 5 presents the baseline estimates and several robustness checks. Section 6 offers concluding comments.

[2] Wolfers (2003) examines the effects of business cycle volatility on subjective well-being. Theodossiou and Vasileiou (2007) explored the relationship between job satisfaction and job security measured in terms of unemployment expectations. Origo and Pagani (2009) investigated the effects of perceived job stability as well as the actual job stability (temporary vs. permanent contract) on job satisfaction. Maurin and Postel-Vinay (2005) studied the determinants of actual and perceived job insecurity in Europe using the ECHP, and De Bustillo and De Pedraza (2010) perceived insecurity taking advantage of another survey. There are also related studies (e.g. Vahtera et al., 1997; Martikainen et al., 2007; László et al., 2010; Rugulies et al., 2010) that focus on the effects of downsizing, job insecurity and workplace closures on health and mortality.

2. Theoretical framework of compensating wage differentials

We test for the existence of a compensating wage differential for uncertainty. Assume that the utility of an employee depends on the wage and working conditions: $U=U(w,D,Z)$, where w is the wage, D a measure of disamenity related to work, and Z all other variables that affect utility. In our case, the disamenities are uncertainties caused by turbulence at the establishment or industry level. It is assumed that $\partial U/\partial w=U_w>0$ and $\partial U/\partial D=U_D<0$. On the other hand, if uncertainty is compensated in the form of higher wages, we have $w=w(D,X)$ with $\partial w/\partial D=w_D>0$. The vector X includes the other determinants of wages, such as the length of education. Inserting the wage equation in the utility function gives $U=U(w(D,X),D,Z)$. Compensation of the disamenity implies that, on the margin, D does not affect utility, i.e. $dU=U_w w_D dD+U_D dD=0$. This gives $w_D=-U_D/U_w$. That is, the marginal compensation of uncertainties in terms of wage has to equal the marginal rate of substitution of wage and the source of uncertainty. In a competitive labor market, the trade-off in terms of firms' profits between the wage and working conditions would also be equal to the slope of the wage equation.

Most of the literature on compensating wage differentials has tested their existence on the basis of a hedonic wage equation: $w=\theta+\phi D+X\rho$, where the wage (or the log of the wage) is regressed on the usual control variables X and the disamenity variable(s) D (see Fernández and Nordman, 2009, for a recent example of this line of research). If the disamenity obtains a significant positive coefficient, the existence of compensating wage differentials is supported. We also present results with this approach, using as disamenities the establishment- and industry-level labor market flows.

However, in this paper, the main focus is on an alternative way of testing for the existence of compensating differentials, which is based on the utility function (see e.g. Godechot and Gurgand, 2000; Helliwell and Huang, 2010; Stutzer and Frey, 2008). If utility depends on the wage and disamenities, and the wage fully reflects compensation for the working conditions (i.e. $w_D=-U_D/U_w$), then inserting the wage as a function of disamenities in the utility function should wipe out the disamenities. This is easily demonstrated in the linear case: $U=\alpha+\delta w+\beta D+Z\gamma$ and $w=\theta+\phi D+X\rho$, where U is measured by job satisfaction and X and Z denote all other variables. The parameters correspond to the derivatives in the following way: $U_D=\beta$, $U_w=\delta$, and $w_D=\phi$. Inserting the wage function in the utility function gives the reduced form utility $U=\alpha+\delta\theta+(\beta+\delta\phi)D+Z\gamma+X\rho\delta$. The existence of compensating wage differentials implies that $\phi=-\beta/\delta$. If this constraint holds, the disamenities D are wiped out, so neither the wage nor the disamenity appears in the utility function. A compensating wage differential can therefore be tested by examining whether the hypothesis $\beta^*=0$ holds in the job satisfaction equation: $U=\alpha^*+\beta^* D+X\gamma^*+Z\rho^*$, where the wage is not included. A significant negative coefficient for the disamenity would be evidence against compensating wage differentials. Note that the variables Z that affect utility and the variables X that affect the wage can be partly the same. In this case the estimated coefficients of these variables would be combinations of utility function and wage function parameters. However, if we are interested in testing for compensating wage differentials, these effects need not be identified separately.

Measurement of utility at work is not a trivial task. A natural candidate for it is employees' job satisfaction. It is a feature of employee surveys that job satisfaction is expressed in an ordinal scale with a few alternatives, which has to be taken into account in the estimation.

