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Do Higher Wages Come at a Price?

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Abstract

Using linked employer-employee data for Britain we find that higher wages are associated with higher job satisfaction *and* higher job anxiety. The association between wages and non-pecuniary job satisfaction disappears with the inclusion of effort measures whereas the positive association between wages and job anxiety remains strong and significant providing no support for a compensating differential explanation, but rather for a ‘gift exchange’ type of reciprocal behaviour. No support is found for the proposition that within-workplace wage differentials are a source of job anxiety.

Key-words: worker wellbeing; job stress; job anxiety; job satisfaction; wages; compensating differentials

JEL-codes: J28; J31; J81

PsycINFO Classification codes: 3650; 3660; 3670

1. Introduction

It seems reasonable to assume that the higher the compensation, the better the employee will feel when undertaking the work. Higher wages may foster greater wellbeing through spending power or social status. However, there is an emerging literature questioning the link between higher income and happiness. We contribute to the literature using linked employer-employee data to establish the relationship between wages and three dimensions of employee wellbeing, namely pay satisfaction (PS), non-pecuniary job satisfaction (NPJS) and job anxiety (JA) as captured by Warr's contentment-anxiety scale (Warr, 2007). This proves to be highly informative. Although job satisfaction (JS) and job anxiety (JA) are as we would expect, negatively correlated, their unconditional and conditional relationships with wages surprisingly go in the same direction. In keeping with the literature, wages are positively associated with job satisfaction¹. However, wages turn also out to be positively associated with job anxiety. Our measure of job anxiety is an index based on subjective answers to survey questions on to what extent the job makes the worker feel tense, calm, relaxed, worried, uneasy, and content. In this paper we establish the robustness of a positive relationship between the job anxiety index and wages, and attempt to distinguish empirically between two alternative hypotheses that might explain this relationship.

A positive relationship between wages and job anxiety may arise for two reasons. The first is compensating wages. Anxiety has a direct negative impact on subjective wellbeing, and in addition job anxiety, job strain and stress in general are detrimental to worker health (see Section Two). Such negative impacts may need compensation in terms of higher pay. This idea was first described by Adam Smith some 250 years ago (Smith, 1759) and later formalized by Rosen (1986). In this framework, a worker is given higher wages to compensate for higher effort or more challenges that come with the job, and job anxiety induces higher wages. The second idea, brought into economics by Akerlof (1982), is one of "gift exchange" or reciprocal behaviour, further developed in the experimental economics literature, see for example Fehr, Gächter and Krichsteiger (1997). Higher wages induce more stress if the worker feels he has to reciprocate and perform better as a result of higher pay. In this case higher wages lead to more job anxiety.

We use British linked employer employee data to distinguish empirically between the two explanations. First we examine to what extent the inclusion of detailed workplace and job controls affects the relationship between wages and job anxiety. Next, we condition specifically on autonomy, effort and responsibilities associated with the job. If the wage-anxiety profile is a result

¹ See e.g. Clark and Oswald (1996) and Lévy-Garboua and Montmarquette (2004).

of compensating wage differentials, the slope of this profile should diminish and disappear as we add relevant controls for working conditions. If the relationship between wages and job anxiety remains strong, even when conditioning on detailed job characteristics, we find no support for the compensating wage differential idea, but rather for the idea that wages have an independent effect on job anxiety, in line with what is predicted by the gift exchange model.

As stressed in the literature, the gift exchange model requires a careful discussion of the relevant reference point from which to measure the gift component (Akerlof, 1982; Clark et al, 2010 and Card et al. 2011). Since we have linked employer-employee data, we are able to devise a test that separately identifies the effect of relative wages via workplace mean wages and rank within the workplace versus an effect of absolute wages (relative to “market” wages that is) on job anxiety.

The remainder of the paper is structured as follows. Section Two reviews the theoretical and empirical literatures linking wages to employee JS and JA. Section Three introduces our data. Section Four outlines the empirical strategy. Section Five reports our results and Section Six concludes.

2. Theoretical and Empirical Literature

There is an emerging literature questioning the link between income growth and happiness. Recent empirical evidence indicates that, at least in the case of citizens in advanced Western economies, GDP growth is not associated with greater happiness (Easterlin, 2001). Although Easterlin’s Paradox has not gone unchallenged (Stevenson and Wolfers, 2008) there is also evidence at a micro-level of a less clear-cut relationship between income and wellbeing. Those receiving a random positive income shock, such as lottery winners, do indeed report higher levels of happiness than they had hitherto (Gardner and Oswald, 2007), but the effect often diminishes over time as they experience their new, richer environment. This is not simply because they must contend with previously unforeseen problems (solicitations from others etc.) but also because they become habituated to their new improved circumstances. Kahneman and Deaton (2010) argue that emotional well-being rises with log income, but not by much beyond \$75,000.

Warr (2007: 116) identifies a number of studies establishing a positive independent correlation between wages and job satisfaction. The association is robust across time and place. It is stronger with respect to pay satisfaction, but it is also statistically significant with respect to non-pecuniary aspects of the job. The studies include longitudinal studies finding increases in pay leading to

increases in job satisfaction, *ceteris paribus* (op. cit.: 228). The emergent behavioural economics literature exploring the underlying reasons for this empirical regularity focuses largely on perceptions of fairness and reciprocity. Employees' sense of self-worth may be enhanced if they feel well-paid for the job they do, if it confers social status or if it heightens perceptions of fairness in the wage-effort bargain (Fehr and Schmidt, 1999). Higher wages can also induce greater feelings of wellbeing when employees reflect with satisfaction on their rank in the wage distribution relative to their peers (Brown et al., 2008), where they were in the past, or where they had expected to be by this point in their career (Lévy-Garboua and Montmarquette, 2004). Conversely, a wage hike may be associated with lower worker wellbeing if the worker was anticipating a larger hike, or if her peers received larger increases. A positive association between wages and satisfaction may also be observed if happiness increases productivity, as Oswald et al. (2009) show in a laboratory setting.

One would expect wages to be negatively correlated with anxiety for several reasons. First, higher wages may foster greater well-being through spending power and via social status (Stinchcombe, 1984; Marmot, 2004). Higher wages might also be associated with greater well-being if wages (as resources) increase workers' ability to cope with stress (Lazarus and Folkman, 1984).

