Some are Punished and Some are Rewarded: A Study of the Impact of Performance Pay on Job Satisfaction[1]

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Theme: Personnel Economics, Job Satisfaction.
Keywords: performance-related pay, job satisfaction, self-selection, endogeneity.
JEL- Code: J28, J33

Abstract

Using an econometric procedure that corrects for both self-selection of individuals into their preferred compensation scheme and wage endogeneity, this study investigates whether significant differences exist in the job satisfaction of individuals receiving performance-related pay (PRP) compared to those on alternative compensation plans. Using data from four waves of the British Household Panel Survey (BHPS), it is found that PRP exerts a positive effect on the mean job satisfaction of (very) high-paid workers only. A potential explanation for this pattern could be that for lower-paid employees PRP is perceived to be *controlling*, whereas higher-paid workers derive a utility benefit from what they regard as *supportive* reward schemes. Using PRP as an incentive device in the UK could therefore be counterproductive in the long run for certain low-paid occupations.

[1] This research forms part of the EPICURUS project (Societal and economic effects on quality of life and well-being: preference identification and priority setting in response to changes in labour market status) - a project supported by the European Commission through the Fifth Framework Programme "Improving Human Potential" (contract number: HPSE-CT-2002-00143). The authors would like to thank Mary Gregory and participants at the LXXXVIII AEA Colloquium in Mons, Belgium for helpful comments.
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1. Introduction

When faced with the classical agency problem, whereby the interests of the worker and the firm are misaligned, reward mechanisms will be designed in such a way that induces employees to act in their employers' best interests. Mirlees (1976) and Holmström (1979) were among the first to demonstrate the theoretical dominance of performance-related pay (PRP) over alternative reward systems when monitoring effort is costly and imperfect. Indeed, such incentive schemes have increasingly found favour in many organisations in the UK, as well as in many other advanced economies. In fact, the widespread use of incentive rewards in boardroom pay deals in the private sector, as noted by Murphy (1999), has now also become common practice in the public sector. For example, the use of explicit incentives to enhance the provision of public sector services is an important component of the UK Government's public service modernisation agenda (Burgess and Ratto, 2003).

Notwithstanding the substantial insights that agency analysis has offered with respect to resolving the problem of 'moral hazard' in the workplace, a number of shortcomings have now been pointed out. The thrust of these arguments is that the introduction of incentive pay schemes may lead to non-optimal responses, with adverse consequences especially in jobs where workers make substantial unobservable contributions to the value of the firm. For example, rewarding workers based only on a subset of tasks may induce them to manipulate the compensation system to their advantage, a phenomenon referred to as "multitasking" by Holmström and Milgrom (1991) and Baker (1992). In this case the worker will direct his entire effort towards those activities that are directly rewarded, to the detriment of other equally valuable

tasks for the firm. Subjective appraisal has been heralded as a solution to this problem as it can take a holistic view of performance, encompassing the totality of contributions by workers. However, subjective performance evaluation is no less contentious. Supervisors may be more lenient in their evaluations in order to avoid conflicts, generating what Prendergast (1999) refers to as "centrality" or "leniency" bias. On the other hand, workers may attempt to creep up to their supervisors in order to influence their subjective evaluation and hence derive personal advantage. Added to these problems are assertions that financial incentives are likely to undermine collaboration and team work, emphasize the power asymmetry between management and workforce, and reduce risk taking, creativity and innovation (Kohn, 1993).

In addition to the aforementioned objections to incentive pay, there are also concerns that were firstly identified in the social psychology literature. The contention is that the use of extrinsic incentives may erode intrinsic motivation and satisfaction, which will ultimately have counterproductive effects on productivity and profitability (Deci, 1971; Lepper et al, 1973). These claims, which constitute 'one of the most important anomalies in economics' (Frey and Jegen, 2001), have, nonetheless, not been mirrored in the empirical evidence reported by economists. For example, Lazear (2000) shows significant positive effects of incentive pay on productivity (in the range of a 44-percent gain) in his unique dataset of a firm (Safelite Glass Co.) that underwent changes in its compensation practices. Nevertheless, it may be that economists have identified the short run benefits of incentives, and any long run negative effects on motivation and job satisfaction postulated by psychologists have yet to be witnessed in the data.

A careful examination of the link between PRP and job satisfaction may therefore unveil significant insights into the workings of incentive pay, and the manner in which it affects productivity in the longer run. In addition, since the choice of compensation strategies by firms is likely to reflect their optimal weighting of costs and benefits given the nature of their production technology, it is expected that the aggregate workforce will be sorted into jobs that offer PRP and those that pay straight salaries. Therefore, it is the primary aim of this paper to examine how the increasingly changing nature of compensation methods has affected attitudes towards jobs by otherwise similar individuals. To do so we follow the practice of an ever-increasing number of economists who use self-reported job satisfaction data to proxy workers' perceptions of the quality of their jobs. Based on the theoretical underpinnings of economic and psychological models no unambiguous prediction regarding the difference in job satisfaction between workers receiving PRP and those that do not can be made a priori. Nonetheless, the disparity in the psychological processes and in the workplace experiences facing the two types of workers leads to the expectation that the salient determinants of job satisfaction are not the same for both groups. There are therefore good reasons to believe that various socio-economic determinants exert a differential impact on the job satisfaction determination processes of workers on alternative compensation schemes.

One such determinant is the absolute wage that workers receive in exchange for their effort, which is also the one that is most likely to differ among workers on dissimilar reward schemes. Taking into account its relative importance among the set of variables affecting job satisfaction, the analysis that follows has also attempted to

correct for the endogenous nature of the income-job satisfaction relationship. This constitutes another important contribution of this paper, as the majority of the literature on job satisfaction has usually assumed exogeneity in the independent variables.

This paper is therefore an investigation of differences in work attitudes between individuals who receive PRP and those who are rewarded with other methods of pay, having controlled for the endogeneity in wages. It builds on the earlier work of Pouliakas and Theodossiou (2004) who show that a significant difference in the job satisfaction of PRP and non-PRP workers exists, once one corrects for the simultaneous relationship between job satisfaction, incentives and wages. However, in that paper no interaction was allowed between the individual's pay status and other characteristics. In contrast, by undertaking a separate analysis for PRP and non-PRP employees this study succeeds in revealing their utility differences across the full spectrum of wages. Using waves 8 to 11 of the British Household Panel Survey (BHPS), and after plotting the 'predicted job satisfaction-wage' profiles of the two types of workers, a scissor-shaped graph is uncovered which shows that PRP has a beneficial impact on the job utility of (very) high-paid workers only.

The remainder of the paper is organised as follows. In the next section a brief review of the literature on subjective well-being will be presented, followed by an examination of the theoretical predictions regarding the incentives-job satisfaction relationship. In section 3 the data is described and summary statistics are displayed. Section 4 details the econometric methodology used in the paper. The econometric estimates of the job satisfaction regressions for the two types of workers are then presented in section 5. Finally, conclusions are offered in section 6.

2. Well-being, Job Satisfaction and Incentives

2.1 Subjective Well-Being and Job Satisfaction

A surge of interest among economists in recent years regarding the use of subjective well-being (SWB) survey questions has led to a broad consensus that these can be used as an empirical proxy for the theoretical concept of 'utility'. Though this is in direct contrast to the axiom of revealed preferences that has dominated traditional microeconomic thinking, this initiative has followed the pioneering work of psychologists who have long verified that different measures of SWB are often mutually consistent. Indicatively, Kahneman et al (1997) showed that self-reported SWB is correlated with the evaluation of the individual's experience by a third party observer, while Kahneman et al (1999) showed that SWB varied with physiological measures of changes in facial muscles, such as the amount of smiling or frowning. Moreover, Van Praag (1991) demonstrated that members of the same language community tend to display a degree of homogeneity in their understanding of the concepts of welfare, well-being and happiness. Nonetheless, problems associated with the use of subjective happiness data have been identified. These include the adaptation phenomenon (Easterlin, 2001) and the potential divergence between remembered utility and experienced utility (Kahneman et al, 1999).

