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HUMAN CAPITAL, MATCHING AND JOB SATISFACTION

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Abstract

Using a model of wage determination developed by Stevens (2003) we offer an explanation of why tenure has a negative effect when entered in job satisfaction equations. If job satisfaction measures match quality, then the explanation follows from a model of the labour market in which workers accumulate specific human capital at the firm they work and the way in which this accumulation affects the way they react to outside job opportunities.

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I Introduction

The idea of using job satisfaction to proxy match quality has recently been discussed in the literature on job matching by Ferreira and Taylor (2011) and additionally there is a much older literature which argues that, because job satisfaction reduces individuals' disutility of effort, it increases workers' productivity, Freeman (1978). Freeman and a number of studies, Borjas (1979) and Theodossiou and Zangelidis (2009) to name but two others also report a negative relationship between tenure and job satisfaction. The contribution of this paper is to use an artefact of a recent paper by Barmby and Eberth (2008) to explain this.

Barmby and Eberth (2008) were seeking to explain a puzzle in Human Capital theory raised by Medoff and Abraham (1980), and the curious reader is referred to their paper for full details on this, but the theory implied that match quality and tenure would be negatively related. It therefore follows that if the theory we outline in the section II is correct and job satisfaction is indeed a measure of match quality then we should see a negative relationship between job satisfaction and tenure. To further support the finding we estimate job satisfaction equations using matched employer-employee data which is described in section III and in section IV we report our estimation of job satisfaction equations. Section V concludes.

II   Theory

We start by considering the wage a worker receives in her current firm and offers from alternative firms she might work for. Consider the worker's productivity in firm 0 (current employer). In Stevens (2003) auction model there are n firms in the market each privately forming a valuation of the match component of a worker's productivity, $\varepsilon_i > 0$ for $i \geq 1$. These match qualities are independently distributed $\varepsilon_i \, \square \, f(\varepsilon_i)$; $\varepsilon_i \in (\underline{\varepsilon}, \overline{\varepsilon})$, $i > 0$. Realised productivity with the current employer will therefore be of the form

$$\ln v_0 = \ln g + \ln k + \ln \varepsilon_0 \qquad (1)$$

If the worker moves the specific human capital is lost and

$$\ln v_i = \ln g + \ln \varepsilon_i, \ i > 0 \qquad (2)$$

Here v is productivity, g general human capital, k specific human capital, measured by tenure, and ε is match quality. Tenure, k, will be observed by the market but ε, the match quality, is the unobserved component of current productivity. Firm wage offer functions of the form $w_i = w_i(\varepsilon_i, g, k)$ are defined in equilibrium. Stevens observes that as general human capital scales up productivity in all firms, the elasticity of wage offers with respect to g is unity. Defining $W_i(\varepsilon_i, k) = w_i(\varepsilon_i, 1, k)$ wage offers can be written as $w_i = gW_i(\varepsilon_i, k)$, this will allow an approximation of the log wage offer of the current employer to be written as

$$\ln w_0 \ \square \ \ln g + \alpha(\varepsilon_0)\ln k + \eta(\varepsilon_0) \tag{3}$$

Which follows from a Taylor series expansion of $\ln W_0(\varepsilon, k)$ [4] around $k=1$, and therefore will be valid for k close to 1, corresponding to a situation when specific human capital is "small" relative to general human capital[5]. Stevens proposition 2 shows that there will be a negative bias in the coefficient on specific human capital, and the reader is referred there for precise analytical details but the intuition is this, workers who stay with their current employer are rejecting outside offers. Workers with high k can have a lower value of a match with their current employer and still reject a given outside offer. Consequently *tenure and match quality will be negatively correlated* and a negative correlation between an included regressor in an (estimating) equation and the equation's error biases the estimated coefficient downwards.

Figure 1 shows Stevens assertion graphically. The joint distribution of specific capital, $\ln k$, and match quality with the current employer, $\ln\varepsilon_0$, is drawn with $\text{cov}(\ln k, \ln \varepsilon_0) = 0$ such that the initial distributions of $\ln k$ and $\ln\varepsilon_0$ are independent; however this isn't vital. Suppose a worker receives an outside offer with match quality $\ln\varepsilon_i$ depicted by the solid line. If the sum of the value of the worker's specific human capital (k) and match quality with the current employer ($\ln\varepsilon_0$) exceeds the outside offer, the area above and to the right (the solid circles) of the outside offer line, the worker will reject outside offers. However, workers in the area below and to the left (the open circles) will accept. This non-random selection process from the joint distribution of $\ln k$ and $\ln\varepsilon_0$ induces a negative correlation between $\ln k$ and $\ln\varepsilon_0$ relative to the initial distribution within the group of *stayers*.