The obvious explanation for a *positive* relationship, on the other hand, between job anxiety and wages is compensating wage differentials, as mentioned in the introduction: jobs that require hard work, stress or responsibility, may be characterized by both high pay and high levels of job anxiety. Poorer working conditions may entail risk potentially ending in injuries and personal damages, but also inherent risk associated with job loss probabilities. Either way, the higher wage is paid in recognition of the disutility engendered by the work. For this reason, intrinsically satisfying jobs may attract lower wages than other, less intrinsically satisfying jobs. If higher wages simply compensate for greater disutility from work and the analyst is able to account for all aspects of the job, one might imagine a relatively weak effect of wages on wellbeing. On the other hand, to the extent that it is not possible to control for all aspects of the job, a negative wage effect on wellbeing may be picking up that otherwise unobservable component of job quality or worker effort.

There are indications of labour intensification in the post-War period which have arisen, in part, as a response to growing product market competition and technological advances toward capital-intensive production processes and monitoring procedures geared to increase the effort that employees can expend in pursuit of productivity gains. Survey research indicates substantial

increases in reported stress and anxiety among British employees in the 1980s and the first half of the 1990s, after which time it appears to have stabilised at this relatively high level (Green, 2006, 2009). This has been attributed to increases in work effort, at both the extensive and intensive margins, required by employers and by the sorts of jobs that have become more numerous in the economy (Green, 2009).

Anxiety and stress are sources of ill-health and disease (Gardner and Oswald, 2004) and individuals report lower levels of happiness when they exhibit stress and anxiety (Blanchflower and Oswald, 2008). Other things equal, one might expect employers to compensate employees for increasing stress and anxiety occasioned by employment. This is precisely what survey research indicates since, over the decade to 2001, British employees experienced declining satisfaction with intrinsic aspects of their jobs – notably work effort and job autonomy – but rising satisfaction with extrinsic aspects of their jobs like pay (Green and Tsitsianis, 2004). According to Karasek and Theorell's Demand-Control-model (Karasek and Theorell, 1990) the psychological strain arises particularly in jobs making high demands but offering low control. Psychological stress and stressful life events have to a varying degree been linked to the common cold, heart disease, diabetes, cancers, stroke, fetal death, major depressions, and low birth-weight in offspring (Cohen et al., 1998; Link and Phelan, 1995; Rabkin and Struening, 1976). Job strain has similarly been associated with coronary heart disease and elevated blood pressure (Karasek et al., 1988; Schnall et al., 1990). Stress also causes biological processes producing hormones which may have detrimental health effects (Lundborg, 2005). The consensus is that stress is detrimental to health (Aboa-Eboule et al., 2007; Chandola et al., 2006, 2008; Cohen et al., 2007; Williams, 2008).

Compensating wage differentials are, however, not the only possible explanation. As discussed in the introduction, a positive relationship might also follow from workers' reciprocal behaviour, driven by cognitive dissonance reduction (Adams and Rosenbaum, 1962; Akerlof, 1982) and fair wage considerations (see e.g., Adams, 1963; Akerlof and Yellen, 1988, 1990) which give rise to non-compensating wage differentials (Fehr and Gächter, 1998).² Rotemberg (2006) interprets this literature as workers experiencing psychological distress when their individual effort deviates from

² This conclusion rests on empirical evidence from the experimental literature, showing that higher wages are reciprocated by increased efforts (Fehr et al., 1997, 1998; Fehr and Falk, 1999; Charness, 2004). However, Gneezy and List (2006) do not find support for reciprocal behavior. Fehr and Götte (2008) present evidence indicating that increased wages increase the overall labour supply in total and the hours of work provided, but not the effort per hour. Based on an experiment of real effort provision, Henning-Schmidt et al. (2010) find no impact on effort from wages, nor from peer comparison, whereas Clark et al. (2010) find that both own income and income comparisons (relative to the average and one's rank position) positively affect effort, both in a laboratory setting and in survey data.

the collective norm, and thus they adjust their efforts appropriately. Conditional on own effort, increasing wages, which also contain norm effort, would then be associated with higher levels of anxiety and psychological distress. In Lawler's discrepancy model (Lawler, 1971) a worker is dissatisfied with his pay if it is below what he believes he should receive, but will experience guilt and discomfort if his pay is above what he expects. Early evidence in the psychological literature (e.g., Rice et al., 1990) also indicates that pay satisfaction is determined by the simultaneous appraisal of current salary against several personal standards of comparisons.³

Thus, in the case of reciprocal behaviour, the difficult question of the reference group arises immediately. The reference groups might be nested within formal organizational units in loosely defined teams (Bamberger and Biron, 2007). Fehr and Schmidt even conclude "that 'who are the relevant reference agents' is an important unresolved problem" (Fehr and Schmidt, 2006: 655). Whereas several authors have addressed the importance of relative wages for job satisfaction and wellbeing (Clark and Oswald, 1996; Fehr and Schmidt, 1999; Luttmer, 2005; Card et al., 2011), we also study the impact of relative wages on job anxiety. We investigate the relevance of wages within the workplace versus wages outside the workplace, so that we can construct measures of relative wages within the workplace. If workers are motivated mainly by better wages than their peers, their peers' wages should enter negatively for job anxiety, whereas if the reference group is outside the workplace, as expressed by the alternative wages, their peers' wages should have no effect.

It may, however, matter whether a worker just simply compares himself with the median worker (as implied by Pardo (1995)) or if the comparison is more complex (e.g., asymmetric or based on some rank measure). In a recent paper, Card et al. (2011) find that wages below the median resulted in lower job and pay satisfaction, but wages above the median had no effect, thus implying asymmetric impacts.

The empirical literature investigating the links between wages and job-related anxiety and stress is in its infancy, and we contribute to this literature by extending analyses of the link between wages and wellbeing to a new dimension of worker wellbeing – job anxiety - hitherto unexplored in the economic literature. The psychological literature on the association between wages and context-free anxiety is mixed, with some studies finding a link between low pay and high anxiety (e.g.,

³ Information quality affects effort (Mitzkewitz and Nagel, 1993; Irlenbusch and Sliwka, 2005), and recent evidence shows that employee reciprocity requires a clear assessment of the surplus at stake (Henning-Schmidt et al., 2010).

Gardell, 1971), while others report no statistically significant *ceteris paribus* association (Clark et al., 1996).

