Do Higher Wages Come at a Price?

By

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Abstract

Using linked employer-employee data for Britain we find higher wages are associated with higher job satisfaction and *lower* worker wellbeing measured on an anxiety-contentment scale. The effect is robust to the inclusion of rich job controls (3-digit occupation, a job autonomy scale) and effort measures. Similar results obtain when we explore the role of relative wages through the introduction of workplace fixed effects. The findings are consistent with the proposition that, whilst higher wages lead to greater job satisfaction they compensate employees for the onerous job responsibilities which induce anxiety.

Key-words: wellbeing; job satisfaction; wages

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1. Introduction

If people prefer leisure to work they will seek wages to compensate for the disutility of employment. It seems natural to assume that the higher the compensation, the better the employee will feel when undertaking the work. Higher wages may foster greater wellbeing in other ways too, for instance through spending power or social status. However, there is an emerging literature questioning the link between income growth and happiness. There are diminishing wellbeing returns to higher income and habituation effects mean positive income shocks tend to have temporary effects on wellbeing. We contribute to the literature using linked employer-employee data to establish the relationship between wages and two dimensions of employee wellbeing, namely job satisfaction (JS) and subjective wellbeing (SWB) as captured by Warr's contentment-anxiety scale (Warr, 2007). This proves to be highly informative. Although JS and SWB are positively correlated, their unconditional and conditional relationships with wages are different from one another. In keeping with the bulk of the literature, wages and satisfaction are positively correlated. However, wages are negatively correlated with SWB. That is, higher wages are associated with greater anxiety and stress. The effect is robust to rich job controls (3-digit occupation, a job autonomy scale) and effort measures. It is also apparent in bivariate probit models which account for the correlation between satisfaction and SWB. The effects are similar controlling for workplace fixed effects, confirming that relative wages are important for employees' wellbeing.

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

2. Theoretical and Empirical Literatures

If higher pay comes as part of a wage-effort bargain the employee may be expected to take on more onerous responsibilities or exert greater effort in return for the higher wage. Alternatively, she may be expected to endure less conducive working conditions, a point emphasised in the compensating wage differential literature which goes all the way back to Adam Smith (1776). 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.

Of course, working conditions have improved markedly since Adam Smith's day. Nevertheless, 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 which have reduced the costs of capital-intensive production processes and monitoring procedures geared to maximising 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). This matters because 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, notably pay (Green and Tsitsianis, 2004).

Higher wages may foster greater wellbeing in other ways too. For example, they imply higher spending power, increasing employees' capacity to consume goods and services and to provide for their families. For all these reasons, it would appear that money can buy employees at least some happiness. However, 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 unforseen problems (solicitations from others etc.) but also because they become habituated to their new improved circumstances.

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, and the effects of wages relative to peers and relative to expectations. 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 induce greater feelings of wellbeing when employees reflect with satisfaction on their rank in the wage distribution relative to their peers (Brown et al., 2007), where they were in the past, or where they had hoped to be by this point in their career. 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.

The empirical literature investigating the links between wages and job-related anxiety and stress is in its infancy. The literature on the association between wages and context-free anxiety is mixed, with some studies finding a link between low pay and high anxiety (eg. Gardell, 1971) while others report no statistically significant *ceteris paribus* association (Clark et al., 1996). There are at least four reasons to anticipate a systematic relationship between job anxiety and wages. First, as noted above, higher wages may be part of a wage-effort bargain which is only partially observed by the analyst. The wage is, in effect, compensating employees for taking on additional tasks or responsibilities which induce stress and anxiety. Thus, although (some) people may be more satisfied in a job which requires them to work hard, it may nevertheless entail greater anxiety and stress than a job requiring lower levels of effort. In this setting, what is driving the relationship between JS, SWB and wages is the unobservable heterogeneous preferences of employees that lead individuals to take high and low effort jobs with commensurately different rewards. Second,

