

Does Employees' Subjective Wellbeing Affect Workplace Performance?

Alex Bryson (UCL, NIESR and CEP)

John Forth (NIESR) †

Lucy Stokes (NIESR)

December 2016

Abstract

This paper uses linked employer-employee data to investigate the relationship between employees' subjective well-being and workplace performance in Britain. The analyses show a clear, positive and statistically-significant relationship between the average level of job satisfaction at the workplace and workplace performance. The relationship is present in both cross-sectional and panel analyses and is robust to various estimation methods and model specifications. In contrast, we find no association between levels of job-related affect and workplace performance. Ours is the first study of its kind for Britain to use nationally-representative data and it provides novel findings regarding the importance of worker job satisfaction in explaining workplace performance. The findings suggest that there is a prima facie case for employers to maintain and raise levels of job satisfaction among their employees. They also indicate that initiatives to raise aggregate job satisfaction should feature in policy discussions around how to improve levels of productivity and growth.

Key words: subjective well being, job satisfaction, job-related affect, workplace performance; job/employee attitudes

† Corresponding author e-mail: j.forth@niesr.ac.uk. Address: National Institute of Economic and Social Research, 2 Dean Trench Street, London, SW1P 3HE.

Introduction

The term subjective well-being (SWB) refers to ‘the various evaluations, positive and negative, that people make of their lives, and the affective reactions of people to their experiences’ (OECD, 2013: 29). As implied by this definition, it is most commonly measured through self-reported evaluations of individuals’ emotional state (affect) or their level of satisfaction with different aspects of their lives. Raising levels of SWB within society is now viewed as an important target of public policy around the world (see Layard, 2011; O’Donnell et. al., 2014; Stiglitz et. al., 2009). In Britain, there is an increasing focus on its measurement and improvement at the national level (e.g. Tinkler and Hicks, 2011) and an increased interest in whether, and how, improvements in wellbeing may contribute to economic growth (O’Donnell et. al., 2014: 68). There are sound reasons to consider that it might. For instance, raising individuals’ SWB has a causal impact on their physical health (see Diener and Chan, 2011), increases their levels of creativity and problem-solving, and encourages pro-social behaviour and greater levels of engagement at work (see Lyubomirsky et al, 2005). Enhanced SWB thus has the potential to enable individuals to work harder or ‘smarter’ and, indeed, a causal link between increased wellbeing and improved productivity at the level of the individual has recently been established in laboratory experiments (Oswald *et al.*, 2015).

Nonetheless, there is no certainty that higher SWB for individual employees will translate into productivity or profitability at the level of the workplace or organisation. First, in workplaces or organisations, group dynamics come into play such that the negative feelings of one employee may spill over to others, thereby impairing the performance of the group as a whole. Second, efforts on the part of the employer to raise SWB are likely to incur some costs, and so any increased productivity may not necessarily have a positive impact on the

firm's overall financial performance. For these reasons, it is necessary to move beyond studies of individuals and to study the links between wellbeing and performance at the workplace or organisational level.

There is little empirical evidence on the relationship between employees' SWB and performance at the level of the workplace or firm, and none examining the relationship with nationally representative data for the manufacturing and service sectors. We contribute to the literature by testing whether there is a robust association between changes in employee wellbeing – aggregated to workplace level – and changes in workplace performance using nationally representative data that allow for generalisation.

Using various multivariate regression techniques, we isolate the independent relationship between SWB at the workplace and workplace performance. We find a clear, positive and statistically-significant relationship between the average level of job satisfaction at the workplace and workplace performance. This finding is present in both cross-sectional and panel analyses and is robust to various estimation methods and model specifications. In contrast, we find no association between levels of job-related affect and workplace performance. Ours is the first large-scale study of its kind for Britain and its findings regarding the importance of changes in worker job satisfaction in explaining change in workplace performance are novel. The findings are also of potential policy significance since they suggest that there is a prima facie case for employers to maintain and raise levels of job satisfaction among their employees.