3. Data

Our data are the linked employer-employee Workplace Employment Relations Survey (WERS) 2004. The survey covers all sectors of the British economy with the exception of mining and quarrying; agriculture, hunting and forestry; fishing; private households with employed persons; and extraterritorial bodies. However, we confine our analyses 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%. The respondent's 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. This 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%.⁴

The data are particularly well-suited for the analysis of employee wellbeing for four reasons. 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. This permits us to compare and contrast the wellbeing of workers with different wages in the same workplace, the same occupation, with the same amount of job autonomy. Second, we have a variety of measures capturing worker effort which we can control for, namely supervisory status, overtime hours worked, and employee (dis)agreement with the statement "my job requires that I work very hard". Third, we can construct mean workplace wages and wage rank from employee observations, thus permitting us to investigate relative wage effects on workers' wellbeing. Fourth, we have 14 measures of employee wellbeing capturing two broad measures of employee affect: 8 are measures of job satisfaction (JS) and 6 are measures of job anxiety and stress capturing Warr's contentment-anxiety scale (Warr, 2007).

3.1: Wellbeing measures

Our data contain two sets of wellbeing measures. The first set is employee responses to the following question: "Thinking of the past few weeks how much of the time has your job made you feel each of the following.. tense, calm, relaxed, worried, uneasy, content?" Responses are coded

⁴ For more information about the survey see Kersley et al. (2006).

on a 5-point scale: “all of the time”, “most of the time”, “some of the time”, “occasionally”, “never”. These measures have their origins in Warr’s (2007: 19-49) anxiety-contentment axis. Warr distinguishes between the two ends of this axis along the two dimensions of pleasure and mental arousal. Anxiety, as measured by feeling tense, worried or uneasy, is associated with negative affect but entails a high level of arousal. Contentment, on the other hand, as measured by feeling calm, contented or relaxed, is associated with positive affect and entails low levels of arousal.⁵ Principal components factor analysis⁶ of the six JA measures revealed two factors, one containing the measures of negative affect and the other containing the measures of positive affect. This confirms Wood’s (2007: 159) analysis which also used WERS 2004 but for the whole economy. However, as explained by Wood (op. cit.), there are good reasons to treat the items as forming a one-dimensional scale. Thus, following Wood, we combine the six items into a single scale. Taken together these six anxiety-contentment items have a Cronbach’s alpha of 0.85. Our single summative JA score rescales the five-point scores for each measure into (-2, 2) scales where ‘-2’ is “never” and ‘2’ is “all of the time” having reverse-coded the positive affect items such that higher scores indicate higher job anxiety. The scale thus runs from (-12, 12). Just over one-third (35%) of the sample score above zero; one-tenth (10%) score zero; and the remaining 55% have negative scores.

Our second set of wellbeing measures relate to job satisfaction. Job satisfaction captures the pleasure-displeasure axis in Warr’s concept of subjective wellbeing. We use all eight facets of job satisfaction available in the data. 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 (2.74) explaining 78% of the variance in the items. Factor loadings ranged from 0.26 (pay) to 0.80 (initiative). The Cronbach’s alpha for all eight job satisfaction items is 0.85.⁷ We constructed a single summative job satisfaction score rescales the five-point scores for each measure into (-2, 2) scales where ‘-2’ is “very dissatisfied” and ‘2’ is “very satisfied”. The scale,

⁵ Our data contain no information relating to Warr’s other key axis for measuring JA, namely depression-enthusiasm (depression being low affect and low arousal, while enthusiasm is high affect and high arousal). Since some of the predictors of depression-enthusiasm are known to differ from those for anxiety-contentment (Warr, 2007: 23) we cannot be sure how these other aspects of wellbeing may be associated with wages.

⁶ We use orthogonal varimax principal components analysis with rotation.

⁷ These results are similar to Wood’s (2008: 160) even though his analysis relates to the whole economy.

which we label global job satisfaction (GJS), thus runs from (-16, 16). One fifth (20%) of the sample score below zero; 30% score between 0 and 4; and the remaining 50% score 5 or more.⁸ The empirical literature indicates that the relationship between wages and satisfaction is stronger with respect to pecuniary aspects of the job. We therefore focus our attention on the effect of wages on non-pecuniary job satisfaction (NPJS) and pay satisfaction (PS) separately. NPJS is the GJS scale minus pay satisfaction thus running from (-14, 14). The relationship between wages and NPJS, on the one hand, and PS on the other, were markedly different in some instances so have not reported results for the GJS scale.

3.2: *Wages*

Employees are asked: “How much do you get paid for your job here, *before* tax and other deductions are taken out? If your pay before tax changes from week to week because of overtime, or because you work different hours each week, think about what you earn on average.” Responses are recorded in fourteen bands ranging from “£50 or less per week (£2,600 per year or less)” through to “£871 or more per week (£45,241 or more per year)”. Employees are also asked: “How many hours, including overtime or extra hours, do you usually work in your job each week? *Exclude meal breaks and time taken to travel to work.*” To obtain hourly wages we obtain lower and upper bounds for the wage by dividing through by continuous hours and take the mid-point from each band (top-coding the open-ended upper band by multiplying the lower band by 1.5). We drop the 155 cases whose hourly wage falls four standard deviations or more away from the mean hourly wage. We test the sensitivity of the hourly wage results to a log transformation and we test non-linear wage effects by introducing quadratic terms and by entering dummies capturing low pay (bottom quartile of the hourly wage distribution), mid-level pay (the two middle quartiles) and high pay (the top quartile). We also construct a measure of workplace mean wages by summing the individual wages of survey respondents and dividing by the number of observations at the workplace. The individual’s own wage is excluded from this mean wage so that when we incorporate it alongside the individual’s own wage we are comparing the effects of own wage relative to the average wage of the worker’s co-workers.

3.3: *Effort and job performance*

To isolate the link between wages and wellbeing net of effort we use three measures of worker effort: the number of overtime or extra hours the employee usually works each week, whether paid

⁸ The correlation between the JA and job satisfaction scales is -0.45. If one regresses them against one another they account for 20% of the variance in the other.

or unpaid; a dummy for supervisory status⁹; and a dummy variable identifying those employees who agree with the statement “My job requires that I work very hard”. Furthermore, those with opportunities to exercise discretion in their jobs are often rewarded for the additional responsibilities this entails, but discretion can also act as a buffer against stress and anxiety because it provides employees with what Warr (2007: 107) refers to as “opportunity for personal control”. When this is low it is “expected to generate anxiety as people are unable to act on their negative environment to avoid danger and potentially harmful events” (op. cit.). On the other hand job autonomy may foster stress as a result of added responsibility. In any case it is important to control for job autonomy when seeking to identify the relationship between wages and wellbeing. We capture job autonomy with 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). Note also that job discretion and job autonomy bear relevance to the Karasek and Theorell’s Demand-Control-model.