3. Data and variables

The paper takes advantage of the European Community Household Panel (ECHP) for Finland, which is available for the period 1996–2001.[3] The Finnish part of ECHP is a representative random sample of

[3] Peracchi (2002) provides a description of ECHP.

individuals and households. We use two measures of employees' subjective well-being as the dependent variables. One's job satisfaction status is an answer to the question on satisfaction with one's work or main activity. Job satisfaction is measured on an ordinal 6-point Likert scale from 'not satisfied' (1) to 'fully satisfied' (6). Thus, a higher value on this scale means that a person currently feels more satisfied. Primarily, we are interested in the effects on job satisfaction, but we also present some descriptive evidence by using satisfaction with job security as the dependent variable. It is an answer to the question: "How satisfied are you with your present job in terms of job security?". Satisfaction with job security is also measured on an ordinal 6-point Likert scale from 'not satisfied' (1) to 'fully satisfied' (6). As is typical with the subjective measures of well-being at work, these measures are bunched towards the higher end of the scale 1–6. Therefore, the mean values are ~4.5 for both of the measures of satisfaction.

The fact that the ECHP for Finland can be matched to the longitudinal register data, FLEED (Finnish Longitudinal Employer-Employee Data), is essential for our purposes.[4] FLEED is constructed from a number of different registers on individuals, firms and establishments that are maintained by Statistics Finland. FLEED also contains information from Employment Statistics, which records each employee's employer during the last week of each year. Matching of the data sources is possible, because both the EHCP and FLEED contain the same unique personal identifiers (i.e. ID codes for persons).

FLEED contains both unique firm and establishment identifiers. Thus, it is possible to calculate the establishment-level measures of job and worker flows. To capture labor market turbulence, we use the standard measures of gross job and worker flows (Davis and Haltiwanger, 1999). They are based on information on the employees in the establishments at the end of each year. The job flow measures that we use are job creation and destruction rates. At the establishment level, job creation is defined as the value of positive employment change. If employment falls or remains constant, job creation is zero. Similarly, job destruction is the absolute value of negative employment change. This is zero if establishment employment grows or remains constant. These values are converted to rates JCR and JDR, respectively, by dividing them by the average of the current and the previous year's employment. At the industry level, the job creation rate is a weighted average of the establishment-level job creation rates, and the job destruction rate a weighted average of the establishment-level job destruction rates. Whereas an establishment cannot grow and decline at the same time, at the industry level some establishments can create jobs at the same time as others are destroying jobs. If this kind of job reallocation (total reallocation is defined as the sum of job creation and destruction) exceeds what is needed to obtain a given rate of net employment change in the industry (NETR), there is excessive job reallocation. Specifically, the excess job reallocation rate (EJR) is defined as $EJR = JCR + JDR - |NETR|$. It constitutes a useful indicator of restructuring at the industry level, because it captures the amount of simultaneous job creation and destruction. At the establishment level, EJR is always zero, since there is no simultaneous job creation and destruction, by definition.

The worker flow measures are worker hiring and separation rates, HR and SR, respectively. The hiring rate (separation rate) is the number of hired (separated) employees divided by the average employment.[5] The churning flow rate, CFR, is defined as the difference of the worker turnover rate (the sum of worker hiring and separation rates) and the job turnover rate (the sum of job creation and destruction rates), i.e. $CFR = HR + SR - (JCR + JDR)$. If there is job turnover, i.e. job creation and/or job destruction, there are also flows of workers into and/or out of the establishments. If the worker turnover exceeds the amount that is needed for job turnover, the difference, i.e. churning, is defined as excessive. It can, for example, be quits of workers and rehiring of new workers for the same positions. The industry-level churning is a weighted average of establishment churning rates. Thus, churning is a natural indicator of the intensity of restructuring at both the establishment level and the industry level.

Therefore, in addition to the establishment-level measures of job and worker flows, we use the flow measures that are calculated separately for 41 2-digit industries. This allows us to identify different levels of labor market turbulence that could potentially have different effects on employees' well-being. Hence, to explore the existence of compensating wage differentials, we use the churning and excess job reallocation rates as the explanatory variables to capture the labor market uncertainty that the employees face.

The annual flow rates are calculated for the non-farm business sector by using information on the employees' employers during the last week of each year. The public sector (~30% of the observations) is excluded, because the employer codes are not as well-defined as in the business sector and therefore the job and worker flows would not be comparable. The job and worker flow rates in the Finnish private sector have approximately the same order of magnitude as in other industrialized countries including the U.S. (see Davis and Haltiwanger, 1999; Ilmakunnas and Maliranta, 2003).[6]

We estimate the models for the wage and salary earners aged 17–64. This produces an effective sample of ~7000 person-year observations for the period 1996–2001, depending on the specification.[7] The exact definitions including the means and standard deviations of the variables are documented in the Appendix (Table A1).