More importantly, the justification for studying subjective assessments of job satisfaction is that they have been found to be strongly correlated with observable employee events and actions, such as quits, absenteeism and worker productivity (Freeman, 1978; Clegg, 1983). Recently, numerous interesting findings appear to have emerged in the literature. For example, unemployed individuals consistently report

substantially lower levels of well-being than the employed, and their level of well-being is permanently 'scared' as a consequence of their unemployment experience (Clark and Oswald, 1994; Theodossiou, 1998). The judgement of individuals about their own past and future financial situation is also important (Easterlin, 2001; Lydon and Chevalier, 2002). Furthermore, the relative wage is also shown to be significant as far as job satisfaction is concerned (Clark and Oswald, 1996; Clark, 1999; Grund and Sliwka, 2003). With regard to personal characteristics, the key results to have emerged are that males tend to have lower levels of job satisfaction than females (Clark, 1997), union members are less satisfied with their jobs compared to non-union members (Blanchflower and Oswald, 1999; Drakopoulos and Theodossiou, 1997), there is a U-shaped age effect (Blanchflower and Oswald, 1999), and the most highly educated are the least satisfied in their jobs (Clark and Oswald, 1996; Sloane and Williams, 1996).

2.2 Incentives and Job Satisfaction

While the literature on happiness and well-being has advanced at a rapid pace, and the theory of firms' choice of incentive contracts is firmly rooted in the agency problem, formal theoretical consideration of the impact of financial incentives on job satisfaction appears to be irrelevant from an economic perspective. The reason is that due to the fundamental economic assumption of disutility of effort, employers who adopt PRP schemes should compensate for the disutility of the extra effort (plus the risk bearing costs) by offering higher wages on average. Thus, the (reservation) utility of individuals who receive performance-enhancing pay should, in equilibrium, be equal to that of non-recipients.

Nevertheless, once the assumption of the selfish *homo economicus* is relaxed, and the possibility that an agent may perform an activity due to the fact that it is inherently enjoyable (over some range) is acknowledged, the influence of an external reward on individual job satisfaction becomes less clear-cut. Allowing for the fact that rational individuals may receive an *intrinsic satisfaction* from their jobs raises the possibility that extrinsic intervention may trigger psychological responses that will alter the agent's utility from work. This forms the basis of cognitive evaluation theory (Deci and Ryan, 1985), which asserts that the ultimate effect of performance-contingent compensation on the intrinsic motivation to perform a task depends on its impact on perceived self-determination and esteem. Thus, it has been argued that if incentives are perceived by individuals as being *supportive*, they facilitate worker autonomy and foster self-esteem, thus enlarging self-determination. In that case *intrinsic* motivation is *crowded-in*, and PRP schemes should enhance inherent job satisfaction. In contrast, rewards that are regarded as *controlling*, or as intended to coax the individual into performing an activity, are likely to cause a shift in the attributed cause of the behaviour from an internal to an external source. With such a shift in the locus of control, tying wages to performance indicators will *crowd-out* the utility that employees derive from the work itself (the 'hidden cost of reward').[3] For either of these reasons it is expected that monetary inducements are unlikely to have a neutral effect on the subjective job satisfaction scores of individuals.[4] This conclusion is reinforced by expectancy-based theories of motivation in psychology (Lawler and Porter, 1967), which assert that attitudes about work are

[3] More recently Benabou and Tirole (2003) also allowed for the possibility that incentive rewards, by affecting an agent's uncertain information set concerning the nature of a task or his/her self-confidence, may have a positive effect on employee welfare in the short-run, but counterproductive in the long-run.

[4] See Kreps (1997), Frey (1997) and Fehr and Falk (2002) for excellent discussions regarding the relevance and application of such theories for economics.

shaped from the rewards produced by performance, which are valued outcomes in themselves (Judge et al., 2001, p. 378).

Standard economic theory also fails to account for the fact that PRP will, in all likelihood, alter the recipient's *relative status*. The idea that *reference-dependent preferences* (whereby some arguments of the utility function are relative, rather than absolute) describe human behaviour more accurately is now firmly ingrained in the literature of well-being.[5] Thus, if job utility depends on both the level of pay and on pay relative to some reference point or aspiration level, it is clear that incentive pay could significantly affect job satisfaction through both of these routes.

Finally, given the overwhelming evidence that workers attach an equal (or even greater) value to other facets of their jobs besides wages and hours worked, it is to be expected that PRP will affect overall attitudes towards work by influencing individual perceptions of the security of employment, of inter-personal relationships and of equity and fairness, among others.

The analysis above therefore highlights the ambiguous theoretical impact of performance-related pay (PRP) on overall job satisfaction, whilst emphasizing that other socio-economic factors are likely to exert dissimilar influences on the utility of otherwise identical workers who are rewarded under different payment schemes. We now turn to the empirical analysis of this paper in order to test whether this hypothesis holds.

[5] Nonetheless, contention exists among economists as to what is exactly the comparison or aspiration benchmark against which individuals compare their utility. While Clark and Oswald (1996) have assumed that well-being measures are inversely related to a comparison income defined as the econometrically predicted 'going rate' for the job, that is the income of comparable employees of given characteristics, Clark (1999) and Grund and Sliwka (2003) have recently argued that it is the wage of the prior period that serves as reference.

3. An overview of the data

This paper uses data from waves eight to eleven of the British Household Panel Survey (BHPS). The BHPS is a nationally representative survey that each year interviews a random sample of nearly 10,000 individuals in approximately 5,500 British households, the addresses of which are taken from the National Postcode Address File. The cumulative attrition in the BHPS has been shown to be of a limited magnitude such that it does not lead to serious inference bias (Nathan, 1999; cited in Gardner and Oswald, 2001). It contains a wealth of information on employees' personal and employment characteristics. Respondents in employment are also asked about their satisfaction with seven specific facets of their jobs (promotion prospects, total pay, relations with supervisors, job security, ability to work on their own initiative, the actual work itself and hours of work) evaluated on a seven point scale (where a value of one corresponds to 'not satisfied at all' and seven reflects 'complete satisfaction'). The questions regarding promotion prospects, relations with boss, and the use of initiative were discontinued after the seventh wave. Individuals are also asked to rate their overall job satisfaction on the same seven-point scale. As in most empirical work in this field, this study employs these job satisfaction questions to identify the determinants of the quality of employment as perceived by the individual workers themselves.

In this paper the sample is restricted to individuals between 16 and 65 years of age who are in employment (both full and part-time) at the survey date. Those who are self-employed, retired, work in the armed forces and live in Northern Ireland are excluded. For waves 8 to 11 of the BHPS this yields 26,585 observations on 9,831

different individuals. A sizeable portion of this sample (16.26%) corresponds to individuals that replied affirmatively to the question: "*Does your pay include* ***performance*** *related pay*"?

Table 1 contains the characteristics of employees with and without PRP. The percentage of male workers is higher among those receiving PRP than it is among those on alternative wage schemes. Employees whose remuneration is linked to their performance are also more likely to be younger, have union coverage at their workplace, in full-time and permanent jobs offering promotion and career opportunities (in the sense that wages rise on an incremental scale) and in larger firms. They are also found primarily among managerial/administrative and clerical/secretarial occupations and in the private sector or the Civil Service. No major differences exist with respect to educational qualifications and marriage/partner status.

The distribution of overall job satisfaction by type of employee is displayed in Figure 1. While a higher proportion of employees receiving incentive pay state the satisfaction values of 3 or 5, it appears that a larger percentage of workers on other pay systems consider themselves as completely satisfied (level equal to 7). It is also evident that there is a bunching of employee responses towards the higher satisfaction categories.

Finally, to gain some insight into the correlations in the raw data, Table 2 presents the means of overall job satisfaction over some of the characteristics of interest for this study, broken down by method of pay. The data demonstrate that regardless of pay status men are less satisfied with their jobs than women, there is a U-shaped effect of age on job satisfaction, and that no union coverage, promotion and career opportunities,

and part-time employment lead to higher average satisfaction levels. This is also true for those individuals with a partner, on permanent jobs and in smaller firms. Comparing the two types of employees now, one can see that for most categories the mean satisfaction of individuals on non-PRP rewards is higher than of those receiving PRP. Nonetheless, this is not the case for higher educated employees, those with non-permanent contracts and those who work in the NHS/Higher education sector.