Concepts and existing evidence

In employment relations and economic research, the aspect of SWB most commonly investigated is job satisfaction, capturing overall or domain-specific reactions to a job. The term derives from the Latin “satis” meaning “enough”: respondents to survey questions are being asked to assess the adequacy of their job, implicitly against some unspecified reference point such as the features of that job in a prior period, the features of jobs held by other employees, or the features of a job that the individual might ideally like. In the empirical literature, feelings of job dissatisfaction have been linked to labour market behaviours, notably quits (Freeman, 1978; Freeman and Medoff, 1984; Clark et al., 1998; Clark, 2001; Green, 2010).

Recently analysts have responded to psychologists’ criticism that studies have focused unduly on job satisfaction to the exclusion of other aspects of SWB. These analysts have been influenced by work which maps SWB along two dimensions: positive versus negative affect (indicating the degree of pleasure or displeasure) and high versus low mental arousal (indicating the extent of mental activation) (Russell, 1980, 1983; Warr, 2007; Warr et al., 2013). Two axes of SWB can thus be distinguished. The first is the anxiety-contentment axis, where anxiety is characterised by the combination of high activation and negative affect and contentment by the combination of low activation and positive affect. The second is the depression-enthusiasm axis, where the former is characterised by low activation and negative affect, and the latter by high activation and positive affect..

In his study of job quits, Green (2010) incorporates these scales alongside job satisfaction. Although he finds some evidence that the other dimensions of SWB are predictive of quits, he finds job (dis)satisfaction is a better predictor. He argues that this is because job satisfaction “implicitly captures well-being relative to outside job opportunities” (2010: 897),

mirroring observations previously made by Levy-Garboua et al. (2007: 252) who argue that job satisfaction is akin to an evaluation resulting from an “experienced or post-decisional preference for her job relative to outside opportunities”. This is in keeping with the view that job satisfaction is broadly equivalent to an ‘attitude’, with attitudes generally assumed to influence or predict behaviour (Warr, 2007, pp.51-2). However, job quits are just one aspect of labour market behaviour, one which may be best predicted using evaluative measures like job satisfaction. It is unclear whether job satisfaction is likely to be a better predictor of other behaviours, such as those relating to in-work performance. Indeed, it is conceivable that, because the anxiety-contentment scale captures both the pleasure and activation dimensions of SWB, whilst job satisfaction is sometimes argued to range primarily along the pleasure dimension (Warr et al., 2013), the former may be a better predictor of productivity-related behaviours than job satisfaction. It is therefore worthwhile to test their associations with performance data.

Many studies find a positive correlation between measures of SWB and job performance at the level of the individual worker. Lyubmirsky *et al.*'s (2005) meta-analysis of 19 cross-sectional studies examined the relationship between positive affect and work-related outcomes, ranging from self-reported task performance and supervisor evaluations through to absenteeism and earnings, and found an average correlation coefficient of +0.20. In respect of job satisfaction, a meta-analysis by Judge *et al.* (2001) covered 254 (mostly cross-sectional) studies found an average correlation of +0.30. These associations may be causal: Staw *et al.* (1994) and Zelenski *et al.* (2008) both report longitudinal studies in which ratings of employees' levels of job-related affect were found to be predictive of subjective evaluations of those employees' performance. Oswald *et al.* (2015) report a laboratory experiment in which they randomly induced improvements in SWB among groups of students who were

undertaking a standardized mathematical test. The subjects were paid for each correct answer and, in repeated measures, those students who experienced the greatest increase in SWB also registered the greatest improvement in test scores.

The causal mechanisms through which such effects might come about include improvements in employees' physiology and general health – raising energy and potentially effort (see Diener and Chan, 2011); improved cognitive abilities e.g. in relation to problem-solving (see Isen *et al.*, 1987); and better employees' attitudes to work – raising their propensity to be co-operative and collaborative and helping to reduce absenteeism and quits (Organ and Ryan, 1995; Hackett, 1989; Clark, 2001). We do not investigate these mechanisms in this study but it is apparent that there is a strong empirical basis for believing that there are causal links between worker SWB and individual job performance.