3.4: Other control variables

An accurate portrayal of the relationship between wages, JS and JA relies upon the analysts’ ability to control for potentially confounding influences, such as aspects of the job which may be correlated with wages and wellbeing. All models contain hourly wages, hours worked and a quadratic hours term. In parsimonious models we control age (9 dummies); academic qualifications (8 dummies); single-digit occupation (9 dummies); single-digit industry (11 dummies); log workplace employment size and a quadratic term; and dummies for disability, gender, ethnicity and low travel-to-work-area unemployment (below 1.2%). We test the sensitivity of results to a ‘full’ model specification which also incorporates vocational qualifications (3 dummies); region (10 dummies); and dummies for union membership, coverage by a collective bargaining agreement, marital status, having any dependent children, carer status¹⁰, single independent workplace, and urban location.¹¹ The full model also replaces single-digit occupation with three-digit occupation

⁹ 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.”

¹⁰ 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.

¹¹ Results presented were robust to a number of specification tests not reported in the paper, including conditioning on labour turnover at the establishment, a factor which a recent paper indicates can generate compensating wage differentials (Böckerman et al., 2011).

dummies and includes proxies for effort described in the next paragraph. The workplace-level controls are replaced by workplace dummies in workplace fixed effects equations.

4. Estimation

We analyse the relationship between wages and employee wellbeing using the additive scales for job anxiety (JA), and job satisfaction (NPJS and PS) described in Section 3.1. We argue that the rescaling makes simple linear models appropriate. We undertake four sets of analyses.

First, we estimate the relationship between wages and wellbeing using OLS. Our baseline equation expressing the relationship between the wellbeing of worker i employed in workplace f and wages can be expressed by Equation 1):

$$1) \quad J_{if} = \beta_1 Wage_{if} + \beta'_x X_{if} + \beta'_y X_f + \varepsilon_{if}$$

where J_{if} expresses job satisfaction or job anxiety for individual i in workplace f , $Wage_{if}$ expresses the wage of individual i in workplace f (different measures), the X_{if} 's express our vector of individual-level demographic and job characteristics, the X_f 's express our vector of workplace-level controls shared by all sampled in the same workplace, and ε_{if} represents the error term. β_1 gives the effect of wages on wellbeing.

Next in Equation 2) we add controls for effort and autonomy to test the compensating wage differential hypothesis:

$$2) \quad J_{if} = \beta_1 Wage_{if} + \beta_e Effort_{if} + \beta_M Autonomy_{if} + \beta'_x X_{if} + \beta'_y X_f + \varepsilon_{if},$$

If the relationship between wages and wellbeing is driven by compensating differentials, β_1 should diminish and eventually become insignificant when effort and worker autonomy is taken into account.

Second, we estimate the association between wages and JA and JS simultaneously to identify the independent association between wages and these two measures of wellbeing having accounted for the possibility that JA and JS are jointly determined by factors that are not accounted for in our model, such as unobservable fixed characteristics of individual employees. We therefore

collapse our measures of JA and JS into dummy variables¹² and run a set of bivariate probit models estimated under the assumption that the errors have a joint normal distribution (Greene 2003). The bivariate probit model estimates one additional parameter representing the correlation between errors, relative to estimating two separate probits. The functional form assumptions identify the model when the same regressors are used for each dependent variable; no exclusion restriction is required.

Third we present models which replace the vector of workplace controls with workplace dummies. These workplace fixed effects models allow us to examine the effects of employees' wages on their JA and JS having controlled for fixed unobserved workplace characteristics.

Finally, we study whether relative wage differentials within workplaces are important for our previous finding. We introduce the mean wages of the individual's co-workers at the workplace to establish the importance of wage relativities in the workplace as a factor in employee wellbeing using the following specification for wellbeing:

$$4) \quad J_{if} = \beta_1 wage_{if} + \beta_2 (wage_{if} - Wage_f) + \beta'_x X_{if} + \beta'_y X_f + \varepsilon_{if}$$

where β_1 measures the effect of individual own wage on wellbeing, and β_2 measures the effect of relative wage within the workplace. By the standard omitted variable formulae, the bias term of an OLS estimate of J_{if} on individual wage only is then $\beta_2(1-b)$, where b is the regression coefficient of $Wage_f$ with respect to $wage_{if}$, conditional on the X 's. A fixed establishment effect model provides a consistent estimator for $(\beta_1 + \beta_2)$, since $E(W_{if} - W_{.f}) = (\beta_1 + \beta_2)(wage_{if} - Wage_f) + \beta' \Delta X$, where ΔX is the within workplace measures of individual characteristics, and a model including the average wage of the establishment $W_{if} = A + (\beta_1 + \beta_2) wage_{if} - \beta_2 Wage_f + \beta' X + u_i$ may provide an estimator for β_2 . Finally, we also explore these relationships using other relative wage measures.

The models are unweighted and so provide within-sample estimates, rather than population estimates. Individuals' probabilities of sample selection are not independent of one another since they are clustered within sampled workplaces. Standard errors are adjusted to account for this using clustering and we use the robust estimator to tackle remaining heteroskedasticity in the error

¹² We construct the dummies such that roughly half the sample score '1' on the dummy variables. The thresholds are ≥ 0 in the case of the 24-point JA measure, > 3 in the case of the NPJS 28-point measure and > 2 in the case of the 5-point PS measure. Results are not sensitive to adjustments in the threshold.

terms. We drop all cases with missing data on any of the dependent or independent variables. The unweighted number of employee observations in the estimation sample is therefore 11,467 and they are clustered in 1,218 private sector workplaces (an average of around 10 employees per workplace).¹³