an unobservable productivity-enhancing trait may induce anxiety *and* affect wages.[1] For example, we know that job performance is wage enhancing and is positively correlated with the mental arousal (Kahneman, 1973) which is picked up in Warr's anxiety/contentment scale (our SWB measure) but not in job satisfaction (JS). The psychology literature distinguishes between "challenge" stressors, which are positively correlated with job performance, and "hindrance" stressors which are negatively related to job performance (Lepine et al., 2005). If anxiety inhibits learning and skill acquisition, for instance, this will lower earnings. Third, even though employees prefer higher wages, as indicated by their higher job satisfaction, higher wages may nevertheless generate anxiety and worry in employees who wish to justify their higher pay. This may be viewed as a true causal impact of higher wages on SWB. Fourth, an employee's health may be affected by how much she earns relative to others. Comparisons can be stressful for the individual, adversely affecting their health (Leigh and Jencks, 2006).

Warr notes that there is some, albeit limited, empirical evidence that wages have a bigger impact on satisfaction at lower income levels, and a limited or no effect above a certain threshold point – what he terms a "constant effect" (Warr, 2007: 118-119). There is also some reason to suspect a non-linear relationship between anxiety and wages due to the links between anxiety and job performance. Warr (op. cit.: 416) suggests: "It may be the case that the relationship between job anxiety and performance is one of an inverted-U, such that moderate demands are linked to raised job-related anxiety and also to more effective performance, but that lower and higher levels of demand and anxiety are accompanied by lower performance".[2] This evidence suggests the importance of investigating non-linear relationships between wages and our two measures of wellbeing.

In our empirical analyses we seek to distinguish between these causal interpretations of wages' impact on JS and SWB, on the one hand, and those explanations which assume that the link is generated by unobservable factors correlated with wages and wellbeing. We also seek to establish the importance of wage relativities in understanding the wages-wellbeing relationship. The techniques used to do this are discussed in Section Four.

[1] Similarly, it has been argued that good performance leads to higher rewards which, in turn, lead to satisfaction (Lawler and Porter, 1967: 23).
[2] Warr points to two empirical studies which offer evidence consistent with this proposition, namely Van Dyne et al. (2002) and Takeuchi et al. (2005).

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%.[3]

The data are particularly well-suited for the analysis of employee wellbeing for three 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, hours worked, overtime hours worked, and employee (dis)agreement with the statement "my job requires that I work very hard". Third, 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 subjective wellbeing (SWB) 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 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 for measuring subjective well being (SWB). 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

[3] For more information about the survey see Kersley et al. (2006).

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.[4] Principal components factor analysis[5] of the six SWB 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-commitment items have a Cronbach's alpha of 0.85. Our single summative SWB 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 negative affect items such that higher scores indicate higher positive affect. The scale thus runs from (-12, 12). Just over one-third (35%) of the sample score below zero; one-tenth (10%) score zero; and the remaining 55% have positive scores.

Our second dependent variable is 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.[6] Our 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, 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.[7] The empirical literature indicates that the relationship between wages and

[4] Our data contain no information relating to Warr's other key axis for measuring SWB, 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.
[5] We use orthogonal varimax principal components analysis with rotation.
[6] These results are similar to Wood's (2008: 160) even though his analysis relates to the whole economy.
[7] The correlation between the SWB and job satisfaction scales is 0.45. If one regresses them against one another they account for 20% of the variance in the other.

satisfaction is stronger with respect to pecuniary aspects of the job. Therefore we test the sensitivity of our results by estimating the effect of wages on non-pecuniary job satisfaction (NPJS) by removing pay satisfaction from this 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).

3.3: Control variables

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 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 status[8], single independent workplace, and urban location. The full model also replaces single-digit occupation with three-digit occupation 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.

[8] 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.

An accurate portrayal of the relationship between wages, JS and SWB 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. One such job characteristic is occupation: we therefore control for occupation. Another is job discretion. Those with opportunities to excercise 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.). Thus 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).

In an attempt to isolate the link between wages and wellbeing net of effort we introduce three measures of worker effort: the number of overtime or extra hours the employee usually works each week, whether paid or unpaid; a dummy for supervisory status[9]; and a dummy variable identifying those employees who agree with the statement "My job requires that I work very hard".