4. Econometric Methodology

For the rest of the paper a multivariate regression methodology is employed in order to uncover the true *ceteris paribus* influence of the explanatory variables on job satisfaction. As noted above, it is expected that the aggregate workforce will be sorted into jobs that offer PRP and those that pay other salaries, since the compensation strategies of firms should reflect their optimal evaluation of costs and benefits given the nature of their production technology. Moreover, since the provision of incentive pay is likely to trigger significant disparities in the psychological reactions and in the workplace experiences facing the two types of workers, one expects that the salient determinants of job satisfaction will not be the same for both groups. Of course, although within the same type of worker category there may be some distinction in the manner in which incentives affect individual attitudes to work, made more probable by the fact that our measure of PRP does not distinguish between the many alternative reward methods that are available (e.g. bonuses, commissions, merit pay etc.), the assumption is made that similar forces should operate within the same type. Thus, in the analysis that follows the overall sample has been split into PRP and non-PRP sub-samples.

Given the decision to separate workers according to their method of pay, a Heckman-type model is employed in order to correct for the incidental truncation problem that arises. Specifically, as Lazear's (1986) 'sorting' model has convincingly illustrated, when examining the consequences of incentive contracts self-selection by workers into their preferred pay scheme is likely to occur. In Lazear's model jobs with PRP attract workers of higher ability, which is likely to be unobservable to the survey statistician. It follows that if selectivity is not taken into account an OLS regression using the selected sub-samples will lead to inconsistent estimates (Heckman, 1979). Thus, in order to correct for this problem this paper utilizes a model commonly known as a "switching regression with endogenous switching". This procedure was most notably espoused by Lee (1978).

The switching regression model consists of two job satisfaction equations (*JS*), one for each type of worker (i = 1,…, N; j = PRP and other):

$$JS_{PRPi} = \mathbf{X}_{PRPi}\boldsymbol{\beta} + W_{PRPi}\beta_k + u_{PRPi} \tag{1}$$

$$JS_{oi} = \mathbf{X}_{oi}\boldsymbol{\gamma} + W_{oi}\gamma_k + u_{oi} \tag{2}$$

and one "selection equation" which determines which sector individuals choose:

$$PRP_i^* = \mathbf{Z}_i\boldsymbol{\delta} + v_i \tag{3}$$

where from equations (1) and (2) $\mathbf{X}_{ji}$ is a [1 x (K-1)] vector of exogenous variables believed to influence the job satisfaction of individual i, W_{ji} denotes the log of real gross

hourly earnings adjusted for overtime[6], $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ are associated (K x 1) coefficients, and u_{ji} are the random error terms with $E(u_{ji}) = 0$ and $Cov(\mathbf{X}_{ji}, u_{ji}) = 0$. Moreover, from equation (3) PRP_i* is a latent variable which describes the agent's propensity of joining either compensation scheme, $\mathbf{Z}_i$ is a (1 x q) vector of all exogenous variables in the model (with at least one determining the employee's selection, but excluded from the structural JS equations i.e. $q \geq K$), and v is the disturbance term with $Cov(\mathbf{Z}_i, v) = 0$ and $v \sim N(0,1)$. Of course, PRP_i* is unobserved, but we know that:

$$PRP_i = 1 \quad iff \quad PRP_i^* > 0 \tag{4}$$

$$PRP_i = 0 \quad iff \quad PRP_i^* \leq 0 \tag{5}$$

Thus, our observed job satisfaction data are defined as follows:

$$JS_i = JS_{PRPi} \quad iff \quad PRP_i = 1 \tag{6}$$

$$JS_i = JS_{oi} \quad iff \quad PRP_i = 0 \tag{7}$$

[6] The logarithm of the hourly wage was constructed in a standard manner as follows:

$$W_i = \ln\{PAYGU_i / [4.33(HOURS_i + 1.3HOURSOTPD_i)]\}$$

where PAYGU is the usual gross pay per month in the current job (including regular bonuses and commissions associated with PRP systems but excluding one-off payments such as Christmas bonuses or redundancy payments), deflated by 1991 prices, HOURS is number of hours normally worked per week, and HOURSOTPD is paid overtime hours of individual i (where we assume that each hour of overtime is paid at 1.3 times the standard hourly rate).

$$Cov(u_{PRPi}, u_{oi}, v_i) = \begin{pmatrix} \sigma^2_{PRP} & \sigma_{PRPo} & \sigma_{PRPv} \\ \sigma_{oPRP} & \sigma^2_{o} & \sigma_{ov} \\ \sigma_{vPRP} & \sigma_{vo} & 1 \end{pmatrix} \quad (8)$$

and it is evident that since $E(u_{PRPi} / PRP_i^* > 0) \neq 0$, $E(u_{oi} / PRP_i^* \leq 0) \neq 0$ and $Cov(u_j, v) = \rho$, estimation by OLS will result in inconsistency.

In order to consistently estimate $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ a Heckman two-step procedure is therefore required. In the first step the selection equation (3) is estimated using the probit method, given the binary nature of the PRP variable. The estimated coefficients from this equation, $\hat{\delta}$, are then used for the calculation of the inverse Mills ratios (one for each group), as is illustrated below:

$$\lambda_{PRPi} = Cov(u_{PRPi}, v_i) \times \frac{\varphi(\mathbf{Z}_i\hat{\boldsymbol{\delta}})}{\Phi(\mathbf{Z}_i\hat{\boldsymbol{\delta}})} \quad (9)$$

$$\lambda_{oi} = Cov(u_{oi}, v_i) \times \frac{\varphi(\mathbf{Z}_i\hat{\boldsymbol{\delta}})}{1 - \Phi(\mathbf{Z}_i\hat{\boldsymbol{\delta}})} \quad (10)$$

In the second step the job satisfaction equations are estimated including the respective Mills ratios as independent variables, as follows:

$$JS_{PRPi} = \mathbf{X}_{PRPi}\boldsymbol{\beta} + W_{PRPi}\beta_k - \lambda_{PRPi} + \eta_{PRPi} \quad (11)$$

$$JS_{oi} = \mathbf{X}_{oi}\boldsymbol{\gamma} + W_{oi}\gamma_k + \lambda_{oi} + \eta_{oi} \qquad (12)$$

The estimated coefficients of $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ should now provide consistent estimates of the marginal effect of $\mathbf{X}_{ji}$ and W_{ji} on JS_{ji}. This will not be the case, however, if W_{ji} and JS_{ji} are endogenously determined, implying that $Cov\{W_{ji}, u_{ji}(or\ \eta_{ji})\} \neq 0$. In fact, it is reasonable to expect that wages and job satisfaction belong to a simultaneous system, given that ever since Adam Smith advocated his theory of 'compensating differences' it has been well understood that wages and utility are interlinked. It also seems plausible that attitudes towards the job (such as job satisfaction) should be related to behaviours on the job (such as performance), with subsequent consequences for wages (Fishbein, 1973; cited in Judge et al., 2001, p. 378). It is therefore evident that correcting for endogeneity is necessary if one wishes to identify the correct effect of W_{ji} on JS_{ji}.

For this reason equations (11) and (12) have been estimated using the Two-Stage-Least-Squares (TSLS) methodology, where the first stage consists of the OLS estimation of the following two reduced form equations of wages:

$$W_{ji} = \mathbf{Z}_{ji}\boldsymbol{\xi}_j + \lambda_{ji}\xi_{jq+1} + \varepsilon_{ji} \qquad (13)$$

As before the matrix $\mathbf{Z}_{ji}$ contains all exogenous variables in the model, one of which is correlated with W_{ji} but does not appear in the structural *JS* equations, while ε_{ji} are the random disturbance terms of the reduced form equations. Using the estimated coefficients from these regressions fitted values of earnings for each individual are then

obtained. These predictions, henceforth denoted by $\hat{W}_{ji}$, are subsequently included in the main job satisfaction equations (11) and (12) in place of the W_{ji} variables:

$$JS_{ji} = \mathbf{X}_{ji}\boldsymbol{\psi}_j + \hat{W}_{ji}\psi_{jk} - \lambda_{ji} + \omega_{ji} \tag{14}$$

Wooldridge (2002, p. 567) illustrates that this TSLS procedure with the inverse Mills ratio added to the regressors is consistent. Of course, in order to fulfil the identification requirements the chosen identifying restrictions $\mathbf{Z}_i$ need to be orthogonal to the structural model - $E(\mathbf{Z}_i'\eta_{ji}) = 0$ (the *exogeneity condition*), but *sufficiently* partially correlated with W_{ji} (the *rank condition)*. The importance of satisfying this latter condition has been highlighted by Bound *et al*. (1995), who showed that, despite large sample sizes, when the instruments are only weakly associated with the endogenous regressors, even a weak $Cov(\mathbf{Z}_i, \eta_{ji})$ can lead to large inconsistencies (and finite sample biases) in IV estimates. More recently Staiger and Stock (1997) and Stock *et al*. (2002) have shown that the relative bias of TSLS methods (relative to the inconsistency of OLS) is approximately inversely proportional to the *concentration parameter matrix* μ^2 i.e. the population analogue to the first-stage F statistic testing the significance of the instruments $\mathbf{Z}_i$ in the reduced form equations (13). They show that with one endogenous regressor a minimum requirement for conducting reliable TSLS inference is that the F statistics in the first-stage regressions are larger than 9.