Table 1 reports evidence of the association between establishment- and industry-level job and worker flows and employees' well-being.[8] The dependent variables are ordered, so we use ordered logit. To include fixed effects in the estimation, we follow the suggestion of Ferrer-i-Carbonell and Frijters (2004). They show that an ordered logit model with fixed effects can be estimated as a fixed effect logit (conditional logit) model, where the ordered data are collapsed to binary data with individual-specific thresholds. In our case, the recording of observations to "high" and "low" satisfaction is individual-specific, based on the individuals' average satisfaction scores in the panel over the period 1996–2001. Only individuals with changes in their satisfaction status over time can be included in the estimations.

The fixed effects ordered logit estimates for establishment-level flows suggest that the previous year's job destruction and worker separation measures are negatively related to job satisfaction, but they are not connected to satisfaction with job security (Table 1,

[4] To our knowledge, only the Danish ECHP has been previously linked to the longitudinal register data. Clark et al. (2009) examined the effect of co-workers' wages on job satisfaction. Their sample size is somewhat larger than ours, mainly because two more waves (1994 and 1995) are available for the Danish ECHP.

[5] Worker turnover that is reversed within the year (e.g. hiring a person in January and laying him off in November) is not observed. We cannot distinguish layoffs and voluntary quits, but their difference is not clear from the theoretical perspective, because employers can decrease workers' wages in order to produce (voluntary) quits in the non-competitive labor market.

[6] Ilmakunnas and Maliranta (2003) provide a detailed descriptive account of job and worker flows in the Finnish private sector. They use exactly the same data sources to calculate the labor market flows.

[7] We focus on the non-farm business sector. Another important restriction is that we focus solely on wage and salary earners, based on the main source of income. Thus, we exclude those who have no income from any source, students, retired, unemployed, and those who are self-employed. (The share of the self-employed in the labor force in Finland is ~7%.) A smaller number of observations are excluded, because we also focus on those aged 17–64. The quality of the establishment link is crucial in the construction of the matched data. We are able to obtain the establishment-level labor market flows for ~95% of the non-excluded individuals in the ECHP.

[8] We could measure turbulence also with other measures like the rates of net employment change, job turnover and worker turnover. To compress the presentation of the associations, we do not report the estimates here. In any case, they would not be as informative as those shown in the table. For example, using the net employment change we would impose the restriction that the job creation and destruction rates have a symmetric effect on satisfaction.

Table 1
The association of establishment- and industry-level job and worker flows with employees' well-being.

	(1)	(2)	(3)	(4)
	Establishment-level flows		Industry-level flows	
	FE ordered logit	FE ordered logit	FE ordered logit	FE ordered logit
Panel A: Job satisfaction				
Job creation rate	0.0933		−0.9774	
	(0.0891)		(0.8894)	
Job destruction rate	−0.2217		1.7136*	
	(0.1461)		(0.8786)	
Hiring rate		0.0776		−1.2581
		(0.0924)		(0.8449)
Separation rate		−0.2385*		1.4116*
		(0.1426)		(0.8526)
N	5163	5163	5519	5519
Panel B: Satisfaction with job security				
Job creation rate	0.0584		1.3675*	
	(0.0797)		(0.8058)	
Job destruction rate	−0.0049		−1.8890**	
	(0.1315)		(0.8530)	
Hiring rate		−0.0136		1.4970**
		(0.0833)		(0.7603)
Separation rate		−0.1583		−1.7822**
		(0.1264)		(0.8309)
N	5506	5506	5875	5875

Notes: The dependent variable is job satisfaction in Panel A. In Panel B, the dependent variable is satisfaction with job security. The job and worker flows are lagged by one year. The models in Columns 1–2 are estimated by using establishment-level flows. The models in Columns 3–4 are estimated by using 41 2-digit industry-level job and worker flow measures. All models are estimated by using ordered logit with the individual-specific fixed effects, as explained in the text. All models include a full set of indicators for years (survey waves) and regions. All models also contain all the (unreported) individual-level control variables that are listed in the Appendix (Table A1). Robust standard errors in parentheses, clustered at the individual level.
* p<0.1.
** p<0.05.

Panels A–B, Columns 1–2).[9] Furthermore, it is interesting to observe that the previous year's industry-level job destruction and worker separation measures are negatively associated with satisfaction with job security (Table 1, Panel B, Columns 3–4).[10] It seems that changes that happen at the workplace have a direct bearing on how the employees feel about their jobs, because establishment turnover makes for a bad work environment. However, what happens at a more aggregate level is a signal of general employment prospects and therefore associated with feelings about job security.