4. Estimation

We analyse the relationship between wages and employee wellbeing using the additive scales for SWB and job satisfaction described in Section 3.1. We argue that the rescaling makes simple linear models appropriate. The relationship between the wellbeing of worker i employed in workplace f can be expressed by Equation 1:

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

[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."

where W_{if} expresses wellbeing (or job satisfaction) 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 a standard normal distributed error term. β_1 gives the effect of wages on wellbeing on the assumption that wages are independent of wellbeing conditional on the other X's we include in the model.

Next we estimate the association between wages and SWB and JS simultaneously to identify the independent association between wages and these two measures of wellbeing having accounted for the possibility that SWB 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 SWB and JS into dummy variables[10] 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. We present Wald test statistics for the null hypothesis that the correlation is equal to zero. We find that our two measures of wellbeing are indeed jointly affected by unobserved variables. The correlations are large and the Wald test is always statistically significant at a 1 per cent level.

Finally 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 SWB and JS having controlled for fixed unobserved workplace characteristics. The workplace dummies also capture mean workplace wages so that these models identify the importance of wage relativities in the workplace as a factor in employee wellbeing. This is apparent from the following specification for wellbeing:

$$2) \qquad W_{if} = A + \alpha wage_{if} + \beta(wage_{if} - Wage_f) + u_{if}$$

where α measures the effect of individual own wage on wellbeing, and β measures the effect of relative wage within the workplace. Consider running an OLS equation:

[10] 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 SWB measure and >4 in the case of the 32-point GJS measure and >3 in the case of the NPJS 28-point measure. Results are not sensitive to adjustments in the threshold.

3) $W_{if} = A + aw_{if} + e_{if}$

akin to equation 1). In that case $a = \alpha + \beta$, and $e_{if} = u_{if} - \beta W_f$, consequently, the expected value of the OLS estimator of a, $Eahat = \alpha + \beta - \beta cov(W_f, w_{if})/var(w_{if})$. Running the FE estimator:

4) $(W_{if} - W_f) = a'(wage_{if} - Wage_f) + \omega_{if}$

gives $\omega_{if} = (u_{if} - u_f)$ and $Ea'hat = \alpha + \beta$. Consequently, a Hausman test of the FE specification versus the OLS specification is a test of $\beta\ cov(Wage_f, wage_{if})/var(wage_{if}) = 0$. In our estimates we find that the null hypothesis that coefficients in the OLS and fixed effects specifications are equal can be rejected, indicating that the inclusion of workplace fixed effects is justified and the OLS estimates are biased. It is thus necessary to consider the role of relative wages in employees' wellbeing alongside their own wage.

Since the labour supply of women is less wage elastic than mens' it is possible that wages are a less important influence on women's wellbeing than mens'. We explore this possibility by running separate analyses for men and women.

The models are unweighted and so provide within-sample estimates, rather than population estimates. Individuals' probability of sample selection is not independent of one another since they are clustered within sampled workplaces. Standard errors are adjusted to account for this using clustering[11] and we use the robust estimator to tackle remaining heteroskedasticity in the error 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).[12]

5. Results

Table 1 presents OLS estimates of the association between wages and the three wellbeing measures, namely SWB, GJS and NPJS. We run three model specifications. Column 1 contains the raw correlations with no control variables, other than hours and hours squared. Column 2

[11] Thus we take into account the Moulton-critique (Moulton, 1990).
[12] 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.

introduces a parsimonious set of controls while Column 3 introduces a more extended set of controls, what we term the 'full' model.

Panel A indicates that higher hourly wages are associated with lower SWB. A one standard deviation increase in the hourly wage reduces SWB by one-tenth of the standard deviation in SWB or around half a point on the 24-point index. The size of the effect falls by around a half with the introduction of the parsimonious controls but remains strong and statistically robust.[13]

[INSERT TABLE 1 ABOUT HERE]

The hourly wage coefficient increases in size slightly when we go from Model (2) to Model (3), that is, when we control for the full set of controls including effort and job autonomy. These variables are themselves strong and significant. The three effort controls (overtime hours, supervisory status, and agreeing that 'My job requires that I work very hard') are all negative and statistically significant, whereas job autonomy is positive and statistically significant.[14] [15]

Panel B runs the same models but this time the dependent variable is 'global' job satisfaction (GJS) which includes satisfaction with pay. Hourly wages are positive and statistically significant. The coefficient rises between Models (1) and (2) with the addition of parsimonious controls, but then falls with the full set of controls such that it is about half the size of the raw effect. Nevertheless, it remains statistically significant.

