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# Do Temporary Agency Workers Affect Workplace Performance?

Alex Bryson<sup>†</sup>

## Abstract

Using nationally representative workplace data we find the use of temporary agency workers (TAW) is positively associated with financial performance in the British private sector and weakly associated with higher sales per employee. However TAW is not associated with value added per employee. Employees in workplaces with TAW receive higher wages than observationally equivalent employees in non-TAW workplaces. But the presence of TAW in the employee's occupation is associated with lower wages for employees in that occupation. Furthermore, conditioning on wages, the presence of TAW at the workplace is associated with lower job satisfaction and higher job anxiety among employees. These findings are consistent with TAW having an adverse effect on employees' experiences at work, perhaps due a more labour intensive regime, one which is only partly compensated for with higher wages.

Key words: temporary agency workers; labour productivity; financial performance

JEL classification: J50, L22, L23, L24

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## **I. Introduction**

According to the *Financial Times* “sub-contracting as many non-core activities as possible is a central element of the new economy” (31<sup>st</sup> July 2001, page 10). Inter alia this has entailed rapid growth in temporary agency working over the last two decades in Britain (Millward et al., 2000: 47; Heywood et al., 2006; Forde and Slater, 2005), as it has in the United States (Segal and Sullivan, 1997).<sup>1</sup> Today there are well over one-quarter of a million temporary agency workers (TAW) in Britain accounting for over 1 percent of the total workforce. According to the workplace-based data used in this paper, by 2004 10 percent of private sector workplaces were using TAW. In 7 percent of private sector workplaces (70 percent of workplaces using any TAW), TAW were equivalent to 5 percent or more of employees at the workplace. Yet there is very little evidence on the links between TAW and workplace financial performance and labour productivity. This paper fills this gap in the literature using nationally representative workplace and employee data for Britain, the biggest user of TAW in Europe (European Foundation, 2006).

The paper is organised in the following way. Section II discusses the theoretical and empirical literature on the links between TAW and workplace productivity and performance. Section III introduces the data and outlines the estimation strategy. Section IV presents results and Section V discusses the implications of the findings and concludes.

## **II. Use of TAW and Workplace Performance**

Commentators and academics identify four broad reasons for TAW usage which imply financial gains to firms. First, TAW are viewed as a cost-cutting device since TAW

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<sup>1</sup> For reviews of the reasons for the growth in temporary agency working see Forde and Slater (2005) and Forde (2008).

receive lower wages than their employee counterparts (Forde and Slater, 2006; Autor and Houseman, 2005) and, until recently, employers using TAW were not obliged to extend employees' non-wage benefits such as pensions to them, thus potentially foregoing substantial non-wage labour costs where they substitute for employees.<sup>2</sup> Houseman et al. (2003) showed for the USA that TAW depress wage increases among employees when labour markets are tight. However, employers must pay agency fees. These can be substantial, mitigating any savings made in wage and non-wage benefits (Houseman, 2001).

Second, TAW can be deployed quickly to meet fluctuations in product or service demand. The costs of firing TAW are minimal in Britain offering employers opportunities to 'buffer' themselves when faced with market uncertainty arising from factors such as turbulent market conditions, intensifying market competition and uncertainties surrounding the success of new products and services. In this sense, TAW offer labour flexibility – often termed 'external' flexibility since it allows employers to adjust the amount of labour they use to market needs relatively quickly and cheaply without affecting the employment status of permanent 'core' employees (Houseman et al., 2003; Atkinson, 1984). Thus this second rationale is linked to the first of cost minimisation.

Third, TAW are used as 'cover' or 'fill in' for short to medium-term absence arising from maternity and paternity leave, sickness and illness and the like. TAW can thus contribute to the smooth-running of the workplace by maintaining uninterrupted production or provision of services when employees are temporarily absent. The continuity this brings allows customers to be served and machinery to continue in operation when the absence of TAW might otherwise have resulted in temporary closure or operating below capacity.

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<sup>2</sup> This is not the case in all EU states (TUC, 2005) and the situation changed in the UK on 1st October 2011 when the Agency Workers Regulations 2010 came into force. After 12 weeks in a given job an agency worker

Fourth, the optimal mix of skills at the workplace may shift in ways that make it uneconomic to retain or recruit groups of workers on permanent contracts, but whose deployment is economically viable on a temporary basis. Thus TAW are used for specialist skills not normally available among employees. Under this scenario it would not be surprising to find highly skilled TAW, including ‘knowledge workers’, offering skills that complement those of permanent employees.