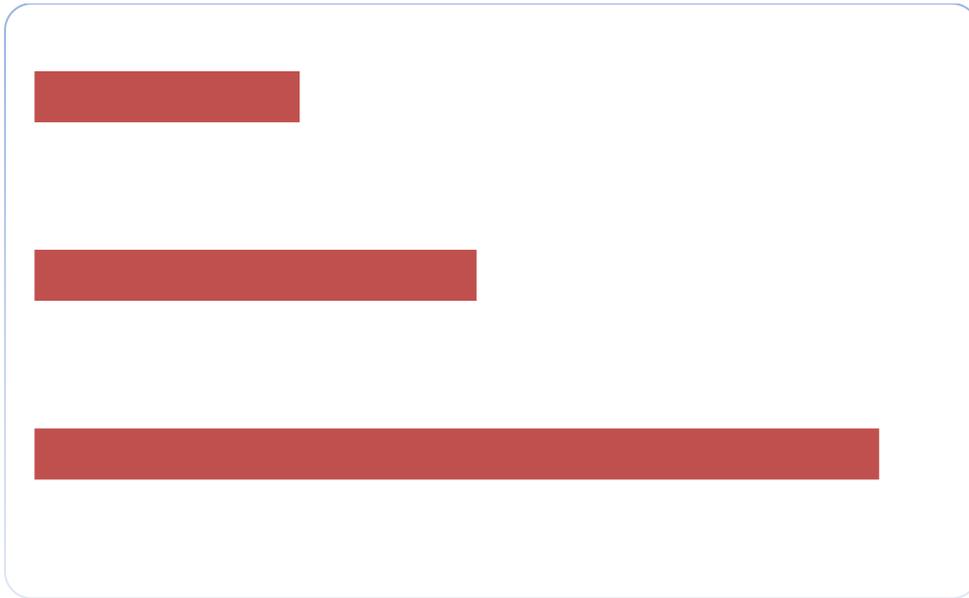
5. Results

Figure 1 shows the coefficients for log hourly wages from regressions of each wellbeing measure, job anxiety (JA), non-pecuniary job satisfaction (NPJS) and pay satisfaction (PS), on hourly wages conditioning only on hours and hours squared. For the figure we have standardised the wellbeing measures by dividing the wellbeing score by its own standard deviation. Not surprisingly, the strongest correlation is with pay satisfaction, but also the coefficient for non-pecuniary job satisfaction is positive. While higher wages are associated with higher job satisfaction, we also find that they are strongly associated with higher job anxiety.

The most immediate explanation for the positive association between wages and job anxiety is compensating wage differentials. We explore this hypothesis below. On the other hand, non-pecuniary job satisfaction is also positively associated with higher wages. In light of a compensating wage differential story, this is a more surprising result. If high wages compensate for negative job attributes, we would expect the raw correlation between job satisfaction and wages to be negative, not positive, in the absence of any other job attributes. To find a positive relationship between wages and pay satisfaction is of course less surprising, but again we would expect this correlation to be affected by a host of other factors, and we thus proceed to a multivariate analysis.

Figure 1: Measures of Subjective Wellbeing and Hourly Pay

¹³ We lose around 2,000 observations by excluding workers with missing data on items used in the analysis. This is another reason why we decide to estimate within-sample rather than population estimates.



Note: The coefficient for log hourly wages of a regression of each index of wellbeing, conditional on hours and hours squared of work. The indexes of wellbeing are standardised by dividing each by its own standard deviation.

Table 1 presents OLS estimates of the association between wages and the three wellbeing measures, JA, NPJS and PS. We run four model specifications. Column 1 contains a parsimonious set of controls, including age, education, industry, firm size, disability, gender, ethnicity and local unemployment. Column 2 adds a set of variables reflecting effort; overtime hours, supervisory responsibilities, hard work and work autonomy. Column 3 introduces a more extended set of controls, including marital status and children as well as 3 digit occupational codes, without the effort variables, what we term the ‘full’ model. Column 4 adds the set of effort variables to the full model.

Panel A indicates that higher hourly wages are associated with higher JA, even when we add the set of parsimonious controls. The effect is strong and statistically robust.¹⁴ Note that we control for standard human capital variables, such as age and education, in addition to occupation. The coefficient should thus be interpreted as the effect of a wage change for given levels of human capital.

[INSERT TABLE 1 ABOUT HERE]

¹⁴ Results are similar when using log hourly wages. These are available from the authors on request.

The hourly wage coefficient increases from .3 to almost .4 when we go from Model (1) to Model (2), that is, when we control for effort and job autonomy. Adding the full set of controls does very little to change this picture: the coefficient remains around .3 with the full controls, and .4 including controls for effort and autonomy.

These effort variables are themselves strong and significant in the JA equation. Column 1 in Table 2 shows the effect of effort on JA. The three effort controls (overtime hours, supervisory status, and agreeing that ‘My job requires that I work very hard’) are all positive and statistically significant, whereas job autonomy is negative and statistically significant.^{15 16} These effects are reasonable and suggest that efforts of this type may require some compensating wage differential. However, the fact that the effect of wages on JA increases rather than disappears when we control for effort and add detailed controls for jobs, individuals and workplaces, strongly suggests that compensating wage differentials is not the explanation for the relationship between wages and job anxiety. Higher wages seem to have an independent effect on subjective wellbeing, as measured by job anxiety, even when controlling for attributes of the individual, the workplace, occupation and various measures of effort. We argue that this observation is consistent with the predictions from the gift exchange model; higher wages increase the internal pressure, reflected in anxiety and worries, for reciprocal behaviour in terms of higher performance standards.

Panel B in Table 1 reports the results from the same models, but this time using non-pecuniary job satisfaction (NPJS) as the dependent variable. Hourly wages are positive and statistically significant when effort is not in the equation. This may seem surprising, since we would expect that higher wages, which are associated with more effort, should have a negative effect on job satisfaction. However, when we look at the effect of effort indicators such as supervisory responsibilities and hard work, effort appears to be positively correlated with job satisfaction. Having a more challenging job is rewarding in itself, and what we pick up in models (1) and (3) may be the effect of a more challenging job on non-pecuniary job satisfaction. The coefficient drops between both models (1) and (2), and between models (3) and (4) with the addition of effort and job autonomy. The non-significance of the wage effect having controlled more fully for the

¹⁵ Full models are available on request.

¹⁶ In sensitivity tests we introduced a quadratic term for hourly wages or dummies for quartiles of the hourly wage distribution. Although they occasionally proved statistically significant there was no compelling evidence of non-linear wage effects.

nature of the job is consistent with what we would expect to find if higher wages are just a reflection of more challenging jobs.