4. Hypotheses and empirical specifications

The basic hypothesis is that under compensating wage differentials, job and worker flows increase wages, but they do not affect job satisfaction. However, if labor market uncertainties are not fully compensated with higher wages, unfavorable aspects like churning at the establishment or industry level should be negatively related to job satisfaction.

We estimate specifications with the following structure:

$$Y_{ijkt} = \beta X_{ijkt} + \alpha_i + \eta UNCERTAINTY + \delta_k + \lambda_t + \varepsilon_{ijkt} \quad (1)$$

where Y_{ijkt} is the outcome (the log of the real wage or job satisfaction) for individual *i* employed in establishment *j* in region *k* in year *t*. Given the theoretical framework of Section 2 the intention is to track the utility at work. Job satisfaction is used as the dependent variable in the tests for the existence of a compensating wage differential, because it constitutes a coherent measure of employees' overall utility at work.[11] X_{ijkt} represents control variables, which incorporate the standard individual-level covariates such as employees' age and education level that can be regarded as 'the usual suspects', based on the literature on job satisfaction (e.g. Clark, 1996).[12] Because we estimate fixed effects specifications, the indicator for gender is omitted from the vector of control variables.

α_i represents the individual-specific fixed effects. Lykken and Tellegen (1996) demonstrate by using twin data that 44–80% of the variation in individuals' self-assessed well-being emerges from genes and upbringing. Therefore, the individual-specific fixed effects are extremely important determinants of subjective well-being. Also, fixed effects specifications are able to mitigate the problems created by the potential endogeneity of the explanatory variables, to the extent that they are determined by time-invariant unobserved employee attributes. In our case, the choice of an uncertain establishment or industry might be related to the unobservable characteristics.

The variable of interest is *UNCERTAINTY*, which is a measure of labor market turbulence. It is not immediately obvious how one should measure the uncertainties for testing the compensating wage differentials. We have seen above in Table 1 that 'negative' shocks such as the separation of workers from the establishment or the decrease in the number of jobs are negatively associated with employees' well-being. However, are these labor market flows the kind of risks that should be compensated? The theory of compensating wage differentials points out that *average* permanent risk is compensated by means of higher wages. However, it does not imply that risky outcomes (*ex post*) are compensated. Otherwise, there would be a labor market situation in which a specific negative demand shock in an establishment would raise wages there. Even average job destruction or average worker separation as the measures of uncertainty would be problematic: firms with poor prospects are not likely to pay higher wages.[13]

Instead, we use the measures that are related to excessive volatility in the establishment or in the industry, i.e. the rates of churning or excess job reallocation. To capture the average permanent risk that employees face, we use 3-year moving averages of the establishment- and industry-level flows over the period *t*-1 – *t*-3 to

[9] The (unreported) standard individual-level control variables largely replicate the well-known patterns from other countries. These results are reported and discussed in the working paper version.

[10] There are individuals in the panel that change their industry (or establishment) over the data period. For this reason, we cannot calculate industry-clustered or establishment-clustered standard errors, because one individual may belong to several different clusters over time. In any case, the matched data do not contain many observations on individuals for each establishment, because we match a random sample of individuals to comprehensive register on establishments.

[11] In contrast, satisfaction with job security captures only one narrow aspect of employees' overall utility at work. Thus, it would not be a valid approach to use satisfaction with job security as the dependent variable when testing for the existence of a compensating wage differential for uncertainty. Therefore, those results would also be very difficult to interpret. For example, if one finds that there is an effect when looking at satisfaction with security, but no effect when looking at overall job satisfaction, it means that workers either do not allocate any weight to security in their assessment of overall job satisfaction or they are compensated in some unobserved manner.

[12] The individual-level covariates originate from the ECHP with the exception that the establishment size groups are taken from FLEED, because employers' characteristics reported by employees themselves can sometimes be unreliable.

[13] Cahuc et al. (2002) developed a dynamic model of firm-level bargaining that predicts that the higher the rate of job destruction within firm, the higher the compensation of employees. They obtain evidence supporting this using a panel of French firms. An alternative argument is that job destruction increases unemployment fears, reduces bargaining power and therefore decreases wages. Campbell et al. (2007), and Hübler and Hübler (2010) analyzed the effect of job security on wages based on this view.

explain job satisfaction in period t.[14] The lag is chosen to ensure that the flow happens before satisfaction is observed. As an alternative, we use flows lagged by one year. It is also likely that the impact of volatility is nonlinear so that small volatility is not reflected in well-being or not compensated by means of higher wages. Therefore, we have categorized the establishments and industries for which employees work as high churning (or high excess reallocation) ones if the moving average of the churning (or excess job reallocation) rate exceeds 20%. This cut-off point is the same as that used by Golan et al. (2007) and makes sense in our matched data, because the mean value for establishment-level churning is ~23% (see the Appendix, Table A1). Note that the establishment- and industry-level flow measures are exogenous to individual employees.