It is not a straightforward task to come up with valid instruments that satisfy these conditions, which may partly explain why much of the job satisfaction literature has overlooked the problem. To the knowledge of the authors only three studies (Lydon and

Chevalier, 2002; Mavromaras and McAvinchey, 2004; Pouliakas and Theodossiou, 2004) have relaxed the assumption of weak exogeneity of the wage variable. In this paper, since the emphasis is on correcting for selectivity whilst also taking into account the endogeneity of *W*, identification requires at least two exclusion restrictions in the structural *JS* equations. Consequently, and in order to identify the second moments of the structural coefficients, four variables have been included in the $\mathbf{Z}_i$ matrix in addition to $\mathbf{X}_i$, so that $\mathbf{Z} = [\mathbf{z}_1 : \mathbf{z}_2 : \mathbf{X}]$, where $\mathbf{z}_1$ are the variables determining selection and $\mathbf{z}_2$ are those that serve as instruments for *W*. In practice the distinction between $\mathbf{z}_1$ and $\mathbf{z}_2$ is not important, since all of these variables appear in the selection equation and as instruments in estimating (11) and (12). We have therefore added in **Z** a dummy variable (SPPT) indicating whether the spouse/partner works part-time (1-30 hours), on the grounds that features of the spouse can act as reasonable proxies for the individual's unobserved characteristics (what has become known as Becker's assortative matching argument). Two indicators of an index describing the possession of basic consumer durables in the household (CDINDX) were also incorporated. The final restriction used is a dummy variable representing whether the vehicle owned by the household is privately or company-owned (CAROWN). The choice of this variable was motivated by the usual modus operandi of British firms to offer company vehicles to individuals in managerial or sales occupations, who are also most likely to be recipients of incentive reward schemes. For all of these identifying restrictions it is believed that while they are correlated with individuals' choice of method of pay and their actual pay, there is no compelling reason for them to be endogenous to job satisfaction. Indeed, the extensive

statistical tests that have been undertaken (discussed in detail below) indicate that the restrictions for identifying the endogeneity effects are adequate.

Before reporting the empirical estimates three technical issues need to be addressed. Firstly, in the absence of any appropriate econometric software that would compute Heckman and IV estimators of ordered latent response models, the decision was taken to follow Freeman's (1978) suggestion of approximating job satisfaction with a standardized z-score transformation. By measuring the number of standard deviations between a given response and the mean, this procedure enables the utilization of linear estimation methods. Secondly, given that the $Var(JS_{ji} / PRP_i = 0,1)$ may not be constant, robust (Hubert-White) standard errors are reported which have also been adjusted for clustering at the individual level. Finally, if selectivity effects are present the standard errors of $\boldsymbol{\psi}_j$ after embarking on the TSLS procedure are likely to suffer from inconsistency, as they fail to take into account the estimation error in the generated regressor λ_j (Wooldridge, 2002, p. 568). In order to tackle this problem we have therefore bootstrapped the data with 1000 replications.

5. Empirical Results

5.1 Correcting for Self-Selection

Table A1 in the Appendix describes the results (and marginal effects at the means of **Z**) of equation (3), the bivariate probit of performance pay. It is evident that the restrictions for identifying the selection equation are significant. Individuals of households that possess more consumer durables are more likely to be members of contingent pay schemes, other things equal. In addition, it appears that the probability of receiving incentive pay is reduced for those individuals whose spouse works in part-time

employment. Finally, our intuition that company ownership of the household vehicle should be positively correlated with PRP is confirmed. All of these instruments are statistically significant variables in the PRP selection regression at the 5% level, while a test of their joint insignificance is clearly rejected at the 1% level (χ^2 (4) = 25.7 > $\chi^2_{critical}$ (4) = 13.27).

The remaining control variables have generally expected signs. Working long hours ('burning the midnight oil') and in larger firms raises the probability of a worker receiving PRP, in accordance with Brown's (1990) observation that piece-rate systems entail fixed costs that can be spread more evenly over more workers in large establishments.[7] This also seems to be the case for trade union members, thus implying that British unions opt for PRP systems to protect their workers against supervisory discretion at the cost of solidarity-enhancing wage equality. The probability of receiving PRP is also positively related to whether the employee has promotion prospects at his current employment, or whether his or her salary increases on an incremental scale, thus indicating complementarities in the manner in which incentive devices are utilized by British firms. In contrast, age, health status, and sex do not seem to be correlated with the likelihood of PRP.[8] Finally, it is well known that explicit incentive contracts have always been more common in the private than in the public sector (Burgess and Ratto, 2003), and this is confirmed in our data for the local government and health and higher education sectors. However, it appears that the extension of PRP to practically the whole

[7] "Large firms with extensive hierarchies may also have more resources, particularly in terms of compensation specialists, to devote to the development of incentive schemes" (McKersie, Miller and Quarterman, 1964; cited in Drago and Heywood, 1995, p. 5).

[8] In other words, Goldin's (1986) assertion that women are more likely to receive performance pay, since the more frequent disruption in their careers makes promotion schemes less effective motivators, is not borne out in this data set.

of the Civil Service over the last few years (as described by Marsden and Richardson, 1992) has taken its toll.[9]

5.2 Determinants of Job Satisfaction by Method of Pay

From the coefficients of Table A1 the relevant Mills ratios, as described in (9) and (10), are obtained, and subsequently included in the estimation by TSLS of the job satisfaction equations (11) and (12). Due to space limitations we refrain from describing the results of the reduced form regressions of wages (equation (13)), though the output is readily available from the authors upon request. It suffices to say that the standard findings of previous Mincer-type estimations are confirmed, and that the chosen instruments satisfy the rank and exogeneity conditions. Specifically, in the first-stage wage regression for workers receiving PRP, the F-statistic testing the joint insignificance of the excluded instruments is F(4, 2109) = 17.71, while in the non-PRP wage regression it is F(4, 7700) = 38.70. Both of these clearly satisfy the Staiger and Stock (1997) rule of thumb, which requires the first-stage F statistic to be larger than 9 in order to avoid the problem of weak identification. The corresponding Hansen-J statistics of $\chi^2(3) = 1.99$ and $\chi^2(3) = 0.99$ for the PRP and non-PRP regressions, respectively, also fail to reject the null hypothesis that the selected instruments are valid in these sub-samples. All of the relevant statistical tests hence indicate that the restrictions for identifying the endogeneity effects in this study are adequate.

Table 3 contains the coefficients that are concurrently purged from endogeneity in *W* and adjusted for self-selection bias (equation (14)). From this table it is clear that the

[9] Of course, it still remains the case that for virtually all civil service staff the importance of the performance related elements is small in relation to total pay, but the direction of the incidence of such pay systems is unambiguous.

marginal effect of some of the explanatory variables on the job satisfaction of PRP and non-PRP workers differs. Interestingly, once one controls for the non-causal relationship between wages and job satisfaction, absolute pay has no statistical significance for both groups of workers. This result is an agreement with a number of studies that have shown that "income not only weakly predicts overall quality of life but also satisfaction in the life domain with which income is intimately associated-work" (Malka and Chatman, 2003, p. 737). Clark (1999), for example, reports an insignificant coefficient in the current pay variable using the first two waves of the BHPS, and interprets this as reflective of the fact that reference-dependent preferences describe human behaviour more accurately. Other authors have also shown that actual wages have no significant effect on the overall job satisfaction of women (Leontaridi and Sloane, 2001), or on some of the facets of job satisfaction (such as security and the actual work itself; see Pouliakas and Theodossiou, 2004), which could also help explain our finding.