Panel C presents identical models but for pay satisfaction (PS). The coefficient is positive and statistically significant throughout. Even with the addition of a full set of job controls and effort, the coefficient changes little. In Table 2 we find that hard work has a negative effect on pay satisfaction, which is reasonable given a compensating wage story, whereas job autonomy has a positive effect, conditional on wages, suggesting that job autonomy is regarded as a positive attribute of a job.

The effort controls in the Model (3) are informative in their own right since their associations with the three well-being measures are at odds with simple propositions regarding compensating wage differentials. The coefficients are presented in Table 2. The perception that one's job requires hard work is associated with higher job anxiety and is negatively associated with pay satisfaction, suggesting the need for higher pay to achieve the same level of pay satisfaction. However, hard work is also positively associated with non-pecuniary job satisfaction, a finding that runs counter to the need for compensating wage differentials. Similarly, supervisory responsibilities engender greater job anxiety, but they are also positively associated with non-pecuniary job satisfaction. Overtime hours are correlated with more job anxiety but are not related to job satisfaction. Longer working hours are associated with higher job anxiety, but the relationship follows an inverted u-shape, with job anxiety declining with very long hours. Similarly, both pay and non-pecuniary job satisfaction fall initially with longer hours, only to rise with much longer hours. These models suggest worker preferences for harder work or greater responsibility may not always require a compensating wage differential.

[INSERT TABLE 2 ABOUT HERE]

Since the labour supply of women is less wage elastic than men's it is possible that wages have less influence on women's wellbeing than men's. We therefore run separate regressions for men and women. Although the hourly wage coefficients are a little lower in the case of women, the pattern of results is very similar to that for men and the differences in the male-female coefficients on hourly wages are not statistically significant.¹⁷

¹⁷ Women's JA is higher than men's whereas their wages are lower, which could induce a positive correlation between JA and wages. These results confirm that this is not what is driving the results. Full results are available on request.

[INSERT TABLE 3 ABOUT HERE]

Table 3 presents estimates of the association between wages and JA and JS simultaneously to identify the independent association between wages and these measures of wellbeing having accounted for the possibility that JA and JS are jointly determined by factors that are not accounted for in our model. Although there is a strong, statistically significant negative correlation between the unobservables in the two equations the results are in line with those already reported. Hourly wages are positively associated with JA in all models. They are positively associated with PS for all four model specifications (Panel B) but the association with NPJS becomes statistically non-significant in Model (2) and Model (4) when the effort controls are added.

[INSERT TABLE 4 ABOUT HERE]

Table 4 presents workplace fixed effects models to examine the effects of employees' wages on their JA having controlled for fixed unobserved workplace characteristics. Workplace dummies replace the workplace characteristics entering the previous models. In doing so they increase the total amount of variance accounted for by the model compared to the equivalent OLS models in Table 1, though the differences are not dramatic. The workplace dummies are always jointly highly statistically significant. The within workplace effects of hourly wages are remarkably similar to the OLS estimates presented in Table 1. Panel A shows JA rises with higher hourly wages, the coefficients being very similar to those presented in Table 1. Panels B and C show a positive correlation between wages and NPJS and PS respectively which are similar in magnitude as well as statistical significance to the OLS estimates. The workplace fixed effects models show that our results are highly robust to the inclusion of unobserved workplace characteristics, for instance related to competition in the product market, exposure to global competition, management practices or local labour market conditions.

Effects of co-worker wages

We have found a positive association between an individual's wages and her job anxiety, and a positive association between wages and pecuniary job satisfaction. A key question is to what extent these effects arise from relative comparisons within the establishment or not. If relative wages matter, the OLS estimator of Table 1 is biased, whereas the fixed effect estimator of Table 5

provides the effect of increasing one's wage, conditional on co-workers' average wage, and is thus a sum of the relative and absolute wage effect. In Table 5 we thus present models that are similar to the OLS estimates in Table 1 but they include an additional term capturing the mean wage of the individual's workplace colleagues.

If relative wages positively affect well-being, an increase in co-workers' wages should lower one's own well being. The coefficient of this variable is thus the negative of the relative wage effect, i.e. $-\beta_2$ in equation 2 as outlined in Section 3.

[INSERT TABLE 5 ABOUT HERE]

In the case of JA, the positive coefficients for hourly wages are very similar to those presented in Tables 1 and 4, while mean workplace wages are not statistically significant (Panel A), in particular when controlling for individual effort and job autonomy. This shows that the positive association between JA and hourly wage is due to the absolute wage level of the individual rather than wage comparisons within the establishment. The preferred model is thus the fixed effect model, providing an estimate of 0.045 (taken from Model (3) in Table 4).

In the JS models presented in Panels B and C the hourly wage effects are akin to those presented in Table 1 and 4. However, mean workplace wages perform very differently in the case of NPJS and PS. Workplace mean wages are negatively correlated with NPJS – significantly so only in model (1) – whereas they are significantly positively associated with PS in all models. Our preferred model is the full model, where we find no significant effect of absolute wages nor relative wages on NPJS.

PS is the only outcome that seems to be affected by relative wages. The coefficient of average wages of one's co-workers is, however, positive (0.019), indicating that pecuniary satisfaction does not arise from improvement of one's relative position in the establishment, but rather that it is enhanced if one's co-workers are paid better as well. These results relating to the correlations between both own wages and workplace mean wages and JS are very similar to findings by Brown et al. (2008). Using the 1998 predecessor of the survey we use in this paper, they also found positive correlations between own wages and PS and NPJS, whereas workplace mean wages were positively associated with PS and negatively associated with NPJS.

Where our results differ is in showing a non-significant link between mean workplace wages and NPJS in our full model, a finding which is consistent with compensating wage differentials. The job anxiety scale was not included in the 1998 survey: ours are the first results exploring links between workplace mean wages and JA and, as we have shown, the finding of no significant relationship differs markedly from that found for JS.