Panel C presents identical models but for the non-pecuniary measure of job satisfaction (NPJS). The results are similar to those for GJS with one notable exception: the hourly wage coefficient in Model (3) is very small and is not statistically significant. This may be due to the additional job controls introduced, notably job autonomy and effort. The non-significance of the wage effect having controlled more fully for the nature of the job is consistent with what we would expect to find if higher wages are compensating employees for more demanding and challenging jobs.

[13] Results are similar when using log hourly wages. These are available from the authors on request.
[14] Full models are available on request.
[15] 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.

Across all specifications in Table 1 the effect of working hours is u-shaped: hours are negative whereas the quadratic term is positive. Both terms are significant for SWB and JS, regardless of model specification. However, the other effort proxies which are only introduced in Model (3) operate rather differently in the JS equations to the way they do in the SWB equations. The supervisor dummy is positive and statistically significant, as is the dummy identifying those who agree with the statement "My job requires that I work very hard", while overtime is positive but non-significant. This is the case for both JS measures. Thus, our proxies for effort are positively correlated with JS but negatively correlated with SWB. In this sense, the effects of effort are analogous to the wage effects: it appears that employees often express a preference for hard work, and perhaps the rewards it brings, even though it can engender stress and anxiety. This can complicate stories regarding compensating wage differentials. What are employees being compensated for? If they are being compensated for hard work and taking on additional responsibilities, it appears that these are things employees like in any event, in the sense that they are correlated with higher job satisfaction. Instead, it seems reasonable to assume, based on our results, that the compensation relates to the additional stress and anxiety that hard work and extra responsibilities bring with them. Once these controls are added, the positive correlation between hourly wages and satisfaction persists for the global JS measure but disappears once we switch to the JS index which excludes pay satisfaction.

[INSERT TABLE 2 ABOUT HERE]

Table 2 presents estimates of the association between wages and SWB and JS simultaneously to identify the independent association between wages and these measures of wellbeing having accounted for the possibility that SWB and JS are jointly determined by factors that are not accounted for in our model. Although there is a strong, statistically significant correlation between the unobservables in the two equations the results are in line with those already reported. Hourly wages are negatively associated with SWB in all models. They are positively associated with GJS for all three model specifications (Panel A) but the association with NPJS becomes statistically non-significant in Model (3) which conditions more comprehensively on the nature of the job.

[INSERT TABLE 3 ABOUT HERE]

Table 3 presents workplace fixed effects models to examine the effects of employees' wages on their SWB 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 dummies capture mean workplace wages so that these models identify the importance of wage relativities in the workplace as a factor in employee wellbeing. As hourly wages rise relative to the workplace average wage employees' SWB deteriorates (Panel A). As was the case in Table 1, the effect is linear with no support for the quadratic term once controls are added, and the size of the effect is similar to the earlier estimates.

Panel B presents identical workplace fixed effects estimates but this time for GJS. The results bear a striking resemblance to the OLS equivalent estimates in Table 1. Hourly wages are positively associated with GJS.

Panel C presents the workplace fixed effects models for NPJS. As in the case of the equivalent OLS models in Table 1 Panel C the positive hourly wage coefficient becomes non-significant with the introduction of the full set of controls in Model (3).

The Hausman tests for the SWB and JS analyses suggest that fixed workplace effects should be included in the models. Table 4 compares the hourly wage coefficients for the FE models with their OLS equivalents. Panel A does this for the SWB models. The differences are small and are only statistically significant in the parsimonious equation (Model (2)). In this model the OLS coefficient is positively biased, that is to say, the OLS coefficient is less negative than the FE equivalent. This indicates that SWB falls as the individual's wage rises above the workplace average wage. However, the difference is not significant in the full model, suggesting that the result is driven by unobservable differences that are accounted for once one conditions on detailed occupation.

[INSERT TABLE 4 ABOUT HERE]

In the JS models presented in Panels B and C the OLS estimates are negatively biased, a difference that is statistically significant in two of the three GJS models and all three of the NPJS models. Thus job satisfaction rises as the individual's wage rises above the workplace average.