δ_k represents a full set of indicators for NUTS2 regions. They pick up all average differences in employees' satisfaction across regions.[15] λ_t represents the fixed effects associated with the year (survey waves). The time effects capture any changes that affect all employees' well-being in the same way. In particular, these indicators allow for the existence of macroeconomic effects, because they have been shown to be important determinants of subjective well-being (e.g. Clark et al., 2010).

Finally, it is useful to note that we do not incorporate indicators for industries in the baseline specifications, because most employees do not change their industry in the six-year data period, which makes it difficult to identify a full set of industry effects in the fixed effects estimation. Standard errors are clustered at the individual level, because we have repeated observations on individuals.

5. Results

5.1. Baseline estimates

To explore the existence of compensating wage differentials, we start by estimating hedonic wage equations in which uncertainties are treated as job disamenities to establish whether employees are compensated by means of higher wages for facing excessive labor market turbulence at the establishment or industry level. In the baseline estimates, we use an indicator for the high churning rate as the measure of disamenity. We use specifications that take into account the individual-specific fixed effects in linear panel data models.

We find evidence that high churning at the establishment level has a statistically significant positive effect on real wages (Table 2).[16] This shows that employees obtain compensation for restructuring at the establishment level when the turbulence is more intensive than a threshold. The point estimate from the specification that uses the 3-year moving average of the indicator for high churning establishments reveals that real wages are ~1.7% higher in establishments with high churning (Table 2, Panel A, Column 2).[17] Regarding the relatively small quantitative magnitude of the estimate, it is useful to note that Finland had a centralized wage bargaining system over the data period, which sets restrictions on establishment-level pay determination. The system has also led to substantial wage compression.

According to Panel A in Table 2, uncertainty increases wages at the establishment level, but not at the industry level. A plausible explanation is that uncertainty at the establishment level is much nearer to an individual employee than uncertainty that prevails at the industry level. Thus, employees demand monetary compensation for uncertainty that occurs at the establishment level. A related argument is that intense job and worker flows at the level of industry may actually be a good thing from the viewpoint of an individual employee. They may indicate the existence of a thick labor market which opens up vacancies and outside options, also for those who would otherwise be negatively affected by the labor market turnover.

To examine the effect of uncertainties on job satisfaction, we estimate specifications that take into account the ordinal nature of the satisfaction measure while using the panel dimension of the linked data at the same time. The fixed effects ordered logit results show that high churning at the establishment level has no statistically significant effect on job satisfaction while not controlling for wages (Table 2, Panel B, Columns 1–2). Thus, the significant effects of high churning on real wages and insignificant effects on job satisfaction at the establishment level give consistent support for the existence of compensating wage differentials for uncertainties. We also find that the indicator for high churning industries has no effect on real wages or on job satisfaction (Table 2, Panels A–B, Columns 3–4). Therefore, there is establishment- rather than industry-level compensation for uncertainty. (Although, of course, the insignificant effect on job satisfaction at the industry level is consistent with the hypothesis of compensating wage differentials.)

5.2. Robustness checks

To check the sensitivity of the baseline estimates, we have estimated several alternative specifications. We briefly discuss these results without presenting them in tables. First, we have used an indicator for a high excess job reallocation rate as a measure of uncertainty. Since excess job reallocation can only be measured at the industry level, this measure is an alternative for the industry-level churning rate. Our finding was similar to that in Table 2: the indicator for high excessive reallocation was not significant in either the wage or the job satisfaction equation. It seems that it is the establishment rather than industry-level volatility that is the relevant source of uncertainty among the employees.

Second, we have used continuous measures of the flows, in essence assuming that there is a linear relationship between the flows and wage or job satisfaction. The results on the wage equation changed, as the flows were not significant. Therefore, using the continuous measures, we obtain conflicting evidence on the compensating wage differentials. It seems that taking the nonlinearities in the relationships into account is important. We have also experimented with some variations to the 20% cut-off point for the definition of high churning. The baseline results of Table 2 are not particularly sensitive to the chosen cut-off point.