Relative position - wage rank

Table 6 shows results where we add the individual's wage rank within the workplace to the model. The results with respect to job anxiety hardly change at all, and wage rank does not enter significantly. The results with respect to NPJS change very little as well; however, in this case we find a significantly positive relationship between one's rank and non-pecuniary job satisfaction. This result is similar to what is reported in Brown et al (2008). Turning to pay satisfaction, we now find that employees are more satisfied with their pay the more they earn, the more their co-workers earn, *and* the better their relative rank in the workplace. This may be interpreted in the following way; the average pay of your co-worker is a reflection of the overall quality of the workplace, including pay expectations facing each worker. Conditional on own wage and expected wages, workers are still more satisfied with their pay the better they are ranked.

[INSERT TABLE 6 ABOUT HERE]

6. Discussion and Conclusions

The relationship between wages and wellbeing depends crucially on the measure of wellbeing. Reported job satisfaction and job anxiety are negatively correlated but still wages are positively associated with both. Our data lack suitable instruments for wages so we cannot discount the possibility that some of the associations we find between wages and wellbeing are driven by unobservable features of employees. However, our results are highly robust to the inclusion of an extensive set of individual controls and complete control for unobserved characteristics of the workplace.

The positive association between wages and job anxiety appears as a puzzle. In particular since the effect is robust to the inclusion of rich individual, workplace and job controls in addition to several measures of effort. The positive association between wages and job anxiety actually become stronger when we control for effort, not weaker, suggesting that a compensating wage story cannot

be the explanation. We thus interpret this result as a reflection of an independent negative relationship between pay and subjective wellbeing as measured by job anxiety.

The persistence of the wage effects on job anxiety provides support for the gift exchange model of reciprocal behaviour. Even though employees prefer higher wages, as indicated by the positive effect of wages on pay satisfaction, higher wages nevertheless generate anxiety and worries among workers, in line with predictions from the gift exchange model.

Pay satisfaction is positively associated with wages. This is not surprising. This relationship prevails even with extensive controls, even though the effect is slightly dampened when controls for effort are included. On the other hand, the positive association between higher wages and non-pecuniary job satisfaction disappears with the inclusion of measures of effort. High levels of effort provide both high levels of non-pecuniary job satisfaction and higher wages, in contrast to what a simple compensating wage differentials theory would predict; namely lower job satisfaction and higher wages or higher job satisfaction and lower wages.

The addition of the mean wage of other workers in the workplace reveals three important findings. First, its introduction does very little to the effects of one's own wage. Second, higher co-worker average wages are associated with higher pay satisfaction. This is an important finding, consistent with Clark et al. (2009) who find that individual job satisfaction is higher where co-workers' wages are higher. They suggest this is due to co-workers' wages providing a positive signal about the individual's own expected future earnings. In addition, consistent with Brown et al. (2008) we find that wage rank has a positive effect on pay satisfaction, showing that relative position matters in addition to wage level and expected future earnings. In accordance with the findings of Brown et al. (2008), we find that higher mean workplace wages are associated with lower non-pecuniary job satisfaction, however, this effect ceases to be significant once we introduce a full set of controls.

Finally, we have shown for the first time that there is no significant relationship between average workplace wages and job anxiety, conditional on own wage, suggesting that job-related stress and anxiety is associated with the level of wages rather than with comparisons within the workplace. To the extent that the wage-anxiety slope is due to reciprocal mechanisms, this result shows that what matters is how employees are rewarded relative to the outside market.

The relationship between wages and wellbeing varies across different dimensions of wellbeing. This result has implications for the on-going debate on how to measure welfare and economic outcomes, and should spur further research into questions of motivations and behavioural responses to economic incentives and wage policies.

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Table 1: OLS for correlation between wages JA, NPJS and PS

	<i>Model (1) Parsimonious</i>	<i>Model (2) Parsimonious incl. effort</i>	<i>Model (3) Full</i>	<i>Model (4) Full incl. effort</i>
Panel A: Job Anxiety (JA)				
Hourly wage	.032 (3.80)**	.039 (4.77)**	.034 (3.92)**	.040 (4.91)**
Adj. r-squared	0.08	0.17	0.09	0.18
Panel B: Non-Pecuniary Job Satisfaction (NPJS)				
Hourly wage	.069 (6.69)**	.003 (0.29)	.069 (7.02)**	.003 (0.35)
Adj. r-squared	0.11	0.30	0.12	0.31
Panel C: Pecuniary Job Satisfaction (PS)				
Hourly wage	.031 (11.07)**	.027 (9.98)**	.031 (10.89)**	.027 (9.80)**
Adj. r-squared	0.07	0.09	0.08	0.10

Notes:

(1) Unweighted OLS of wellbeing and job satisfaction scales. JA=job anxiety; NPJS=non-pecuniary job satisfaction; PS=pay satisfaction. N=11,467 for all models.

(2) Robust estimator with clustered standard errors. T-stats in parentheses. *=significant at 95% confidence interval; **=significant at 99% confidence interval.

(3) Parsimonious model controls are: age (9 dummies); academic qualifications (8 dummies); hours (and squared), single digit occupation (9 dummies), single-digit industry (11 dummies); log workplace employment size and a quadratic term; and dummies for disability, gender, ethnicity, and low travel-to-work-area unemployment (below 1.2%). The full model adds the following controls to the parsimonious model: vocational qualifications (3 dummies); region (10 dummies); dummies for home carer status, married or living as married, having any dependent children, union member, covered by a collective bargaining agreement, single independent workplace, urban location. It also replaces single-digit occupation with 3-digit occupation dummies. Effort proxies include a supervisor status dummy, continuous overtime hours worked, agreement with the statement “My job requires that I work very hard”, together with the job autonomy scale described in the text.

Table 2: Effort Coefficients

	<i>JA</i>	<i>NPJS</i>	<i>PS</i>
Overtime hours	.031 (3.79)**	-.004 (0.55)	-.004 (1.70)
Supervisory responsibilities	.690 (6.98)**	.648 (6.66)**	.012 (0.45)
Hard work	1.150 (21.74)**	.296 (5.13)**	-.069 (4.90)**
Autonomy	-.301 (23.47)**	.606 (44.40)**	.054 (16.20)**

Notes:

(1) Effort coefficients and t-statistics taken from Model (4) in Table 1. JA=job anxiety; NPJS=non-pecuniary job satisfaction; PS=pay satisfaction. N=11,467 for all models.