Since the labour supply of women is less wage elastic than mens' it is possible that wages are a less influence on women's wellbeing than mens'. We therefore run separate regressions for men and women. The results presented in Table 5 indicate that, 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.[16]

[INSERT TABLE 5 ABOUT HERE]

Warr hypothesised an inverted u-shaped relationship between anxiety and worker performance arguing that worker performance may rise initially with higher anxiety levels, only to switch above a certain threshold at which anxiety induces poorer worker performance. This implies a positive relationship initially between rising wages and anxiety which switches to a negative association above a certain threshold. To test this we incorporated a quadratic hourly wage term in the models presented above. However, it was rarely statistically significant.

6. Discussion and Conclusions

Using nationally representative linked employer-employee data for Britain we find wages tend to be negatively associated with SWB, that is to say, they are positively associated with anxiety and stress. They are also positively associated with two indexes of job satisfaction, one which incorporates pay satisfaction and one that is confined to non-pecuniary job satisfaction. These findings are consistent with three potential explanations which are not mutually exclusive. First, higher wages may be part of the wage-effort bargain which we only partially observe, despite our detailed job controls. The wage is, in effect, compensating employees for taking on additional tasks or responsibilities which induce stress and anxiety. The positive association between higher wages and higher satisfaction indicates that employees are happy to be compensated in this fashion, and may even welcome the opportunity to take on additional responsibilities, despite the negative effect on their SWB. Put another way, (some) people have a preference for hard work which can be challenging but also brings the satisfaction of a higher wage. When employees report that the job they do requires that they work very hard this is positively correlated with satisfaction *and* anxiety/stress, lending further support to this proposition. Second, an

[16] Women's SWB and wages are both lower than men's, which could induce a negative correlation between SWB and wages. These results confirm that this is not what is driving the results.

unobservable factor may induce anxiety *and* increase wages. For example, we know that job performance is wage enhancing and is positively correlated with mental arousal (Kahneman, 1973) – which is picked up in the anxiety/contentment scale but not in job satisfaction. Third, even though employees prefer higher wages, as indicated by their higher job satisfaction, higher wages may nevertheless generate anxiety and worry in employees who wish to justify their higher pay.

It seems that jobs that attract a better hourly wage do so, in part, because they require workers to expend more effort or take on additional responsibilities which induce greater anxiety and stress. If wages compensated fully for this additional anxiety we might not observe this relationship in our data, but it is likely that we do not fully observe the wage-effort bargain, or that SWB is not the metric which allows us to observe this compensation. However, there is some support for a straight-forward compensating wage differentials story in the OLS and bivariate probit models for non-pecuniary JS. In these models the association between hourly wages and JS becomes statistically non-significant only when we add detailed controls for job autonomy and effort.

The workplace fixed effects models reveal two important findings. First, higher wages relative to the workplace average are associated with higher global JS even having controlled for job autonomy and effort. They are also positively associated with NPJS, although the coefficient is only significant at a 90 percent confidence level once the full demographic and job controls are included alongside the workplace fixed effects. Comparison of the wages coefficients in the OLS and fixed effects models reveals a negative bias in the OLS job satisfaction estimates, indicating that when others are paid more relative to oneself this reduces one's own job satisfaction confirming that wage rank among one's workplace peers plays an important role in employees' wellbeing. The second finding is, while the negative association between one's own wage and SWB persists with the introduction of workplace fixed effects, a comparison of the wage coefficients in the OLS and workplace fixed effects models indicates that relative wages do not play a significant role in accounting for employees' SWB. The difference is only significant in the parsimonious model.