TAW might also have a positive effect on labour productivity. This may occur if TAW are potential substitutes for existing employees, thus threatening permanent employees’ job security and acting as a spur to improve incumbents’ performance. Alternatively, TAW may complement employees’ skills in a productivity-enhancing fashion. For instance, during times of demand uncertainty they may ‘buffer’ employees thus allowing them to concentrate efficiently on core activities. More generally, firms may raise the average productivity of the firm when they concentrate on core activities where they have a comparative advantage, contracting out those aspects of their work where they operate less efficiently - what Amiti and Wei (2006) describe as a productivity gain arising from compositional change in the workforce. Employers may also use TAW as a pool from which to draw their employees, whereupon TAW can help them manage the risk of making permanent offers by screening TAW to ensure suitable job matches (Autor, 2001).

TAW can also militate against good workplace performance. TAW may be less productive than their employee counterparts if, as some have argued, they are less committed to the firm, have lower job satisfaction, or take time to acquire the firm-specific skills required by the employer. TAW may have unintended negative spill-over effects on employees, as might occur where employee job insecurity arising from TAW leads to

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is entitled to equal treatment with respect to basic working and employment conditions that would apply to a

employee unrest or dissatisfaction. A TAW-based strategy geared towards numerical flexibility may militate against a strategy based on functional flexibility, or result in a reduction in innovative capacity, as Hempell and Zwick (2005) found in Germany.

Even if the labour productivity effects of TAW are benign or positive, any productivity benefits may be outweighed by the cost of using them. This might happen if, for example, the start-up costs of training TAW outweigh the productivity benefits, or if TAW are actually paid more than incumbent employees because the demand for specialist TAW means their spot-market price is higher than the wages set for like permanent employees.

There is very little evidence on the effects of TAW on workplace performance and productivity. Instead the literature is dominated by papers that consider the effects of numerical and functional flexibility on performance. These studies tend to define numerical flexibility in a variety of ways but the broad consensus is that numerical flexibility is associated with poorer performance whereas functional flexibility is associated with better performance.<sup>3</sup> Some studies point to positive productivity effects of contracting out (Siegel, 1995; ten Raa and Wolff, 2001). Amiti and Wei (2006) suggest that off-shoring (sourcing service inputs from overseas suppliers) increased labour productivity in the US manufacturing sector over the period 1992-2000.<sup>4</sup> Using data on UK manufacturing plants for the period 1980-1992 Girma and Gorg (2004) find that an establishment's outsourcing intensity is positively related to its labour productivity and total factor productivity growth, and this effect is more pronounced for foreign establishments.

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worker recruited directly by the employer to occupy the same job.

<sup>3</sup> This is the case with respect to productivity in Britain (Michie and Sheehan, 1999, 2001) and the USA (Chadwick and Cappelli, 2002).

<sup>4</sup> There is growing evidence that productivity growth in the US manufacturing sector has been over-estimated due to the outsourcing of labour to temporary agency firms (Dey, Houseman and Polivka, 2006; Houseman, 2006).

Very few studies deal directly with the effects of TAW because data on TAW use is absent from most data sets. Those studies that do consider TAW effects find mixed results. Kleinknecht et al. (2006) find different effects of the percentage of hours worked by TAW on sales growth according to the presence of R&D at the enterprise. It seems that, in their Dutch data, the higher usage of TAW is positively associated with sales growth in enterprises with R&D but negatively associated with sales growth where the enterprise has no R&D activities. The authors speculate that innovative R&D firms were using TAW to complement existing employees in a growth strategy whereas non-innovative firms without R&D were downsizing, substituting TAW for employees. Functional flexibility, on the other hand, is positively associated with both employment and sales growth. Arvanitis (2005) finds the use of temporary workers has no significant effect on the sales per employee of Swiss firms, nor on the introduction of process innovations. However, it did appear to be associated with the introduction of product innovations. Using panel data for German manufacturing firms Nielen and Schiersch (2011) find a u-shaped relationship between a proxy for TAW as a percentage of total employment at the firm and firm competitiveness measured in terms of unit labour costs.