Evidence of self-selection is only found among those workers who are not in receipt of PRP. The Mills ratio, an indicator of the extent to which the employees' characteristics affect the satisfaction score they report, is found to be positive and statistically significant for this group. This implies that unobserved characteristics, which influence an individual's decision on whether to opt for non-performance-based schemes, have a positive effect on the utility from work once he/she chooses to work in the non-PRP sector.

With respect to the remaining independent variables a statistically significant U-shaped age effect, and negative coefficients for union and full-time workers are only found in the non-PRP sub-sample. Significant negative effects for larger firms, working

in the Civil Service, and on the duration of commuting to work are also only observed for workers on non-contingent pay. Similarly, individuals who have a partner, or enjoy good health, seem to be happier with their jobs in the non-PRP sector. In contrast, females, workers with career opportunities, and those who have fewer educational qualifications are more satisfied with their work regardless of the method of pay.

5.3 Average Job Satisfaction by Method of Pay

Based on the regression output of Table 3, it is now possible to test whether a significant difference in the average job satisfaction, $E(JS_{ji}/W_{ji}, X_{ji})$, of the two types of workers exists, by comparing the predicted values of (14), $\hat{JS}_{ji} = X_{ji}\hat{\psi}_j + \hat{W}_{ji}\hat{\psi}_{jk} - \hat{\lambda}_{ji}$. For this purpose the two non-parametric tests of Kolmogorov-Smirnov (KS) and of Wilcoxon-Mann-Whitney (WMW) are employed, which test whether the fitted job satisfaction distributions of PRP and non-PRP workers (as shown in Figure 2) are statistically different. While the former test is sensitive to differences in the median, dispersion and skewness between the two distributions, the latter is more robust to extreme values. Their values of 0.1015 and 9.780, respectively, clearly reject the null of the equality of the distribution functions at the 1% level. Moreover, from the WMW test the hypothesis that the values of $\hat{JS}_{noPRP}$ are less than those of $\hat{JS}_{PRP}$ is rejected at the 1% level. These results confirm the main proposition of this paper i.e. that the provision of performance-related rewards should alter the nature of the job satisfaction determination processes of those workers receiving them. They also indicate that the provision of PRP exerts an adverse average effect on the overall utility that employees derive from their employment (e.g. $\bar{\hat{JS}}_{PRP} = 5.24 < \bar{\hat{JS}}_{noPRP} = 5.31$),

provided, of course, that our econometric methodology has controlled for differences in observable and unobservable characteristics that affect both the method of pay as well as the stated job satisfaction scores of workers.

By comparing the predicted job satisfaction values of the two types of workers, evaluated at the means of the remaining independent variables ($\overline{X}$), one can also obtain a visual display of the varied effect of PRP across the full spectrum of wages. It is interesting to examine $\widetilde{JS}_{ji} = \overline{X}_{ji}\hat{\psi}_j + W_{ji}\hat{\psi}_{jk} - \overline{\lambda}_{ji}$ over wages, since PRP has been typically preferred as a method of compensation in high-paid occupations (e.g. CEOs, managers). Figure 3, which plots the 'predicted job satisfaction-wage' ($\widetilde{JS} - W$) profiles of PRP and non-PRP workers, offers a potential explanation for this phenomenon, since it can be seen that PRP exerts a beneficial effect on the utility of (very) high-paid workers only. From the scissor-shaped graph of Figure 3 it is clear that for a large part of the wage distribution workers receiving contingent rewards have lower average job satisfaction scores compared to those on other compensation schemes. The $\widetilde{JS} - W$ profile of PRP workers, however, is steeper, implying that for real wages that are larger than approximately £10.80 per hour employees receiving incentives rewards become happier.[10] Since individuals receiving more than £10.80 per hour in the UK are likely to belong to the highest decile of the earnings distribution, we conclude that incentive pay has a positive effect on the mean job satisfaction of (very) high-paid workers only.

[10] This difference in job satisfaction between workers on alternative remuneration schemes is statistically significant, as verified by two independent WMW tests. Specifically, the null hypothesis that there is no significant difference between the predicted job satisfaction scores of workers under different pay systems is rejected at the 1% level, both before and after the 'overtaking' wage of £10.80. Furthermore, the WMW z-value of 15.661 implies that for wages that are below the threshold of £10.80 non-PRP workers derive greater utility from their work, compared to those on contingent pay schemes. However, once we compare those employees who earn more than the threshold, there is a significant difference in job satisfaction in favour of those workers who receive performance pay (WMW z-value = –9.187).

5.4 Discussion and Satisfaction with Pay

This prediction might seem to be at odds with the empirical findings of most studies investigating the relationship between methods of pay and earnings. According to these, workers earning part (or all) of their income due to explicit incentives have higher mean wages than those who are paid hourly rates or salaries (Seiler, 1984; Brown, 1992; Booth and Frank, 1999). This result holds even after the sorting effects of variable pay are controlled for by the use of fixed effects regressions (Parent, 1997; Lazear, 2000). In fact, the impact of this difference in wages on individual attitudes can be seen if we replicate the analysis of this paper using the 'satisfaction with earnings' question as the dependent variable. Table 4 reassuringly indicates that current pay is a significant determinant of pay satisfaction, and that the marginal effect of wages is larger for individuals receiving PRP than those on alternative pay (though the difference is not statistically significant). Furthermore, from Figure 4, which depicts the average pay satisfactions of the two types of workers, a scissor-shaped graph is uncovered as before, albeit one in which the crossing point of the two plots is at the much lower real hourly wage value of £6.8.[11] However, it has to be borne in mind that, as was confirmed by the insignificant coefficient of wages in Table 3, the absolute level of pay "tends to be ranked relatively lowly in terms of what individual workers claim is important to them in their jobs" (Leontaridi and Sloane, 2001, p. 6). Thus, despite the fact that PRP appears to have a positive impact on the pay satisfaction of a much larger fraction of workers, it is

[11] Two independent WMW tests confirm once again that there is a significant difference (at the 1% level) in the pay satisfactions of workers on alternative wage schemes, with non-PRP workers being more satisfied than their PRP counterparts for wages that are below the threshold of £6.8 (WMW z-value = 10.36), while the reverse pattern holds for wages that are above the threshold (WMW z-value = -21.768).

probable that via its effect on the other facets of jobs it only results in greater overall happiness among those workers who are at the top of the earnings distribution.

In the absence of any clear-cut theoretical predictions regarding the differential impact of PRP on the job satisfaction of workers by wage level, in this final section of the paper we discuss potential explanations for the pattern that is observed in Figure 3. The finding that at low wages individuals receiving incentive pay derive less utility from their jobs is consistent with the idea these workers might perceive such compensation schemes as *controlling*. In light of recent evidence that low-paid workers in the UK are not significantly less satisfied with their jobs compared to high-paid employees (Leontaridi and Sloane, 2001; Pouliakas and Theodossiou, 2005[a][b]), presumably because there is compensation in the non-monetary features of their jobs, the provision of extrinsic incentives may divert the attention of workers away from these non-pecuniary and intrinsically rewarding aspects of work. This effect would be magnified if, in accordance with the theory of cognitive dissonance, individuals in low wage jobs feel the need to convince themselves that they are doing important work despite the low pay. Figure 3 therefore suggests that the negative impact of PRP on the self-attribution of motives by low-paid individuals outweighs the more 'economically-driven' expectation, which would posit that the marginal benefit of extra income should be higher for those workers whose basic needs have not been satisfied yet. In addition, low wage workers are expected to suffer from a greater inability to diversify the extra risk that is inherent in the variability of PRP wage systems, which is not the case for those employees on the higher rungs of the income distribution.

Workers enjoying high wages are, instead, more likely to perceive incentive rewards as *supportive*. "In terms of Maslow's (1954) hierarchy of needs, excess income can aid in the satisfaction of esteem needs because high income implies high competence and overall personal worth. So, even when satisfaction of basic physiological and security needs is not an issue, some people will value high income as a marker of competence and personal worth" (Malka and Chatman, 2003). In addition to this, the size of the additional rewards that arise from incentive pay might also act as a signal of recognition and higher status within the organization for workers who are already high in the hierarchy.