Throughout this paper we have been careful to note that what we explore in this paper are associations between wages and wellbeing. We can make no causal inferences unless one assumes that conditioning on the observables in our equations is sufficient to account for the factors which might conceivably determine both wages and subjective wellbeing. Although our

data do contain a particularly rich set of observable characteristics, we do not make this claim. It is conceivable that satisfied employees are also 'better' employees. For instance, they may have effected a better job match, thus increasing their work motivation, or else the personality traits that make them more likely to express happiness may also be productivity enhancing. If this is so, the wages coefficients may be upwardly biased in the JS equations. Similarly, people who tend to feel anxious or stressed may be less able to work productively in their jobs, potentially limiting their learning capability or otherwise inhibiting their productivity. If so, then again, we might anticipate an upward bias in the negative effects wages appear to have on SWB. These conjectures ignore the literature pointing to more complex, non-linear relationships between subjective wellbeing and wages, but they illustrate the need to be cautious when interpreting these results. The challenge in the future is to identify the causal impact of wages on wellbeing through an instrumental variables approach. The difficulty is finding an instrument for wages that can be credibly excluded from our wellbeing equations. Others have used industry dummies, or interactions between industries and geographical location (eg. Luttmer, 2005), but these do not appear persuasive. Some have identified income effects through random income shocks such as lottery winnings, or through natural exogenous events. We will continue to pursue this matter in the hope of establishing the nature and extent of any omitted variables bias.

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Table 1: OLS for correlation between wages SWB, GJS, and NPJS

	Model (1) *No controls*	*Model (2)* *Parsimonious*	*Model (3)* *Full*
Panel A: SWB			
Hourly wage	-.067	-.032	-.040
	(9.45)**	(3.80)**	(4.91)**
Hours	-.153	-.120	-.114
	(10.75)**	(8.02)**	(7.97)**
Hours squared	.00123	.00079	.00096
	(6.26)**	(3.93)**	(4.95)**
Constant	5.917	7.178	6.989
	(20.87)**	(12.44)**	(10.87)**
Adj. r-squared	0.04	0.08	0.18
Panel B: GJS			
Hourly wage	.073	.100	.030
	(7.29)**	(8.31)**	(3.09)**
Hours	-.132	-.065	-.083
	(6.22)**	(3.24)**	(5.00)**
Hours squared	.00171	.00115	.00092
	(5.66)**	(4.15)**	(3.96)**
Constant	5.467	7.699	-0.935
	(13.58)**	(10.31)**	(1.23)
Adj. r-squared	0.01	0.11	0.30
Panel C: NPJS			
Hourly wage	.042	.069	.003
	(4.87)**	(6.69)**	(0.35)
Hours	-.111	-.050	-.065
	(5.88)**	(2.82)**	(4.51)**
Hours squared	.00148	.00098	.00072
	(5.56)**	(4.01)**	(3.53)**
Constant	5.425	7.421	-0.695
	(15.09)**	(11.24)**	(1.04)
Adj. r-squared	0.01	0.11	0.31

Notes:

(1) Unweighted OLS of wellbeing and job satisfaction scales. SWB=subjective wellbeing; GJS=global job satisfaction; NPJS=non-pecuniary job 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); 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 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 2: Bivariate Probit for correlation between hourly wages, SWB and JS

	Wellbeing	*Satisfaction*	*athrho*	*Wald r=0*	*P for Wald*
Panel A: global job satisfaction					
M (1) Raw	-.015 (7.83)**	.014 (6.06)**	.511	927.68	0.0000
M (2) Parsimonious	-.0065 (2.87)**	.021 (7.33)**	.514	848.48	0.0000
M (3) Full	-.0082 (3.35)**	.007 (2.67)**	.498	729.36	0.0000
Panel B: non-pecuniary job satisfaction					
M (1) Raw	-.015 (7.86)**	.010 (4.51)**	.511	902.88	0.0000
M (2) Parsimonious	-.007 (2.90)**	.016(5.74)**	.519	838.05	0.0000
M (3) Full	-.0083 (3.40)**	.0009 (0.33)	.512	734.12	0.0000

Notes:

(1) Unweighted bivariate probits for WELL and SAT dummies. Panels A derives a satisfaction dummy based on the global job satisfaction scale (SATSC8) while Panel B uses the non-pecuniary job satisfaction scale (SATSC7).