### **III. Data and Estimation Techniques**

The data are the 1998 and 2004 Workplace Employment Relations Surveys (WERS 2004). The analysis exploits four elements of the survey. The first is the 2004 management interview, conducted face-to-face with the most senior workplace manager responsible for employee relations. The response rate was 64%. This was linked to the second element, the Financial Performance Questionnaire (FPQ), a short paper questionnaire completed by the individual responsible for financial matters at the workplace (response rate 47%). Our cross-

sectional analyses of workplace performance are confined to the sub-sample of workplaces with valid FPQ data. The third element was a panel survey of workplaces initially interviewed in 1998. A random sub-set of these workplaces were re-interviewed in 2004 permitting analyses of the links between TAW usage in 1998 and subsequent financial performance (response rate 80%). The fourth and final element was an employee survey based on a self-completion questionnaire distributed to a randomly selected set of employees at the workplaces interviewed for the 2004 cross-sectional survey. (In the case of workplaces with fewer than 26 employees, all employees were surveyed). The overall response rate for the employee questionnaire was 61%.<sup>5</sup> Analyses of employees' wages and wellbeing offer insights into the mechanisms linking TAW with workplace performance.

The estimating sub-sample is all private sector workplaces with complete information on the variables used in the analysis. The estimating sub-sample for the employee-level analysis is the employees surveyed in private sector workplaces in 2004. All models are run with sampling weights that are the inverse of the probability of sample selection. The weights for the FPQ productivity models and the employee wage and worker wellbeing models also adjust for non-response to the FPQ and employee questionnaires respectively.<sup>6</sup> A robust estimator is used to account for heteroskedasticity.

Three measures of labour productivity are analysed. The first is taken from HR managers' responses to the question: 'Compared with other establishments in the same industry, how would you assess your workplace's labour productivity?' We run probit analyses for a dummy variable where workplaces answering 'a lot better than average' score "1" and zero otherwise. Seven percent of the survey-weighted estimation sample scored 1 on this dummy.

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<sup>5</sup> For full details of the survey see Kersley et al. (2006) and Chaplin et al. (2005).



Subjective measures of productivity dominate the British literature but there is some debate about the properties of these data and their value in estimating influences on productivity compared with accounting-type data.<sup>7</sup> We therefore also run analyses on two accounting measures collected for the first time in WERS using the FPQ.<sup>8</sup> The first is the log of gross output per worker (sometimes referred to as ‘average labour productivity’) and is derived by dividing total employment at the workplace into the total value of sales of goods and services over the past year. The second measure is the log of gross value-added per worker and is derived by subtracting the total value of purchases of goods, materials and services from total sales, and then dividing this figure by total employment.<sup>9</sup> Both accounting measures of productivity are estimated using ordinary least squares. Final estimation samples exclude those with missing data and some with outlier values on dependent variables.<sup>10</sup>

Sales per employee and value added per employee are highly correlated with one another. However, the subjective measure of productivity relative to the industry average is not strongly correlated with the accounting measures, suggesting that it contains different information from the other two dependent variables (Forth and McNabb, 2007).

Cross-sectional analyses of workplace financial performance estimate effects on HR managers’ responses to the question: ‘Compared with other establishments in the same

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<sup>6</sup> For full details see Chaplin et al. (2005).

<sup>7</sup> See Kersley et al. (2006: 287-289) and Forth and McNabb (2007).

<sup>8</sup> A copy of the FPQ questionnaire can be downloaded at:  
<http://www.wers2004.info/wers2004/crosssection.php#fpq>.

<sup>9</sup> The mean for log sales per employee was 4.107 with a standard error of 0.072. In deriving logged value added per employee for estimation a constant was added to push the whole distribution above zero. The mean was 6.497 with a standard error of 0.0038.

<sup>10</sup> Most of the data provided related to an accounting period ending in 2004, the remainder providing data for a period ending in 2003. Where data did not relate to a full calendar year it was adjusted accordingly. Workplaces with values below the 2.5<sup>th</sup> percentile and above the 97.5<sup>th</sup> percentiles of the productivity distributions were classified as outliers and removed from the analyses.

industry, how would you assess your workplace's financial performance?' We run probit analyses for a dummy variable where workplaces answering 'a lot better than average' score "1" and zero otherwise. Twelve percent of the survey-weighted workplaces scored 1 on this variable. This is supplemented with a panel analysis of changes in workplace financial performance over the period 1998-2004. Using workplace-level predictors collected in the 1998 survey we estimate probit models for a dummy variable identifying those workplaces where the manager believed the workplace's performance was better than the trend for the industry.<sup>11</sup> Forty-seven percent of weighted panel survey workplaces scored 1 on this variable. We were unable to conduct difference estimators or workplace fixed effects models because we lack an identical dependent variable in both years.