6. Concluding Remarks

By using an econometric procedure that corrects job satisfaction equations for both self-selection of individuals into their preferred compensation scheme and wage endogeneity, this study showed that significant differences exist in the average utility that individuals derive from their work depending on method of pay. Investigating these differences further also revealed that incentive pay has a positive effect on the mean job satisfaction of (very) high-paid workers only. A potential explanation for this pattern could be that for lower-paid employees PRP is perceived to be controlling, whereas higher-paid employees derive a utility benefit from what they perceive as supportive reward schemes. Using performance pay as an incentive device in the UK could therefore prove to be counterproductive in the long run for certain low-paid occupations.


Figure 1 Satisfaction by method of pay
Percent
50
40
30
20
10
0
1
2
3
4
5
6
7
Satisfaction level
PRP
Other

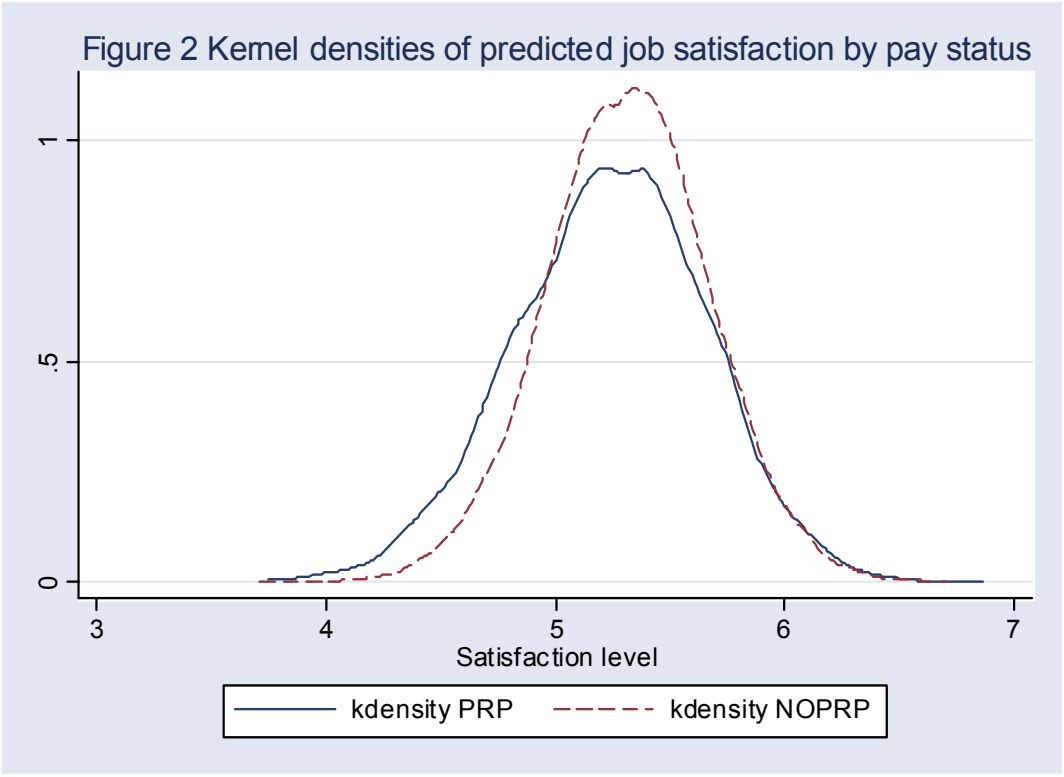


Figure 2 Kernel densities of predicted job satisfaction by pay status
1
.5
0
3
4
5
6
7
Satisfaction level
kdensity PRP
kdensity NOPRP

Table 1 Characteristics of employees by method of pay

Characteristics (%)	PRP	Other
Male	58.5	47.1
Female	41.5	52.9
Age 17-19	3.17	3.93
Age 20-25	13.35	12.91
Age 26-35	32.29	26.95
Age 36-45	27.5	27.35
Age 46-55	18.32	20.95
Age 56-65	5.37	7.91
Union	55.33	48.77
No Union	44.67	51.23
Promotion	67.06	47.49
No promotion	32.94	52.51
Wage rise	51.21	45.16
No Wage rise	48.79	54.84
Full-time	90.01	78.7
Par-time	9.99	21.3
Partner	73.65	72.07
No partner	26.35	27.93
Educ: no qualifications	7.71	13.17
Educ: O-level	27.12	28.23
Educ: A-level	16.2	13.04
Educ: Other higher	28.07	27.56
Educ: First/Higher	20.91	18.01
Contract: permanent	98.29	93.74
Contract: non-permanent	1.71	6.26
Size: 1-24	24.64	36.92
Size: 25-99	23.54	25.21
Size: 100-499	28.47	21.84
Size: 500+	23.35	16.03
Sector: private	78.02	67.88
Sector: Civil Service	11.59	2.5
Sector: Local Govt	5.74	16.03
Sector: NHS/Higher education	1.5	8.56
Sector: non-profit organisations	1.25	3.6
Sector: other	1.9	1.43
Occupation: Managers and Administrators	22.11	12.12
Occupation: Professional Occupations	8.91	10.15
Occupation: Associate professional and Technical	10.83	11.54
Occupation: Clerical and Secretarial	22.34	17.66
Occupation: Craft and Related Occupations	10.46	10.09
Occupation: Personal and Protective Service	3.38	12.48
Occupation: Sales	8.7	7.46
Occupation: Plant and machine Operatives	8.31	9.79
Occupation: Other	4.95	8.73

Table 2 Mean reported job satisfaction scores by method of pay

Characteristics	PRP	Other
Male	5.20(1.28)	5.20(1.33)
Female	5.32(1.30)	5.47(1.26)
Age 17-19	5.36(1.33)	5.41(1.31)
Age 20-25	5.17(1.38)	5.24(1.33)
Age 26-35	5.27(1.24)	5.31(1.28)
Age 36-45	5.25(1.29)	5.32(1.30)
Age 46-55	5.24(1.31)	5.37(1.30)
Age 56-65	5.33(1.28)	5.55(1.26)
Union	5.19(1.30)	5.29(1.29)
No Union	5.31(1.27)	5.38(1.31)
Promotion	5.37(1.19)	5.42(1.21)
No promotion	5.00(1.43)	5.27(1.37)
Wage rise	5.34(1.26)	5.43(1.23)
No Wage rise	5.15(1.31)	5.26(1.34)
Full-time	5.23(1.29)	5.26(1.31)
Par-time	5.38(1.26)	5.62(1.20)
Partner	5.28(1.26)	5.38(1.28)
No partner	5.18(1.36)	5.25(1.34)
Educ: no qual	5.34(1.40)	5.49(1.36)
Educ: O-level	5.30(1.30)	5.39(1.29)
Educ: A-level	5.13(1.32)	5.31(1.25)
Educ: Other higher	5.23(1.25)	5.33(1.28)
Educ: First/Higher	5.26(1.27)	5.20(1.30)
Contract: permanent	5.25(1.29)	5.36(1.29)
Contract: non-permanent	5.14(1.34)	5.12(1.39)
Size: 1-24	5.34(1.27)	5.47(1.27)
Size: 25-99	5.24(1.35)	5.33(1.29)
Size: 100-499	5.21(1.27)	5.21(1.31)
Size: 500+	5.23(1.26)	5.24(1.30)
Sector: private	5.25(1.28)	5.31(1.32)
Sector: Civil Service	5.19(1.26)	5.19(1.34)
Sector: Local Govt	5.33(1.36)	5.43(1.24)
Sector: NHS/Higher education	5.58(1.22)	5.44(1.18)
Sector: non-profit orgs	4.92(1.54)	5.53(1.20)
Sector: other	5.23(1.46)	5.23(1.47)

Notes: Standard deviations in parenthesis.