Figure 1 Negative correlation between tenure and match quality

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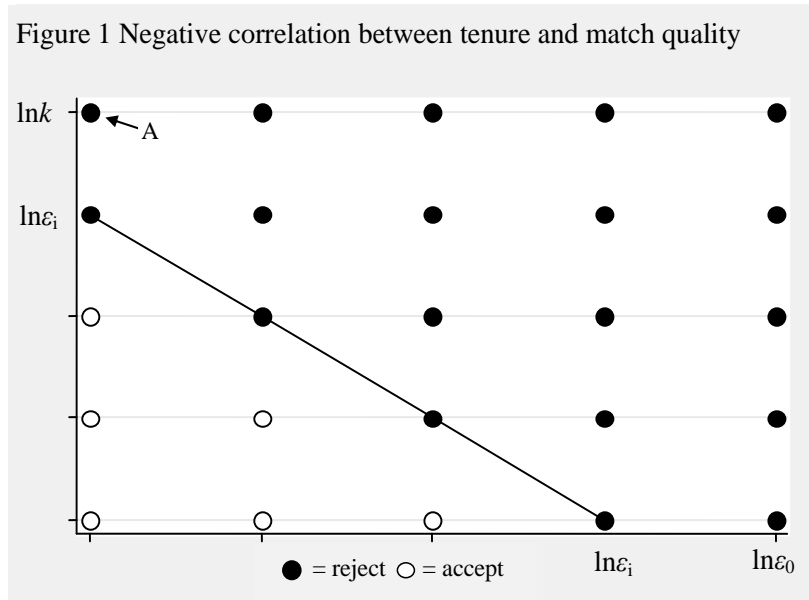
[4] Writing $\ln W_0 = \ln g + \ln W_0(\varepsilon, k)$ and expanding $\ln W_0(\varepsilon, k)$ to get (3)

[5] In (3) $\alpha(\varepsilon) = \dfrac{1}{W_0(\varepsilon,1)} \left. \dfrac{\partial W_0}{\partial k} \right|_{k=1}$ and $\eta(\varepsilon) = \ln W_0(\varepsilon,1)$, $\ln k \ \square \ (k-1)$ for k close to 1 has also been used

In the above figure we can also see how if specific capital is high, workers will reject outside offers, and stay with their present employer even when the match quality of the outside offer is better than that in the incumbent firm, consider worker A as an example.

However for the purposes of the present paper if job satisfaction measures also serve as measure of job match quality then if we estimate a job satisfaction equation including tenure as one of the independent variables, the same theory suggests that job satisfaction (match quality) to fall with increasing tenure. This is what we seek to examine now.

III Data

Our analysis is based on the linked employer-employee Workplace Employment Relations Survey (WERS) 2004.[6] Whilst the survey comprises all sectors of the British economy apart from mining and quarrying; agriculture, hunting and forestry; fishing; private households with employed persons; and extraterritorial bodies, our analysis is restricted to the private sector. Workplaces with at least 5 employees were sampled from the Inter-Departmental Business Register with a view to conducting a face-to-face interview with the manager at the workplace responsible for employment relations. The response rate was 64%. Respondents' permission was sought to distribute an eight page self-completion questionnaire to a randomly selected set of employees at the workplace or, in the case of workplaces with fewer than 26 employees, all of them. Permission was granted in 86% of cases. A further 10% of workplaces did not return any questionnaires. The overall response rate for the employee questionnaire was 61%.[7]

The data lend themselves well to the analysis of employee job satisfaction. First, we can control for workplace fixed effects and a broad array of job characteristics, as well as the standard controls for demographic and human capital attributes. Second, the data collects 8 measures of job satisfaction.

III.i Measures of job satisfaction

Job satisfaction captures the pleasure-displeasure axis in Warr's concept of subjective wellbeing (Warr, 2007). The data collects eight facets of job satisfaction. Employees are asked: "How satisfied are you with the following aspects of your job?... achievement you get from your work; the scope for using your own initiative; the amount of influence you have over your job; the training you receive; the amount of pay you receive; your job security; the work itself; the amount of involvement you have in decision-making at this workplace?" Responses are coded along a 5-point Likert scale ranging from "very satisfied" to "very dissatisfied". Principal component analysis identifies a single factor with an eigenvalue above 1 (4.04) explaining 51% of the variance in the items. Factor loadings ranged from 0.52 (pay) to 0.82 (influence).[8] The job satisfaction measure used in the analysis focuses on the job satisfaction gained from the non-pecuniary aspects of the job (NPJS) which we will argue is a proxy for match quality. The NPJS scale, which has a Cronbach's alpha of 0.85, incorporates all the satisfaction items excluding pay. We sum all non-missing responses having recoded each item (-2,2) where "very satisfied" scores two and "very dissatisfied"

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[6] We thank the WERS sponsors (Department for Business Innovation and Skills, Acas, ESRC and PSI) and the UK Data Archive for access to the data.
[7] For more information about the survey see Kersley et al. (2006).
[8] These results are similar to Wood's (2008: 160) even though his analysis relates to the whole economy.

scores -2, resulting in a dependent variable running from (-14, 14). One-sixth (17%) of the sample score below zero; one-fifth (22%) score zero; and the remaining 61% score above zero.