In the employee-level cross-sectional analysis for 2004 we focus on four outcomes: wages, perceptions of hard work, job satisfaction, and job anxiety. As noted in Section II, TAW may lower overall labour costs at the workplace, or exert downward pressure on permanent employees' wages through a wage disciplining effect, as may occur where TAW are credible substitutes for permanent employees. Alternatively, employees' wages may rise in the presence of TAW for a variety of reasons. For instance, employees in TAW workplaces may be offered efficiency wages, akin to a compensating wage differential, for working in a

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<sup>11</sup> Managers were asked "Generally speaking, in establishments in your industry or field has the financial performance...improved, stayed the same, or deteriorated since 1998?" Depending on the response to this question managers were then asked one of three questions. Those who thought industry performance had improved were asked "would you say that, compared with the improvement in the average financial performance of establishments in your industry or field, your own establishment has improved at a faster rate, improved at a similar rate, improved at a slower rate, remained static or actually deteriorated?" Those saying industry performance had remained more or less the same were asked "would you say that compared with the stability in the average financial performance of establishments in your industry or field your own workplaces has...improved, remained stable like the rest of the industry, actually deteriorated?" Those saying industry financial performance had deteriorated were asked "would you say that compared with the deterioration in the average performance of establishments in your industry or field, the financial performance of your own workplaces has actually improved, remained stable, deteriorated at the same rate as the rest of the industry, or deteriorated at a faster rate than the rest of the industry?" Where managers rated their own workplace's performance as better than the trend in the industry they scored "1" on the dummy variable, zero otherwise. There are no panel data items allowing us to track labour productivity over time.

high-effort environment. Alternatively, employees may extract a wage premium if they are complements to TAW and are thus able to bargain over the additional rents accruing through the deployment of TAW. If TAW results in labour intensification for employees this may be apparent in subjective wellbeing measures and perceptions of how hard they are required to work, while the perception that TAW threaten job security should directly affect satisfaction with job security. We explore these avenues by incorporating measures of TAW at workplace and occupation level in employee-level analyses. (Full descriptions of the dependent variables are presented in the results section).

We use three TAW measures. The first is a dummy (0,1) variable identifying the presence of any TAW at the workplace. Fourteen percent of the estimation sample scored 1 on this dummy variable in survey weighted data. The second is a set of dummy variables identifying the presence of any TAW in each of the (up to) nine single-digit occupations in the workplace. The third TAW measure is a dummy (0,1) used in the employee analysis to identify whether or not the occupation that the employee works in at the workplace contains any TAW.<sup>12</sup> All control variables are reported in the footnotes below the results tables.

The causal impact of TAW on productivity and performance is difficult to identify due to the potential endogeneity of TAW that arises from the non-random usage of TAW by workplaces. It is possible that high performing workplaces may be the most likely to use TAW. Alternatively, low performing firms may be most likely to use TAW if, for example, they resort to it as a means of overcoming short-term financial constraints on recruiting employees or as a means of cost-cutting, both of which are identified among the reasons for using TAW above. In both cases estimates of TAW effects on performance will suffer from

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<sup>12</sup> This variable is constructed by linking management level data on the incidence of TAW at the workplace in each single digit occupation to the occupational classification of employees collected in the employee questionnaire.

biases induced by reverse causation. We use various strategies to help tackle this issue. First, we present panel estimates which condition on initial financial performance and other baseline predictors when estimating TAW effects on establishment financial performance relative to the industry trend. Second, in our cross-sectional estimates we account for the initial performance of the workplace by conditioning on the trend in employment at the workplace over the previous year. Finally, we explore possible mechanisms by which TAW may influence workplace financial performance by examining their effects on employee wages, hard work, and wellbeing.

#### **IV. Results**

Table 1 reports results for the three measures of labour productivity and the single measure of financial performance described above. The models contain baseline controls described in footnote 3 to the table. The model fit statistics indicate that the models perform well in accounting for a sizeable degree of variance in these outcomes. The model of sales per employee accounts for almost half the variance among private sector workplaces, while the value-added per employee model accounts for around one-quarter of the variance. The presence of TAW at the workplace is not significantly associated with labour productivity, although its positive association with sales per employee is on the margins of statistical significance. However, TAW is positively associated with workplace financial performance. In the absence of controls, the raw coefficient is 0.48 ( $t=1.79$ ). The coefficient rises to 0.71 when controlling for other factors, and is more precisely estimated ( $t=2.27$ ). The effect is quite large: the average marginal effect of moving from no TAW to TAW is to increase the probability of having financial performance that is a lot better than the industry average by 11 percent.