Third, we have experimented with different sets of control variables and estimation samples. We have estimated specifications that include a full set of indicators for 41 2-digit industries. In addition, we have excluded the individual-level control variables (X_{ijkt}) from the specifications. The standard control variables (i.e. age and education level) that we use are strongly correlated with individual wages, but the wage should not be included in the model when the compensating differential for uncertainty is tested for. Moreover, we have estimated models that include employee-specific linear time trends in addition to the individual-specific fixed effects, following e.g. Jacobson et al. (2005). These models control for any unobserved employee characteristics that change at a constant rate over time, which can be related to, for instance, career development. We have

[14] This is somewhat similar to Magnani (2002), who has presented U.S. evidence about the positive effects of industry-specific volatility on earnings, using the moving average of industry-specific shipment volatility as a proxy for unemployment risk. This is exogenous to individual employees as opposed to individual unemployment histories, which reflect largely unobserved heterogeneity among employees.

[15] Because we use panel data, the regional effects are identified through those individuals who change their NUTS2-region over the period 1996-2001.

[16] The minimum wages in Finland result from industry-level bargaining. They determine the lowest possible wage for each task in the sector. Employers can naturally pay more than the minimum, and the average wages are generally much higher than the minimum rates. The wage variable that we use includes supplements and bonuses in addition to the base salary, because these are the wage components that are determined at the establishment level and they are subject to individualized wage setting.

[17] The point estimate for the three year average in Panel A of Table 2 is larger than the effect from one year only, because the three year average captures the permanent effect of turnover more fully. However, the 95% confidence intervals reveal that these estimates do not differ statistically significantly from each other.

Table 2
The effect of establishment- and industry-level uncertainty on wages and employees' job satisfaction.

	(1)	(2)	(3)	(4)
	FE OLS	FE OLS	FE OLS	FE OLS
Panel A: The effect on wages				
High churning rate (establishment-level, flow lagged by one year)	0.0136**			
	(0.0068)			
High churning rate (establishment-level, 3-year moving average)		0.0165**		
		(0.0071)		
High churning rate (industry-level, flow lagged by one year)			−0.0051	
			(0.0068)	
High churning rate (industry-level, 3-year moving average)				−0.0065
				(0.0078)
N	7173	7173	7173	7173
	(1)	(2)	(3)	(4)
	FE ordered logit	FE ordered logit	FE ordered logit	FE ordered logit
Panel B: The effect on job satisfaction				
High churning rate (establishment-level, flow lagged by one year)	−0.0416			
	(0.0724)			
High churning rate (establishment-level, 3-year moving average)		0.0370		
		(0.0906)		
High churning rate (industry-level, flow lagged by one year)			−0.0741	
			(0.1042)	
High churning rate (industry-level, 3-year moving average)				0.0664
				(0.1078)
N	5160	5160	5160	5160

Notes: The dependent variable is the real wage in Panel A. In Panel B, the dependent variable is job satisfaction. The establishments and industries for which employees work are categorized as high churning ones if the (moving average of the) churning rate exceeds 20%, following Golan et al. (2007). The models in Panel A are estimated by using OLS with the individual-specific fixed effects. The models in Panel B are estimated by using ordered logit with the individual-specific fixed effects, as explained in Section 3. All models include a full set of indicators for years (survey waves) and regions. All models also contain all the (unreported) individual-level control variables that are listed in the Appendix (Table A1). Note that the wage is not included in the set of control variables in the models of Panel B. Robust standard errors in parentheses, clustered at the individual level.
** $p<0.05$.

also estimated specifications that include the regional unemployment rates for the NUTS2 regions as an additional control variable, because local unemployment might be thought of as another aspect of insecurity and there is evidence showing that local unemployment reduces wages (e.g. Blanchflower and Oswald, 1995). Furthermore, we have incorporated the uncertainty measures both at the establishment and industry level at the same time. Also, we have estimated specifications in which we have dropped the smallest establishments (those with less than 20 employees) from the data. The turnover rates are much higher among them, so the results may be driven by these observations. The baseline results of Table 2 remain unchanged in all of these alternative specifications.[18]

Fourth, we have estimated specifications in which we have used the uncertainty measures between t and $t+1$ as proxies for expected future uncertainty. These estimation results confirm the insignificant effect of insecurity on job satisfaction and a positive wage which is somewhat weaker than in the baseline specifications.[19]

Fifth, we have estimated models that include an indicator for those who have changed their establishment during the past year to account for outside options.[20] There may be a tendency for dissatisfied employees to switch from the establishments with high turnover to those with low turnover. This could lead to a situation in which employees with the highest distaste for churning at the workplace gradually move into establishments with the lowest level of actual turnover. Therefore, the estimates in Table 2 could underestimate the negative effects of excessive labor market turnover on satisfaction. However, the inclusion of an indicator for job changers has only a small effect on the results. A plausible explanation for this is that high average unemployment over the data period (~11%) has hindered employees' efforts to improve their labor market position by taking advantage of outside options. Interestingly, the indicator for job changers obtains a statistically significant positive coefficient in most of the models.[21] This pattern is in accordance with the results by Akerlof et al. (1988). They show that job changes generally lead to an increase in job satisfaction.