Table 3 IV Estimates of Job Satisfaction by Pay Status

	PRP		Other	
	Coef.	Std.Error	Coef.	Std.Error
Personal/Job vars				
LNPAY	0.398	(0.284)	0.182	(0.152)
AGE	-0.035	(0.020)	-0.025	(0.009)**
AGESQUARE/1000	0.429	(0.230)*	0.341	(0.101)***
SEX	-0.134	(0.057)**	-0.160	(0.030)***
HOURS	0.000	(0.004)	-0.003	(0.001)
UNION	-0.093	(0.069)	-0.163	(0.022)***
PERMANENT	0.094	(0.218)	0.034	(0.043)
PROMOTION	0.304	(0.068)***	0.179	(0.018)***
TRAVELTIME	0.000	(0.001)	-0.002	(0.001)**
PARTNER	0.087	(0.046)	0.049	(0.019)**
PAY RISE	0.155	(0.042)***	0.105	(0.016)***
SECOND JOB	-0.081	(0.075)	0.019	(0.026)
FULL TIME	-0.129	(0.087)	-0.156	(0.036)***
Human Capital				
O-LEVELS	-0.080	(0.083)	-0.111	(0.031)***
A-LEVELS	-0.271	(0.100)**	-0.166	(0.038)***
OTHER HIGHER	-0.236	(0.096)**	-0.176	(0.041)***
FIRST/HIGHER	-0.400	(0.143)**	-0.355	(0.066)***
Firm Size				
25-99	-0.050	(0.058)	-0.097	(0.022)***
100-499	-0.069	(0.064)	-0.163	(0.026)***
500+	-0.078	(0.080)	-0.172	(0.032)***
Sector				
CIVIL SRV	-0.055	(0.202)	-0.262	(0.078)***
LOCAL GOVT	-0.154	(0.174)	0.031	(0.042)
NHS/HIGHER EDU	-0.101	(0.306)	0.115	(0.052)*
OTHER	0.006	(0.149)	-0.021	(0.069)
NON-PROFIT ORGS	-0.332	(0.230)	0.136	(0.046)**
Health				
EXCELLENT	0.563	(0.322)*	0.572	(0.125)***
GOOD	0.370	(0.323)	0.457	(0.124)***
FAIR	0.240	(0.321)	0.310	(0.124)**
POOR	0.316	(0.324)	0.192	(0.128)
MILLS	0.206	(0.338)	0.406	(0.145)**
WAVE 2	-0.046	(0.047)	0.008	(0.024)
WAVE3	-0.009	(0.069)	-0.009	(0.024)
WAVE 4	-0.033	(0.076)	0.010	(0.024)
CONSTANT	-0.986	(1.007)	0.141	(0.188)
N(CLUSTER)	3558(2173)		17503(7764)	
F(60, CLUSTER)	2.750***		6.600***	
1ST STAGE F(4, CLUSTER)	17.71***		38.70***	
Hansen J stat $\chi^2(3)$	1.985		0.985	

Notes: Standard errors robust to arbitrary heteroscedasticity and the repeat sampling of individuals over time, bootstrapped to 1000 replications; * significant at 10%; ** significant at 5%; *** significant at 1%; All regressions include controls for region (11), occupation (9) and industry (10); *Reference groups*: human capital: no educational qualifications; firm size: 1-24; sector: private; health: very poor; wave: 1998.

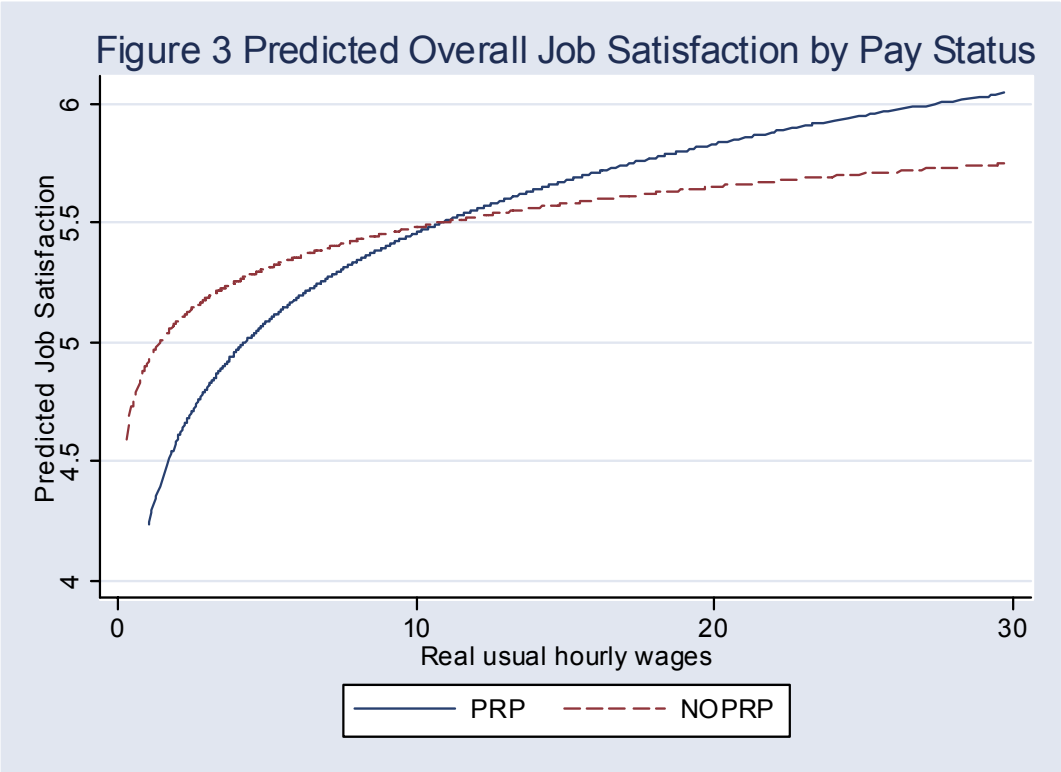
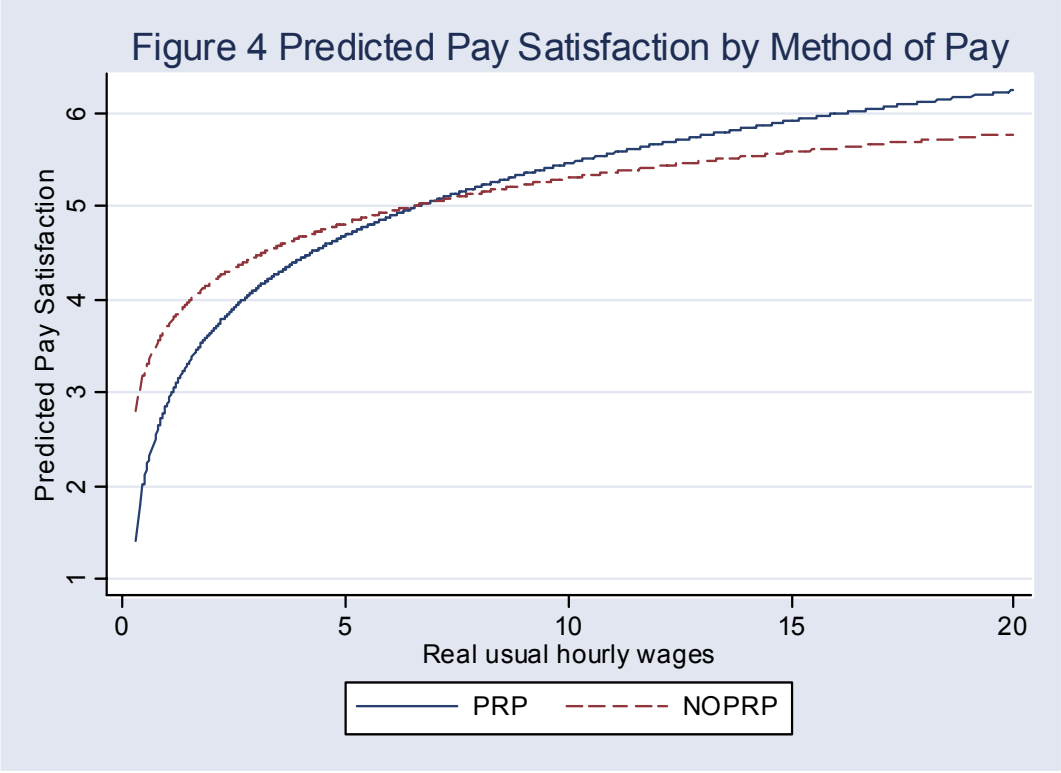


TABLE 4 IV Estimates of Pay Satisfaction by Method of Pay

	PRP		Other	
	Coef.	Std.Error	Coef.	Std.Error
LNPAY	0.684	(0.262)***	0.423	(0.176)***
MILLS	-0.517	(0.314)	0.583	(0.162)***
1ST STAGE F(4,CLUSTER)	17.68***		38.58***	
Hansen J Stat $\chi^2(3)$	3.714		1.561	

Notes: Standard errors robust to arbitrary heteroscedasticity and the repeat sampling of individuals over time; *** significant at 1%; All regressions include controls for region (11), occupation (9) and industry (10); The complete regression output is available from the authors upon request.