[INSERT TABLE 1 ABOUT HERE]

In financial performance models replacing the TAW dummy with dummies identifying the presence of TAW in each occupation (the six lower occupations plus a single dummy for the top three occupations), the dummies are jointly statistically significant at a 90 percent confidence level. TAW in skilled trades and personal services are positively significantly associated with financial performance a lot better than the industry average.<sup>13</sup>

The association between TAW and improved financial performance is also apparent in the panel of workplaces followed up between 1998 and 2004. The percentage of managers who believed the workplace's performance was better than the trend for the industry over the period 1998-2004 was 54 percent among those with TAW in 1998, compared with 44 percent among those with no TAW in 1998. This effect is apparent having controlled for workplace characteristics (coefficient 0.49,  $t=2.30$ ).<sup>14</sup> Once again, the marginal effect of moving from no TAW to TAW is substantial (17 percent) and statistically significant. Replacing the TAW dummy with dummies for the presence of TAW in nine single-digit occupations reveals that they are jointly statistically significant in the model ( $p=0.032$ ). The presence of TAW in two occupations (sales and unskilled operatives) was positively and significantly associated with improved financial performance relative to the industry's trend performance.

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<sup>13</sup> Full models are available from the author on request.

<sup>14</sup> The panel analyses was survey weighted and run on 544 unweighted observations. It included the following controls measured in 1998: financial performance, industry (11 dummies), establishment aged 25+ years, single-establishment firm, foreign owned, total number of employees, union recognition. These variables were jointly significant ( $p=0.024$ ).

To explore possible mechanisms by which TAW may positively affect workplace financial performance we turn to the 2004 employee survey which is linked to the workplace data. We find that the presence of TAW at a workplace has a substantial impact on employees' experiences at the workplace. Results are presented in Table 2.

[INSERT TABLE 2 ABOUT HERE]

We find the presence of TAW at the workplace and the presence of TAW in the employee's own occupation within a workplace are not associated with employees' responses to the question "My job requires that I work very hard" (Model (1)). This suggests that there may be no direct impact of TAW on the intensity with which employees work, but it could also reflect the precise wording of the question which focuses on the demands of the job. However, conditioning on a range of variables including wages, the presence of TAW at the workplace is negatively associated with employees' wellbeing as indicated by lower overall job satisfaction, lower satisfaction with non-pecuniary aspects of the job, and higher job anxiety (Models (2), (3) and (4) respectively). The effect is not driven by the presence of TAW in the employee's occupation, as might be expected if employees were primarily concerned about a threat to their jobs arising from substitution by TAW. Instead, it's the presence of any TAW at the workplace that matters. Finally, log wage regressions indicate a wage premium for employees associated with the presence of TAW of around 9 percent. However, in the case of employees with TAW in their occupation, this is offset by a wage penalty of around 5 percent.

## V. Conclusions

Using nationally representative workplace data for Britain we find the use of temporary agency workers (TAW) is positively associated with financial performance in the British private sector. The association between TAW and improved financial performance is apparent in both cross-sectional and panel data. The effects are quantitatively quite substantial. However, TAW is only very weakly associated with higher sales per employee and it is not associated with value added per employee. Nor is it associated with how hard employees in TAW workplaces say they have to work.

Analyses of employee data provide clues as to the mechanism by which TAW affects financial performance. The presence of TAW at the workplace is negatively associated with employees' wellbeing. The effect is not driven by the presence of TAW in the employee's occupation, as might be expected if employees were primarily concerned about a threat to their jobs arising from substitution by TAW. Instead, it's the presence of any TAW at the workplace that matters. One possible interpretation of these results is that workplace regimes which harbour any TAW are more labour intensive and perhaps more cost conscious than workplace regimes which do not resort to TAW. If so the TAW effect could be picking up a labour intensification effect which operates at the level of the whole workplace.

We also find a wage premium of 9 percent for employees associated with the presence of TAW. However, in the case of employees with TAW in their occupation, this is partly offset by a wage penalty of around 5 percent. Thus it would appear that the presence of TAW in one's occupation may exert downward wage pressure on the wages paid to employees in that occupation, resulting in cost savings for the employer. The wage premium attached to having any TAW at the workplace may indicate employers sharing rents with employees which accrue from the deployment of TAW. Taken together these findings are

consistent with TAW having an adverse effect on employees' experiences at work, perhaps due a more labour intensive regime, one which is only partly compensated for with higher wages. We have presented evidence to indicate that this is profitable from an employer perspective.