Table 3: Bivariate Probit for correlation between hourly wages, JA and JS

	<i>Job anxiety</i>	<i>Satisfaction</i>	<i>atrbo</i>	<i>Wald r=0</i>	<i>P for Wald</i>
Panel A: non-pecuniary job satisfaction					
M (1) Parsimonious	.007 (2.90)**	.016(5.74)**	-.519	838.05	0.0000
M (2) Parsimonious incl. effort	.009 (3.65)**	.001(0.36)	-.516	739.01	0.0000
M (3) Full	.006 (2.73)**	.016 (5.86)	-.521	845.74	0.0000
M (4) Full incl. effort	.008 (3.40)**	.001 (0.33)	-.512	734.12	0.0000
Panel B: pecuniary job satisfaction					
M (1) Parsimonious	.006 (2.84)**	.037 (7.71)**	-.293	327.06	0.0000
M (2) Parsimonious incl. effort	.009 (3.58)**	.033 (7.14)**	-.254	236.38	0.0000
M (3) Full	.006 (2.66)**	.036 (7.46)**	-.291	326.31	0.0000
M (4) Full incl. effort	.008 (3.32)**	.033 (6.89)**	-.251	234.62	0.0000

Notes:

(1) Unweighted bivariate probits. Panels A derives a satisfaction dummy based on the non-pecuniary job satisfaction scale (SATSC7) while Panel B uses the pecuniary job satisfaction scale.

(2) Robust estimator with clustered standard errors. T-stats in parentheses. **=significant at 99% confidence interval; *=significant at 95% confidence interval.

(2) See Table 1 for controls

(3) All models statistically significant with $p > \chi^2_{0.0000}$

Table 4: Workplace Fixed Effects Models for correlation between wages and JA, NPJS and PS

	<i>Model (1) Parsimonious</i>	<i>Model (2) Parsimonious incl. effort</i>	<i>Model (3) Full</i>	<i>Model (4) Full incl. effort</i>
Panel A: JA				
Hourly wage	.045	.045	.045	.046
	(4.83)**	(5.01)**	(4.69)**	(5.06)**
Adj. r-squared	0.13	0.21	0.13	0.21
Panel B: NPJS				
Hourly wage	.088	.017	.086	.015
	(8.63)**	(2.02)*	(8.31)**	(1.77)
Adj. r-squared	0.19	0.36	0.19	0.36
Panel C: PS				
Hourly wage	.026	.021	.025	.021
	(9.77)**	(8.30)**	(9.45)**	(8.06)**
Adj. r-squared	0.16	0.19	0.16	0.19

Notes:

(1) Unweighted estimates. N=11,467. Robust estimator with clustered standard errors. T-stats in parentheses.

*=significant at 95% confidence interval; **=significant at 99% confidence interval.

(2) Parsimonious model controls are: age (9 dummies); academic qualifications (8 dummies); and dummies for disability, gender, ethnicity. The full model adds the following controls to the parsimonious model: vocational qualifications (3 dummies); dummies for home carer status, married or living as married, having any dependent children, union member, covered by a collective bargaining agreement. It also replaces single-digit occupation with 3-digit occupation dummies and includes proxies for effort, namely a supervisor status dummy, continuous overtime hours worked, agreement with the statement “My job requires that I work very hard”, together with the job autonomy scale described in the text.

Table 5: OLS estimates of JA, NPJS and PS incorporating mean workplace wages alongside individual hourly wages

	<i>Model (1)</i> <i>Parsimonious</i>	<i>Model (2)</i> <i>Parsimonious</i> <i>incl effort</i>	<i>Model (3)</i> <i>Full</i>	<i>Model (4)</i> <i>Full</i> <i>incl effort</i>
Panel A: JA				
Hourly wage	.038	.041	.038	.041
	(4.41)**	(5.00)**	(4.23)**	(4.91)**
Mean workplace wage	-.036	-.011	-.031	-.011
	(1.83)	(0.57)	(1.67)	(0.63)
r-squared	0.08	0.17	0.09	0.18
Panel B: NPJS				
Hourly wage	.076	.008	.074	.006
	(7.61)**	(0.95)	(7.50)**	(0.74)
Mean workplace wage	-.044	-.029	-.032	-.021
	(2.11)*	(1.43)	(1.62)	(1.17)
r-squared	0.11	0.30	0.13	0.31
Panel C: PS				
Hourly wage	.029	.024	.028	.024
	(10.68)**	(9.54)**	(10.51)**	(9.38)**
Mean workplace wage	.017	.017	.020	.019
	(3.73)**	(3.66)**	(4.20)**	(4.16)**
r-squared	.07	.10	0.08	0.11

Notes:

(1) N=11,415.

(2) Mean workplace wage excludes individual's wage. Derivation is described in the text.

(3) For other details of models see Table 1.

Table 6: OLS estimates of JA, NPJS and PS incorporating wage rank at workplace alongside mean workplace wages and individual hourly wages

	<i>Model (1) Parsimonious</i>	<i>Model (2) Parsimonious incl effort</i>	<i>Model (3) Full</i>	<i>Model (4) Full incl effort</i>
Panel A: JA				
Hourly wage	.044 (3.92)**	.040 (3.88)**	.044 (3.80)**	.039 (3.77)**
Mean workplace wage	-.044 (1.94)	-.009 (0.43)	-.040 (1.81)	-.008 (0.41)
Workplace wage rank	-.205 (1.00)	.045 (0.24)	-.208 (1.01)	.072 (0.38)
r-squared	0.08	0.17	0.09	0.18
Panel B: NPJS				
Hourly wage	.030 (2.58)**	-.005 (0.51)	.032 (2.72)**	-.004 (0.47)
Mean workplace wage	.019 (0.79)	-.011 (0.49)	.025 (1.09)	-.007 (0.32)
Workplace wage rank	1.551 (7.33)**	0.456 (2.43)*	1.434 (6.79)**	.375 (2.01)*
r-squared	0.11	0.30	0.13	0.31
Panel C: PS				
Hourly wage	.010 (3.44)**	.008 (3.12)**	.010 (3.46)**	.008 (3.14)**
Mean workplace wage	.043 (7.59)**	.039 (7.08)**	.045 (7.69)**	.041 (7.25)**
Workplace wage rank	.634 (12.78)**	.563 (11.52)**	.633 (12.66)**	.561 (11.45)**
r-squared	.08	.11	.09	.12

Notes:

(1) N=11,415.

(2) Mean workplace wage excludes individual's wage. Derivation is described in the text.

(3) For other details of models see Table 1.