III.ii Tenure

Job tenure is measured as a categorical variable in the data. Employees are asked: "How many years in total have you been working at this workplace? By workplace we mean the site or location at, or from, which you work." Employees were presented with the following options: "less than 1 years"; "1 to less than 2 years"; "2 to less than five years"; "5 to less than 10 years"; or 10 years or more". The percentage of employees in the estimation sample who were in these categories is, respectively: 17, 13, 28, 19, and 23 percent.

III.iii Other covariates

The model controls for hourly wages, hours worked and a quadratic hours term; age (9 dummies); academic qualifications (8 dummies) and vocational qualifications (3 dummies); three-digit occupation (81 dummies); dummies for disability, gender, and ethnicity; dummies for having a permanent contract, union membership, coverage by a collective bargaining agreement, marital status, having any dependent children, and carer status[9]. We further include proxies for effort: the number of overtime or extra hours the employee usually works each week, whether paid or unpaid; a dummy for supervisory status[10]; a dummy variable identifying those employees who agree with the statement "My job requires that I work very hard"; and a composite job autonomy measure.[11]

IV Estimation & results

We model NPJS (match quality) as a function of tenure with workplace fixed effects.

$$NPJS_{if} = \beta_1 Tenure_{if} + \delta' X_{if} + \alpha_f + \varepsilon_{if} \qquad (6)$$

where β_1 gives the effect of tenure of individual i in firm f on NPJS; X_{if} is a vector of individual demographic and job characteristics as defined in 3.3; α_f is a firm fixed effect; and ε_{if} an iid(0, σ^2) error term. The abbreviated estimation results are shown in table 1.[12]

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[9] The dummy identifies those answering 'yes' to the question: "Do you look after or give help or support to any family members or friends who have a long-term physical or mental illness or disability, or who have problems related to old age?" Carer responsibilities may affect employees' wellbeing directly, as well as their earnings potential.

[10] The question is: "Do you supervise any other employees? A supervisor, foreman or line manager is responsible for overseeing the work of other employees on a day to day basis."

[11] The measure is based on responses to the following question: "In general, how much influence do you have over the following….What tasks you do in your job, the pace at which you work, how you do your work, the order in which you carry out tasks, the time you start or finish your working day?" The responses have a four point scale ("a lot, some, a little, none"), from which we formed a summated rating that went from 0 ('none' on all five items) to 15 ('a lot' on all five items).

[12] The full model is available from the authors on request.

The coefficients on the tenure dummies reveal a negative effect of job specific human capital on NPJS. The effect becomes more negative with increasing tenure relative to tenure of less than one year with the firm. Furthermore, the coefficients are statistically significantly different from one another until the employee reaches 5 years' tenure.

This result supports the idea that a measure of job satisfaction can be used as a measure of match quality and that match quality and tenure are negatively correlated.

Table 1 Abbreviated estimation results

	Coefficient	Standard error	P>|t|
1 to less than 2 years of tenure	-0.71683969	.1469904	0.000
2 to less than five years of tenure	-0.93884676	.1314653	0.000
5 to less than 10 years of tenure	-1.0163024	.1438284	0.000
10 or more years of tenure	-1.0023154	.1532475	0.000
N	11438		
F(117, 10104)	29.41		
Prob > F	0.0000		
R^2	0.4408		
Adjusted R^2	0.3669		

Note: - the reference category is less than 1 year of tenure. The 11438 employees are drawn from 1217 workplaces.

V Conclusion

In the context of a model of wage determination similar to that developed in Stevens (2003) and used in Barmby and Eberth (2008) we offer an explanation of why tenure will have a negative effect in job satisfaction equations. This explanation is based on a model of the labour market in which workers accumulate specific human capital at the firm they work at and how this accumulation affects the way they react to outside job opportunities.

In essence over time the accumulation of specific human capital introduces a sort of friction which induces workers to, quite rationally, "carry" a low match quality with their incumbent firm. This shows up in the negative relationship between job satisfaction and job tenure.

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