Since individual behaviours, when aggregated, may affect workplace-level performance this raises the prospect that raising employees' SWB may in turn bring financial benefits for employers. However, it is by no means clear whether this individual-level link between SWB and performance actually translates into a business-unit level relationship. Since workplaces and organisations are social entities in which workers interact, the level of wellbeing of Worker A may well affect the level of wellbeing of Worker B (see Totterdell *et al.*, 2004). An individual worker's wellbeing can therefore affect workplace performance not only through its potential effect on the worker's own output, but also through its potential effect on the output of work colleagues. For instance, Felps *et al.* (2006) propose a model – supported by a review of research on organisations – in which the negative affect and behaviour of one group member (the so-called 'bad apple') elicits negative feelings and behavioural reactions in other members of the group. These feelings and reactions then influence important group

processes, for example impairing levels of co-operation and creativity within the group as a whole.

Empirical evidence on the link between worker SWB and *organisational* performance is limited, partly due to the lack of linked employer-employee data required to investigate the relationship. It is not normally practical to undertake controlled experiments in real workplaces or firms, while obtaining repeated measures over time to create longitudinal datasets is costly.

Positive correlations between SWB and workplace or firm-level productivity have been reported by Harter *et al.* (2002) and Patterson *et al.* (2004). A positive correlation between employee SWB and business-unit profitability has also been reported by Harter *et al.* (2010). Positive associations with business outcomes have also been found in non-profit organisations, including schools (e.g. Ostroff, 1992; Currell *et al.*, 2005) and hospitals (e.g. Robertson *et al.*, 1995). A key limitation of most of these studies, however, is that they do not address the twin concerns of unobserved heterogeneity (the failure to control for characteristics which determine both satisfaction and performance) and endogeneity (the possibility that good performance brings personal rewards for employees which may, in turn, raise their SWB – see Lawler and Porter, 1967). One study which suggests that the former may be particularly important is that of Bartel *et al.* (2011), who undertook longitudinal analysis of the relationship between employee attitudes and workplace performance across 193 branches of a US bank. They found that branches in which employees had more favourable attitudes had better sales performance and were less likely to close down, but they also found that these links could be explained by other, unobserved characteristics of the branches. Dawson *et al.*'s (2014) study of UK hospital performance also found employee job

satisfaction to be associated with hospital performance in cross-section, but not longitudinally. Finally, Schneider et al.'s (2003) study of 35 companies over 8 years suggested firms' prior performance was a predictor of employee job satisfaction, although in some cases the reverse relationship was also found, thus suggesting the importance of testing for reverse causality.

A counter to concerns about unobserved heterogeneity and endogeneity is provided, however, by the only workplace-based experimental intervention that we are aware of in this area.

Proudfoot *et al.* (2009) randomly allocated 81 employees from a sample of 136 workers in a British insurance firm to a training programme which aimed to improve employees' levels of self-esteem and job satisfaction, and to reduce their levels of psychological distress. At a follow-up three months after the intervention, SWB had improved among the intervention group relative to the control group. Employee turnover was also lower in the intervention group and, two years later, their productivity had also improved (measured in terms of their sales figures versus the average for their division). Nevertheless, this was a small-scale study and questions remain about the generalisability of the findings.

The evidence base is thus suggestive of a positive link between SWB and workplace or firm-level performance, but is in need of further expansion, particularly through the analysis of nationally-representative datasets which permit broader generalisation. In her recent review of the literature Fisher (2010: 47) concluded: "Most of the research on unit level happiness and outcomes has involved small to medium-sized work units such as bank branches or restaurant locations (cf. Harter et al. 2002; Koys 2001). These studies indicate modest but significant effects running from happiness to business unit performance. I found only one study of very large units (entire Fortune 500 firms; Schneider et al. 2003)."