(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>chi2 0.0000

Table 3: Workplace Fixed Effects Models for correlation between wages and SWB, GLS and NPJS

	Model (1) *No controls*	*Model (2)* *Parsimonious*	*Model (3)* *Full*
Panel A: SWB			
Hourly wage	-.063	-.045	-.046
	(7.62)**	(4.83)**	(5.06)**
Hours	-.125	-.113	-.108
	(7.93)**	(7.00)**	(6.81)**
Hours squared	.00072	.00063	.00080
	(3.36)**	(2.91)**	(3.77)**
Constant	5.622	5.470	6.209
	(17.18)**	(13.30)**	(12.42)**
Adj. r-squared	0.10	0.13	0.21
Panel B: GJS			
Hourly wage	.127	.114	.036
	(11.92)**	(9.60)**	(3.62)**
Hours	-.024	-.029	-.065
	(1.30)	(1.53)	(3.70)**
Hours squared	.00082	.00091	.00082
	(3.19)**	(3.60)**	(3.38)**
Constant	2.214	2.944	-3.113
	(5.93)**	(6.22)**	(5.70)**
Adj. r-squared	0.16	0.19	0.36
Panel C: NPJS			
Hourly wage	.100	.088	.015
	(10.92)**	(8.63)**	(1.77)
Hours	-.0037	-.0100	-.0431
	(0.23)	(0.61)	(2.80)**
Hours squared	.00058	.00069	.00057
	(2.56)**	(3.08)**	(2.66)**
Constant	2.177	2.920	-2.859
	(6.58)**	(6.95)**	(5.94)**
Adj. r-squared	0.16	0.19	0.36

Notes:
(1) Unweighted workplace fixed effects estimates for EWELLSC wellbeing scale. 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 4: Comparison of hourly wage coefficients in the OLS and Workplace Fixed Effects Models

	Model (1) *No controls*	*Model (2)* *Parsimonious*	*Model (3)* *Full*
Panel A: SWB			
Fixed effects model	-.063	-.045	-.046
OLS	-.067	-.032	-.040
Bias	-.005 (.005)	.013 (.005)**	.007 (.004)
Panel B: GJS			
Fixed effects model	.127	.114	.036
OLS	.073	.100	.030
Bias	-.053 (.006)**	-.014 (.005)**	-.006 (.005)
Panel C: NPJS			
Fixed effects model	.100	.088	.015
OLS	.042	.069	.003
Bias	-.057 (.005)**	-.020 (.005)**	-.013 (.004)**

Notes:
(1) For details of models see Tables 1 and 3. These estimates are identical but are run without clustered standard errors.
(2) Standard errors in parentheses. *=significant at 95% confidence interval; **=significant at 99% confidence interval.

Table 5: Hourly wage coefficients, separate models for men and women

	Model (1) *No controls*	*Model (2)* *Parsimonious*	*Model (3)* *Full*
Panel A: SWB			
OLS, men	-.079	-.038	-.043
	(8.39)**	(3.25)**	(3.90)**
OLS, women	-.064	-.019	-.028
	(6.03)**	(1.44)	(2.29)*
FE, men	-.077	-.051	-.055
	(6.61)**	(3.88)**	(4.15)**
FE, women	-.052	-.022	-.025
	(3.57)**	(1.38)	(1.57)
Panel B: GJS			
OLS, men	.108	.122	.039
	(8.13)**	(7.37)**	(2.92)**
OLS, women	.068	.092	.031
	(4.67)**	(5.48)**	(2.17)*
FE, men	.163	.142	.045
	(10.93)**	(8.55)**	(3.18)**
FE, women	.113	.103	.037
	(6.16)**	(5.14)**	(2.12)*
Panel C: NPJS			
OLS, men	.073	.084	.006
	(6.40)**	(5.93)**	(0.56)
OLS, women	.038	.063	.007
	(3.04)**	(4.49)**	(0.57)
FE, men	.127	.108	.016
	(9.77)**	(7.35)**	(1.28)
FE, women	.094	.083	.023
	(5.87)**	(4.80)**	(1.46)

Notes:
(1) OLS and workplace FE models are as per those presented in Tables 1 and 3 but run separately for men and women. Male N=6,093. Female N=5,374.
(2) Robust estimator with clustered standard errors. T-stats in parentheses. *=significant at 95% confidence interval; **=significant at 99% confidence interval.
(3) See footnotes to Tables 1 and 3 for controls and other details.