Despite some support for causal inferences from the panel analysis, one should be cautious in interpreting the results presented here as causal. Future research could usefully explore whether results differ using alternative identification strategies, under different economic conditions, and whether they differ according to the regulatory and institutional setting in which firms operate.



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**Table 1: Correlation between TAW incidence and workplace productivity and performance**

	(1)	(2)	(3)	(4)
	labprod	finperf	lnnte	lngvae
<i>Any TAW</i>	-0.31	0.71	0.23	0.01
	(0.89)	(2.27)**	(1.60)	(0.58)
Constant	-1.90	-1.53	4.80	6.57
	(2.16)**	(1.86)*	(12.73)***	(228.14)***
Obs	511	599	569	573
Model fit p>f	0.05	0.00	0.00	0.00
R-squared	-	-	0.48	0.27

Notes:

(1) The dependent variables and estimation techniques are as follows. LABPROD: (0, 1) dummy variable where 1=manager says labour productivity is a lot better than the industry average, zero otherwise. Probit estimator. FINPERF:(0,1) dummy variable where 1=manager says financial performance is a lot better than the industry average, zero otherwise. Probit estimator. LNTE: log sales per employee. OLS estimator. LNGVAE: log value added per employee. OLS estimator.

(2) T-stats are in parentheses. \*=significant at a 90% confidence level. \*\*=significant at a 95% confidence level. \*\*\*=significant at a 99% confidence level or above.

(3) All models contain the following controls: log employment, single independent workplace, industry dummies (12), workplace aged 25+ years, if domestically owned, union recognition, core occupation dummies (8), region dummies (11); workplace employment rose in the last year; workplace employment fell over the last year.

(4) For full versions of these models are available from the author on request.

**Table 2: Correlation between TAW and employees' work experience**

	(1)	(2)	(3)	(4)	(5)
	Hard Work	Job sat.	Non-pecuniary job sat.	Job anxiety	Log wages
<i>Any TAW</i>	-0.01	-0.49	-0.46	0.44	0.09
	(0.48)	(2.64)***	(2.85)***	(2.88)***	(3.94)***
<i>TAW in own occupation</i>	-0.04	-0.05	-0.05	-0.07	-0.05
	(1.24)	(0.25)	(0.26)	(0.41)	(2.83)***
Constant	3.05	-0.51	-0.22	-8.25	1.46
	(22.08)***	(0.59)	(0.28)	(11.63)***	(13.90)***
R-squared	0.09	0.30	0.31	0.18	0.47

Notes:

- (1) N=11,412 employees in all models. All models are linear estimation with survey weights to account for probability of selection and non-response.
- (2) The dependent variables are as follows. Hard Work: (1,5): ordinal responses from "strongly disagree" to "strongly agree" in response to the statement "My job requires that I work very hard". Job satisfaction (-16,16): additive scale based on employee responses to: "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 of the job satisfaction items indicates one factor, which explains over 50 percent of variance. When combining the eight items into a single scale, we achieve a reliability statistic of 0.85, as measured by the Cronbach's alpha. 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". Higher scores denote greater satisfaction. Non-pecuniary job satisfaction (-14, 14): the same scale minus the responses on pay satisfaction. Job anxiety (-12,12): an additive scale based on responses to "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". combine the six items into a single scale. This anxiety-contentment scale has a reliability statistic of 0.85 as measured by the Cronbach's alpha. Our single summative job anxiety (JA) score rescales the five-point scores for each measure into (-2, 2) scales where '-2' is "never" and '2' is "all of the time" having reverse-coded the positive affect items such that higher scores indicate higher job anxiety. Log 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.
- (3) The following variables are common to all five models: male; disabled; white British; age (9 dummies), academic qualifications (8 dummies), union membership, hours worked, hours squared, overtime hours, supervisor, degree of job autonomy, establishment size, establishment size squared, single-establishment firm, industry (11 dummies), local unemployment rate, urban area. Models (1)-(4) condition on wages. Models (2) to (5) condition on job requiring hard work.
- (4) T-stats are in parentheses. \*=significant at a 90% confidence level. \*\*=significant at a 95% confidence level. \*\*\*=significant at a 99% confidence level or above. Standard errors are adjusted for the non-independence of employee observations arising from the workplace sampling.
- (5) For full versions of these models are available from the author on request.