Edmans (2011, 2012) has since extended this list of large-firm studies by examining the links between job satisfaction and firm value in a sample of publicly-traded US firms. However, studies on representative samples of firms are still relatively uncommon. One reason is that few publicly-available datasets contain all of the necessary measures; another is that new, large-scale experiments are difficult to implement in practice. Bockerman and Ilmakunnas (2012) provide a notable case, therefore, since they analyse the relationship between SWB and performance in a representative sample of Finnish manufacturing plants. Moreover, their study uses quasi-experimental methods to convincingly demonstrate a causal impact of employee SWB on workplace productivity. They use a single, overall job satisfaction measure from the European Community Household Panel Survey over the period 1996-2001 and match employees' responses on this measure to data on the productivity of the employees' workplace that is available from an administrative database. Their baseline estimate found that a one point increase (on a six-point scale) in the average level of job satisfaction among workers at the plant increases the level of value-added per hour worked two years later by 3.6 percentage points, after controlling for other factors. This estimate rose to 9 percentage points in a two-stage estimation approach designed to account for unobserved establishment-level heterogeneity. However tests on their data indicated that job satisfaction was, in part, influenced by the level of productivity in the plant (i.e, job satisfaction was not exogenously determined). Employees' satisfaction with their housing situation was thus used as an instrumental variable to purge the job satisfaction measure of any resulting bias arising from this endogenous relationship. The positive effect of job satisfaction on workplace productivity remained under the instrumental variables approach, thereby providing a robust indication of a causal effect – at least in this particular sample (Finnish manufacturing plants).

Our study extends this literature contributing to it in three ways. First, ours is the first study to use nationally representative workplace data for workplaces of all sizes (apart from those with fewer than 5 employees) across all sectors of the economy (with the exception of agriculture, fisheries and mining). As such we can extrapolate from our results to the population of workplaces at large. Second, we examine the links between workplace performance, variously defined, and alternative measures of SWB, and demonstrate the importance of doing so with novel findings relating to job satisfaction, on the one hand, and job-related affect on the other. Third, we examine links between changes in SWB and workplace performance variously defined, including its relationship with workplace closure. The findings are of policy-relevance for Britain where the study was conducted, a point we elaborate on in our conclusions.

Data and methods

The Workplace Employment Relations Survey

We analyse linked employer-employee data from the Workplace Employment Relations Survey 2011 (WERS) (Department for Business Innovation and Skills, 2013). Appropriately weighted, WERS provides nationally representative data on workplaces in Britain with 5 or more employees, covering all sectors of the economy except agriculture and mining (Van Wanrooy et al, 2013). Our analysis exploits three elements of the survey. The first is the management interview, conducted face-to-face with the most senior workplace manager responsible for employee relations. Interviews were conducted in 2,680 workplaces between March 2011 and June 2012 with a response rate of 46%. The second element is the survey of

employees, distributed in workplaces where a management interview was obtained. Self-completion questionnaires were distributed to a simple random sample of 25 employees (or all employees in workplaces with 5-24 employees) in the 2,170 workplaces where management permitted it. Of the 40,513 questionnaires distributed, 21,981 (54%) usable ones were returned.

The third element of the survey is the panel component to the sample. Among the 2,680 productive workplaces in 2011, some 989 were panel workplaces that had previously been interviewed in 2004. The management response rate among this group of panel workplaces was 52 per cent. Some 600 of these 989 workplaces generated employee questionnaires in both 2004 and 2011 (providing 7,943 employee responses in 2004 and 7,324 employee responses in 2011). The panel also contains information on workplace closure for all but a handful of the workplaces surveyed in 2004. Some 1,718 workplaces with SWB information from employees in 2004 provided information regarding their status in 2011 which identified whether or not they had closed between 2004 and 2011; seventeen per cent had done so. If a workplace has closed we do not know when this took place – only that it had occurred before workplaces were followed up for a panel interview in 2011.

Survey weights have been devised for each element of WERS in order to account for sample selection probabilities and observable non-response biases (see Van Wanrooy et al, 2013: 212-3), and we employ these weights throughout our analysis.

Empirical strategy

We use both the cross-sectional data for 2011 and the panel data for 2004-2011 to assess the relationship between the level of employee SWB at a workplace and workplace performance.