APPENDIX

Table A1 Selection probit equation of performance pay

	Coef.	Std.Error	Marginal Effect
Identifying variables			
4-5 CD's	0.227	(0.077)***	0.053
6-7 CD's	0.177	(0.078)**	0.040
SPPT	-0.098	(0.041)**	-0.021
CAROWN	0.119	(0.038)***	0.030
Personal/Job vars			
AGE	0.007	(0.009)	0.001
AGESQUARE/1000	-0.114	(0.112)	-0.016
SEX	0.027	(0.036)	0.011
HOURS	0.005	(0.002)**	0.000
UNION	0.231	(0.034)***	0.049
PERMANENT	0.512	(0.079)***	0.083
PROMOTION	0.218	(0.028)***	0.047
TRAVELTIME	0.001	(0.001)	0.000
PARTNER	0.069	(0.035)*	0.014
PAY RISE	0.073	(0.028)***	0.016
SECOND JOB	-0.038	(0.049)	-0.009
FULL TIME	0.114	(0.065)*	0.025
Human Capital			
O-LEVELS	0.079	(0.055)	0.018
A-LEVELS	0.129	(0.062)**	0.031
OTHER HIGHER	0.077	(0.057)	0.018
FIRST/HIGHER	0.186	(0.065)***	0.047
Firm Size			
25-99	0.127	(0.037)***	0.029
100-499	0.180	(0.039)***	0.042
500+	0.272	(0.045)***	0.065
Sector			
CIVIL SRV	0.767	(0.074)***	0.226
LOCAL GOVT	-0.491	(0.072)***	-0.087
NHS/HIGHER EDU	-0.923	(0.100)***	-0.125
OTHER	0.090	(0.102)	0.020
NON-PROFIT ORGS	-0.494	(0.118)***	-0.081
Health			
EXCELLENT	0.057	(0.145)	0.006
GOOD	-0.033	(0.143)	-0.012
FAIR	0.014	(0.144)	-0.002
POOR	-0.041	(0.146)	-0.016
WAVE 2	0.004	(0.028)	
WAVE3	-0.173	(0.030)***	
WAVE 4	-0.186	(0.031)***	
CONSTANT	-2.403	(0.295)***	
N	21293		

$\chi^2(62)$	2546.710***
Pseudo R^2	0.133

Notes: Standard errors robust to arbitrary heteroscedasticity and the repeat sampling of individuals over time; * significant at 10%; ** significant at 5%; *** significant at 1%; All regressions include controls for region (11), occupation (9) and industry (10); *Reference groups*: identifying variables: less than 3 CD's; human capital: no educational qualifications; firm size: 1-24; sector: private; health: very poor; wave: 1998; Test of the joint insignificance of the selection variables (H_o: Z=0): χ^2 (4) = 25.7***; Test of the joint insignificance of the selection variables in an overall job satisfaction equation: F(4, 8468) = 0.96.

TABLE A2 VARIABLE CODES WITH DESCRIPTION

Variable	Description
Dependent variables	
OVERALL JS	= respondent satisfaction rating with overall job (1 = 'not satisfied at all', 7 = 'completely satisfied')
PAY	= respondent satisfaction rating of following facet of present job: total pay (including overtime and bonuses)
Identifying variables	
SPPT	= 1, if spouse works 1-30 hours, 0 otherwise
CDINDX	= 0-7 index describing possession of consumer durables (CD's) in household (CD's = colour tv, vcr, washing machine, dish washer, home PC, cd player microwave oven - 0 implies no CD's; 7 implies possession of all CD's)
Cdindx: <3 CD's	=1, if possession of less than 3 CD's, 0 otherwise (omitted)
Cdindx: 4-5 CD's	=1, if possession of four or five CD's, 0 otherwise
Cdindx: 6-7 CD's	=1. if possession of six or seven CD's, 0 otherwise
CAROWN	=1, if household vehicle is owned by the company, 0 otherwise
Job and Personal Variables	
PRP	=1, if in receipt of performance-related pay, 0 otherwise
Ln(PAY)	= natural log of real usual hourly wage with overtime weighted at 1.3
AGE	= age of respondent at date of interview
AGESQUARE	= age squared
SEX	=1, if gender is male, 0 otherwise
HOURS	= number of hours normally worked per week
UNION	=1, if union or staff association represents worker at workplace, 0 otherwise
PERMANENT	=1, if contract is permanent, 0 otherwise
PROMOTION	=1, if current job has opportunities for promotion, 0 otherwise
TRAVELTIME	= minutes spent travelling to work
PARTNER	=1, if married or living as couple, 0 otherwise
PAY RISE	=1, if wage rises on incremental scale, 0 otherwise
SECOND JOB	=1, if respondent has second job, 0 otherwise
FULL TIME	=1, if respondent works full-time, 0 otherwise
Human Capital	
NO QUALIFICATIONS	=1, if no educational qualifications, 0 otherwise (omitted)
O-LEVELS	=1, if highest educational qualification is O-levels or equivalent, 0 otherwise
A-LEVELS	=1, if highest educational qualification is A-levels or equivalent, 0 otherwise
OTHER HIGHER	=1, if highest educational qualification is nursing or other higher qualifications
FIRST/HIGHER	=1, if highest educational qualification is teaching qualifications or a first or higher degree, 0 otherwise
Firm Size	
1-24	=1, if respondent works in 1-24 size plant, 0 otherwise (omitted)
25-99	=1, if respondent works in 25-99 size plant, 0 otherwise
100-499	=1, if respondent works in 100-499 size plant, 0 otherwise
500+	=1, if respondent works in 500+ size plant, 0 otherwise
Sector	
PRIVATE FIRM	=1, if employing organization is private firm/company, 0 otherwise (omitted)

CIVIL SRV	=1, if employing organization is civil service or central government, 0 otherwise
LOCAL GOVT	=1, if employing organization is local government/town hall, 0 otherwise
NHS/HIGHER EDU	=1, if employing organization is NHS or higher education, 0 otherwise
OTHER	=1, if employing organization is nationalised industry or other sector, 0 otherwise
NON-PROFIT ORGS	=1, if employing organization is non-profit organization, 0 otherwise
Health	
EXCELLENT	=1, if health over the last twelve months has been excellent compared to people of own age, 0 otherwise
GOOD	=1, if health over the last twelve months has been good compared to people of own age, 0 otherwise
FAIR	=1, if health over the last twelve months has been fair compared to people of own age, 0 otherwise
POOR	=1, if health over the last twelve months has been poor compared to people of own age, 0 otherwise
VERY POOR	=1, if health over the last twelve months has been very poor compared to people of own age, 0 otherwise (omitted)
REGION	= a set of 11 dummies for region, coded according to the Government Office Regions classification, taking the value 1 if the respondent lives in the region and 0 otherwise. The regions are: London, South East, South West, East Anglia, North West, North East, Yorkshire and Humber, East Midlands, West Midlands, Wales, Scotland (omitted: London)
INDUSTRY	= a set of 10 dummies for one-digit industry, taking the value 1 if the respondent's job belongs to the corresponding industry classification, 0 otherwise. The one-digit industries include: Agriculture, Forestry and Fishing (omitted); Energy and Water Supply Industries; Extraction of Minerals and Ores other than fuels, Manufacture of Metals, Mineral products and Chemicals; Metal Goods, Engineering and Vehicles Industries; Other Manufacturing Industries; Construction; Distribution, Hotels and Catering, Repairs; Transport and Communication; Banking, Finance, Insurance, Business Services and Leasing; Other Services.
OCCUPATION	= a set of 9 dummies for one-digit occupation, taking the value 1 if the respondent's job belongs to the corresponding occupational classification, 0 otherwise. The one-digit occupations include: Managers & administrators; Professional occupations; Associate professional & technical occupations; Clerical & secretarial occupations; Craft & related occupations; Personal & protective service occupations; Sales occupations; Plant & machine operatives; Other occupations (omitted: managers and administrators).
WAVE	= a set of four dummies taking the value 1 for observations that belong to the corresponding wave of the BHPS, 0 otherwise. Years of sample include: 1998, 1999, 2000, and 2001 (omitted category: 1998).

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