Sixth, we have examined whether compensating wage differentials vary along the earnings distribution, following Fernández and Nordman (2009). These results suggest that the positive wage effects of uncertainty of Panel A in Table 2 are somewhat larger for the high-wage employees who have above-average wages. One explanation for this pattern is that the high-wage employees have a better bargaining position to negotiate for higher wages when facing substantial uncertainty at the establishment level.

[18] The estimates that use the interactions for regional unemployment and the insecurity measures suggest that high churning at the establishment level may have a more negative effect on job satisfaction if regional unemployment is very high (over 10%). However, our matched data are not particularly well suited to explore these interactions, because the regional division of the data is quite aggregative covering five NUTS2-regions.

[19] While this result supports our main conclusions, we have to treat it with caution. Realized future turbulence is expected turbulence plus expectational error. Replacing expected future turbulence by the realized one leads to inconsistent estimates since the realized future value is correlated with the expectational error, which is now part of the residual.

[20] We do not drop job changers from the data, because this would produce a biased sample.

[21] The positive job satisfaction effect for job changers seems to reflect higher wages, because the result does not prevail when we also control for wage change.

Finally, we have explored the other possible sources of heterogeneity in the relationship between labor market turbulence and employees' well-being. The results remain similar for those with at least 10 years of tenure. We have also estimated the models separately for those younger than 35 (but use the flow measures that capture the turnover among the whole workforce in the establishments). It is interesting to note that the indicator for the high 3-year moving average of establishment-level churning obtains a positive coefficient of 0.0357 in the wage equation that is statistically significant at the 2% level. This effect (~3.6%) is roughly twice the wage effect (~1.7%) for all employees (Table 2, Panel A, Column 2). A prominent explanation for the finding that the wage effect of uncertainty is larger for the younger employees is that they are located on the upward sloping part of the wage profile. This also makes their wages more responsive to the exogenous changes in the economic environment. In contrast, the wage profile for the older employees is generally relatively flat, making their wages less responsive to the changes in the labor market. The insignificant effect of churning on job satisfaction remains intact for employees younger than 35.

6. Conclusions

Matching administrative records to individual well-being responses provides a natural way to improve the understanding of how the labor market works. This is the first study of the connection between creative destruction and employees' well-being by using a nationally representative panel data set. Our novel interpretation of compensating wage differentials relies on linked employer–employee panel data that contain both survey information on employees' subjective well-being and comprehensive register-based information on job and worker flows in the private sector. The panel structure allows us to eliminate the bias stemming from unobservable individual characteristics that may be related to the selectivity to different kinds of jobs.

We test for the existence of compensating wage differentials by explaining wages and job satisfaction with uncertainties. The baseline results show that high excessive worker turnover, or churning, at the establishment level, is positively related to individual wages. We also find that it is not a statistically significant determinant of job satisfaction. Therefore, the baseline estimates provide evidence supporting the existence of compensating wage differentials. However, we find no wage effects when a continuous measure of churning is used. Uncertainty does not seem to have a linear effect.

The broader methodological lesson is that it is important to take a step further and use also the measures of job satisfaction to test the existence of compensating wage differentials. The existing literature on compensating wage differentials has almost exclusively used only hedonic wage equations to evaluate the hypothesis. Our findings may be partly related to the specific institutional characteristics of the labor market in Finland, which includes a substantial wage compression. In another kind of institutional setting, one might find stronger evidence.

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Appendix

Table A1
Definitions and descriptive statistics of the variables.