We begin with the cross-sectional analysis, which has the advantage of a larger sample. We regress the level of performance (p) in 2011 for workplace i on a measure of the mean level of job satisfaction among employees at workplace i (\overline{JS}_i), the mean level of job-related affect among employees at workplace i (\overline{JRA}_i), and a set of other workplace and workforce characteristics (X_i) which serve as controls.

$$p_i = \alpha + \beta \overline{JS}_i + \gamma \overline{JRA}_i + \delta X_i + \epsilon \quad (1)$$

We then move on to analyse the panel sample. The sample is smaller, but is better able to address concerns about unobserved heterogeneity, as we can estimate first-difference models which examine *changes* in SWB and performance *within* workplaces over time. This is virtually identical to estimating a fixed effects model, in a two-period panel such as ours.

$$\Delta p_i = \beta \Delta \overline{JS}_i + \gamma \Delta \overline{JRA}_i + \delta \Delta X_i + \epsilon \quad (2)$$

We are also able to use the panel sample to test for the possibility of reverse causality: we test for this directly by investigating whether we can predict workplace SWB in 2011 as a function of the workplace's performance in 2004.

We attach particular weight to the findings from the panel analysis because of its ability to tackle some of the issues that may confound attempts to draw causal inferences about the links between employee SWB and workplace performance. Nevertheless, it is clear that we cannot make strong causal inferences because we lack a true identification of the causal impact of SWB on workplace performance, due to the absence in our data of a convincing instrumental variable. However, as we show later, our results are consistent with the those found by Bockerman and Ilmakunnas (2012) using a quasi-experimental approach.

Measures of subjective wellbeing

Respondents to the WERS Survey of Employees provide measures of their wellbeing which, when aggregated, can be used to characterize workplaces according to the wellbeing of their workers. The 2011 WERS collects information on employees' satisfaction with nine aspects of their job, namely pay, sense of achievement, scope for using initiative, influence over the job, training, opportunity to develop skills, job security, involvement in decisions and the work itself. Each domain of job satisfaction is rated on a five-point scale from 'Very satisfied' to 'Very dissatisfied'. The nine measures were each recoded into ratings ranging from -2 (Very dissatisfied) to + 2 (Very satisfied) and used to create an additive measure of job satisfaction for each employee with a scale running from -18 to +18.ⁱ The employees' scores on this additive scale were then aggregated to compute the overall mean level of job satisfaction for the workforce. We also constructed measures which identified the share of workers who were 'very satisfied', and the share who were 'very dissatisfied'; these allowed us to investigate any asymmetry in the effects of SWB on performance – as found in an earlier analysis of employees' propensity to quit their job (Green, 2010). It can be noted that this is a much more complete set of SWB measures than ordinarily appears in a national

survey. Bockerman and Ilmakunnas (2012), for example, had to be content with a single job satisfaction item.

In addition to the nine job satisfaction items, employees were also asked to rate their job-related affect. They were asked: ‘Thinking of the past few weeks how much of the time has your job made you feel....tense, uneasy, worried, gloomy, depressed, miserable?’. Responses are coded along a five-point scale: ‘all of the time’, ‘most of the time’, ‘some of the time’, ‘occasionally’ and ‘never’. The first three items are a subset of the anxiety-contentment scale that forms part of Warr *et al.*'s (2013) Multi-Affect indicator, while the latter three items are part of that indicator’s depression-enthusiasm scale. These items have the advantage of covering all four quadrants of the affect circumplex (Russell, 1980, 2003), in contrast to the measures used in a number of earlier studies which relied on the Positive and Negative Affect Schedule (Watson et al, 1988). The latter has been demonstrated to cover only those feelings with a high level of activation, i.e. the upper half of the circumplex (see Remington et al, 2000).

Each of the six items was recoded into a rating ranging from -2 (All of the time) to + 2 (Never) and the six items were then summed to create an additive scale running from -12 to +12. Higher values on this scale thus indicate a more-positive emotional state overall, after combining the scores along the two axes of the affect circumplex (anxiety-contentment and depression-enthusiasm). A workplace-level mean was then computed in an equivalent way to the job satisfaction measure reported above.ⁱⁱ In addition, ‘asymmetric’ measures were also computed to identify the shares of workers who ‘never’ felt anxiety or depression, and the shares who ‘always’ or ‘mostly’ felt anxiety or depression.

Measures of performance

Workplace performance was measured using the manager's subjective assessment on three separate measures. The managerial respondents to the survey were asked: 'Compared with other workplaces in the same industry how would you assess your workplace's...financial performance; labour productivity; quality of service or product?'. They chose one of five responses presented to them on a show card ranging from 'a lot better than average' to 'a lot below average'. The percentage of managers saying their workplace performance was 'a lot below average' was very small, so these responses were combined with those saying 'below average' to form a four-point scale (1,4). The three subjective workplace performance measures are positively and significantly correlated such that those scoring high (low) on one indicator tend to score high (low) on the other two; thus, although distinct, these three measures may relate to a single underlying workplace performance scale. We therefore also constructed an additive scale from the three performance items, summing the items then subtracting 3, such that the scale ran from 0 ('below average' performance on all three items) to 9 (performance 'a lot better than average' on all 3 items).ⁱⁱⁱ We present results for both this overall indicator as well as for the three separate performance measures.

When investigating workplace influences on performance it is more conventional to rely on accounting measures such as sales per employee and value added per employee. They have the advantage of being measured along a cardinal scale against which one can readily quantify correlations with other workplace factors, such as the average of employee wellbeing at the workplace. Although WERS collects such measures with its Financial Performance Questionnaire (FPQ) we prefer to focus on the subjective measures of workplace performance for three reasons. First, a much higher percentage of workplace

managers feel able to provide an answer along the subjective ordinal scales. Eighty-seven per cent are able to do so on all three subjective performance measures, whereas the number of responses to the FPQ is low (n=545, which is 20 per cent of the respondents to the management questionnaire). Second, the subjective measures are directed to both private and public sector respondents, whereas the FPQ was administered solely in the private sector; we can thus span across private and public sector workplaces. Third, earlier studies have validated the subjective performance measures, confirming that they are predictive of subsequent workplace closure, for example, and are associated with other workplace features in the way theory might predict (Machin and Stewart, 1990, 1996; Forth and McNabb, 2008). In contrast the managers responsible for employment relations who complete the WERS managerial questionnaire find it difficult to supply the detailed accounting information that is necessary to respond to the FPQ. For instance, they are often only able to provide information at the firm level, rather than workplace level. Consequently, the accounting measures of performance are not immune to concerns about sizeable measurement error.

Results

The results from the WERS analyses are presented in two parts. The first set of results is based on cross-sectional analyses of the 2011 survey. The second set of results is based on analyses of the 2004-2011 panel survey.

Analysis of the 2011 WERS cross-section

To analyse the cross-sectional relationship between SWB and workplace performance, we ran ordered probit regressions for the three separate performance measures (financial

performance, labour productivity, and product/service quality), thereby taking account of their ordinal scales. We also ran ordinary least squares (OLS) estimates for the overall additive performance scale since this more closely approximates a continuous scale (though results are similar if one estimates ordered probit models). Our regressions include controls for: single vs multi-site firm; number of employees; workplace age; industry sector; private vs public sector; region; whether unions are recognised; largest non-managerial occupational group; and the mean hourly wage. All analyses are survey-weighted to account for the probability of a workplace being sampled for the survey (sampling bias) and to account for observable variations in the probability of response.^{iv}

Our primary analyses used the workplace mean SWB scores for job satisfaction and job-related affect. However, as noted earlier, the literature finds some evidence that the effects of SWB on individuals' performance can be asymmetrical such that the effects of being, say, very satisfied or very dissatisfied may not be apparent if one focuses solely on mean satisfaction (eg. Green, 2010). We therefore ran models incorporating the share of employees at the workplace who were 'very satisfied' and the share who were 'very dissatisfied' and, in the case of job-related affect, the workplace share of employees 'never' feeling depression and anxiety and the workplace share 'mostly' feeling depression and anxiety.^v

The analyses begin by establishing the raw correlation between the measures of workplace mean SWB and workplace performance. Then control variables are incorporated to identify the independent association between SWB and workplace performance. The two dimensions of SWB are incorporated alongside one another. The results are presented in Table 1 and show that the average level of employee job satisfaction among employees at the workplace is positively correlated with the three separate workplace performance measures (financial

performance, labour productivity, and the quality of output/service, relative to the industry average) as well as with the workplace performance additive scale constructed from the three measures to assess overall workplace performance. These positive correlations are present not only in the raw data, but also after the addition of our controls (furthermore, these correlations change little with the inclusion of the control variables). In contrast, job-related affect is not correlated with workplace performance, except in the raw correlation with product/service quality (Table 1, column 5).^{vi}