Variable	Mean (standard deviation)	Definition/measurement
Dependent variables		(Source: ECHP)
Job satisfaction	4.516 (0.906)	Job satisfaction is measured on an ordinal 6-point Likert scale from 'not satisfied' (1) to 'fully satisfied' (6) (the question PK001). A higher value means that a person currently feels more satisfied.
Satisfaction with job security	4.527 (1.212)	Satisfaction with job security is an answer to the question (PE032): "How satisfied are you with your present job in terms of job security?". Satisfaction with job security is measured on an ordinal 6-point Likert scale from 'not satisfied' (1) to 'fully satisfied' (6). A higher value means that a person currently feels more satisfied.
Real wage	8.913 (0.384)	A logarithm of real monthly wage, deflated to the year 2000 by using the consumer price index. Real monthly wage includes supplements and bonuses in addition to the base salary.
Independent variables		
Job and worker flows		(Source: FLEED)
Job creation rate (JCR)	0.189 (0.415)	Industry-level job creation is calculated by adding up positive employment changes at the establishment level. At the establishment level, job creation is positive employment change or zero. The rates are calculated by using as the denominator, the average number of employees in two consecutive years.
Job destruction rate (JDR)	0.069 (0.236)	Industry-level job destruction is the sum of the absolute values of negative employment changes at the establishment level. At the establishment level, job destruction is the absolute value of negative employment change or zero. The rates are calculated by using as the denominator, the average number of employees in two consecutive years.
Excess job reallocation rate (EJR)	0.192 (0.084)	The excess job reallocation rate equals the job reallocation rate (job creation rate + job destruction rate) minus the absolute value of the net employment change (job creation rate–job destruction rate). It measures the magnitude of gross job flows that is above what is necessary to accommodate the net employment changes at the industry level. At the establishment level, excess job reallocation is zero.
Hiring rate (HR)	0.306 (0.413)	Hiring is calculated by counting the number of employees who are in an establishment at the end of the year and were not there at the end of the previous year. Industry-level hiring is the sum of hirings of the establishments. The rates are calculated by using the average number of employees in two consecutive years as the denominator.
Separation rate (SR)	0.186 (0.258)	Separations are calculated by counting the number of employees who were in an establishment at the end of the previous year, but are not there at the end of the current year. Industry-level separation is the sum of separations of the establishments. The rates are calculated by using the average number of employees in two consecutive years as the denominator.
Churning rate (CFR)	0.233 (0.237)	The churning rate equals the worker flow rate (the sum of hiring and separation rates) minus the job reallocation rate (the sum of job creation rate and job destruction rates). It measures the magnitude of worker turnover that is above what is needed to accommodate the job turnover.

(continued on next page)

Table A1 (*continued*)

Variable	Mean (standard deviation)	Definition/measurement
Human capital variables		(Source: ECHP)
Age <=24	0.079 (0.269)	Age <= 24 = 1, otherwise = 0
Age 25–34	0.258 (0.438)	Age 25–34 = 1, otherwise = 0
Age 35–44	0.305 (0.460)	Age 35–44 = 1, otherwise = 0 (reference)
Age 45–54	0.287 (0.452)	Age 45–54 = 1, otherwise = 0
Age 55–64	0.072 (0.258)	Age 55–64 = 1, otherwise = 0
Married	0.621 (0.485)	Married = 1, otherwise = 0
Basic education only	0.210 (0.408)	Less than second stage of secondary level education (International Standard Classification of Education 0–2) = 1, otherwise = 0 (reference)
Middle education	0.461 (0.498)	Second stage of secondary level education (ISCED 3) = 1, otherwise = 0
Higher education	0.329 (0.470)	Third level education (ISCED 5–7) = 1, otherwise = 0
Self-assessed health	3.976 (0.716)	Self-assessment of health is scaled from 1 to 5 (top condition). (We have reversed the original scale of the health measure to emphasize that higher numbers correspond to better health.) (Source: ECHP)
Employer characteristics		(Source: FLEED)
Establishment size <=4	0.013 (0.112)	Size of establishment at most 4 employees = 1, otherwise = 0 (reference)
Establishment size 5–9	0.106 (0.308)	Size of establishment 5–9 employees = 1, otherwise = 0
Establishment size 10–19	0.135 (0.342)	Size of establishment 10–19 employees = 1, otherwise = 0
Establishment size 20–49	0.182 (0.386)	Size of establishment 20–49 employees = 1, otherwise = 0
Establishment size 50–99	0.120 (0.325)	Size of establishment 50–99 employees = 1, otherwise = 0
Establishment size>100	0.444 (0.497)	Size of establishment over 100 employees = 1, otherwise = 0
Indicators		
Years (survey waves)	..	Indicators for 6 years, 1996–2001
Regions	..	Indicators for 5 NUTS2 regions (Source: FLEED)

Notes: Descriptive statistics refer to the establishment-level job and worker flows except in the case of the excess job reallocation rate in which they refer to the 2-digit industry-level measures.

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