[Table 1 here]

It is possible that our results may be sensitive to the inclusion of workplaces with relatively few employee responses (see Mairesse and Greenan, 1999). In the WERS data the number of employee respondents per workplace ranges between 1 and 25, with a median of 12. However, results are robust to removing around 12 per cent of workplaces who had fewer than 3 employee respondents. Further sensitivity tests which replaced the measures of mean SWB with the asymmetric measures of SWB discussed above found that workplaces with larger shares of ‘very satisfied’ employees had higher labour productivity, higher quality of output, and higher overall performance. Workplaces with larger shares of ‘very dissatisfied’ employees had lower financial performance and lower overall performance on the additive scale. Again, the measures of job-related affect were not statistically significant in any specification.

It is not straightforward to quantify the size of the SWB ‘effect’ on workplace performance because both the performance and SWB measures are based on ordinal scales. However, the coefficients underlying the results reported Column 8 of Table 1 provide some kind of guide.

The coefficient for mean overall job satisfaction of around 0.07 indicates that an increase of 1 point in a workplace's mean overall job satisfaction scale (a scale which ranges between -18 and +18) results in an increase of 0.7 points in the workplace performance scale which runs from 0 to 9. To put this into context, moving from, say, the 25th percentile of the mean employee job satisfaction scale to the median (an increase in the mean job satisfaction scale from 3.3 to 5.6, or 2.3 points on the scale) would result in an increase of 1.6 points on the 10-point additive workplace performance scale, which is roughly equivalent to one standard deviation on that scale.

Analysis of the 2004-2011 WERS panel

Having presented the cross-sectional correlations, we now move onto the analysis of the panel sample. Although the panel sample is smaller in size (around one third of the size of the cross-sectional sample), it does offer two distinct advantages.

First it enables us to investigate whether the cross-sectional associations seen in the previous section are simply the result of unobserved heterogeneity (omitted variable bias). There is a possibility that, whichever set of control variables are used to identify the independent association between employees' SWB and workplace performance, the analyst may not observe features of the workplace that are jointly correlated with both employee SWB and workplace performance, and that these fixed, unobserved characteristics may thus obscure the true independent association between the two items of interest. An example might be unobserved facets of good management: workplaces with good managers may have 'happier' workforces and also perform better than the average for their industry. We are able to address

this issue, at least in part, by using the panel survey to identify whether *changes* in workplace performance occur alongside *changes* in SWB within the same workplace over time.

Second, the panel sample enables us to address the problem of reverse causality. Although there are good reasons to suspect a causal relationship running from employee SWB to workplace performance, it is plausible that good workplace performance will lead to employees becoming happier. Employees' SWB is liable to rise and fall with the fortunes of the employer, in much the same way as a nation's wellbeing rises and falls with stock market prices, in part because employee welfare rises with prosperity, resulting in a 'feel good' factor (Deaton, 2012).

The measures of performance available to us in the panel sample are identical to those available in the cross-section. Accordingly, each workplace provides information on its performance relative to the industry average in 2004 and then again in 2011 on a 4-point scale ranging from below average to a lot above average.^{vii} A workplace moving from the bottom of the scale in 2004 ('below average') to the top of the scale ('a lot above average') would score the maximum +3 points on this change variable. A workplace going in the opposite direction scores -3.

On each measure, around 40 per cent of workplaces provide the same rating in both years, thus producing a change score of zero; the remainder move around, with the numbers reporting improved performance approximating the numbers reporting poorer performance. Around one-fifth of workplaces score zero on the change in the additive scale, indicating their workplace performance has remained unchanged, relative to the industry average over the period. The proportion improving their performance is similar to the proportion doing less

well. Most workplaces that move tend to do so by between one and three points on the nineteen-point scale.

The job satisfaction and wellbeing measures in the panel are identical to those presented earlier for the cross-sectional analysis, with two exceptions. Instead of nine job satisfaction items there are eight: the missing item relates to satisfaction with opportunities to develop skills, which was introduced only in 2011. Instead of six job-related affect items, the panel contains three items measured in 2004 and 2011. These are the anxiety-contentment items, namely tense, worried and uneasy. The depression-enthusiasm items are only available in 2011, so they are absent from the panel, whereas a further three anxiety-contentment items (calm, relaxed and content) were collected in the 2004 survey but not in 2011. As in the case of the workplace performance measures it is straightforward to construct measures identifying changes in SWB over time within workplaces by comparing the 2004 workplace means with the 2011 workplace means. The additive scale for changes in job satisfaction runs from -32 to +32. Around 10 per cent of workplaces saw little or no change in their overall mean job satisfaction score, while workplaces at the 25th percentile of the distribution experienced a decline in mean job satisfaction of 2.3 points and those at the 75th percentile experienced an increase in mean job satisfaction of 2.2 points. The distribution of changes in mean job-related affect was similar, albeit over a shorter scale of -12 to +12.

To identify the independent association between within-workplace changes in workplace performance and employees' subjective wellbeing, we ran ordinary least squares regressions which treat changes in performance as a cardinal scale (though results are again robust to the use of ordered probit regressions). Many of the other workplace characteristics that were included as controls in the cross-sectional models do not change across time and so cannot be

included here. However we are able to include time-varying controls for the number of employees in the workplace and the mean hourly wage of employees; the latter is a useful summary measure helping to capture changes in the quality of the workforce. The models with controls always account for a significant amount of the variance in performance with an r-squared typically in the range of 0.10 to 0.15. The regressions are survey-weighted to account for the probability of a workplace being sampled for the survey and to account for the probability that any employee questionnaires will be returned from a sampled workplace.

The results from the panel analyses are presented in Table 2. The table shows that increases in the average level of job satisfaction at the workplace are associated with increases in the financial performance and quality measures (Models 2 and 6) as well as increases in the overall additive performance scale (Model 8). Increases in job satisfaction are also positively associated with increases in labour productivity, but the coefficient lies just outside the bounds of statistical significance. If we add controls for the levels of performance and well-being at the first time point, the coefficients on mean job satisfaction reported in models 2, 6 and 8 of Table 2 decrease in size (to 0.031, 0.051 and 0.090 respectively), but they each remain statistically significantly different from zero. The coefficient on job satisfaction remains non-significant in model 4, as do the coefficients on mean job-related affect in all four models. The associations found in the cross-sectional analysis cannot thus be attributed to some fixed, unobserved characteristics of workplaces that are themselves jointly associated with higher SWB and higher performance.

[Table 2 here]

The cross-sectional analysis sought also to investigate asymmetric effects, and we do so again here. In these analyses (not shown), workplaces with rising job dissatisfaction experience deterioration in each of the three separate performance measures, as well as in the overall performance measure, whereas workplaces with an increase in ‘very satisfied’ employees experience rising quality of output or service and an increase in the additive performance measure, but not financial performance or labour productivity.

As in the cross-sectional analysis, changes in job-related affect are not associated with workplace performance, regardless of the measure used, although there is some evidence that an increase in employees reporting ‘ill-being’ most or all of the time is associated with deteriorating quality of output or service and a decline in the additive performance scale, at least in some models.

As a further extension, we also used the panel data to investigate whether SWB was associated with workplace closure: as an extreme test of whether low SWB can bring a workplace to extinction. Workplace closure is a binary outcome coded zero if the workplace survives and one if it has closed by the time of the 2011 survey. Probit models were run to estimate this outcome for all workplaces surveyed in 2004 where one or more employee surveys had been completed and returned. The control variables used in these analyses are nearly identical to those used in the 2011 cross-sectional analysis: the only differences are that the workplace closure models contain controls collected in 2004 and additional sensitivity checks were performed where we incorporated workplace performance in 2004 as an additional control. All the SWB measures used in the workplace closure models derive from the 2004 survey. Models had sample sizes ranging between 1713 and 1716 workplaces.

The workplace closure models with controls were always highly jointly statistically significant confirming that it is possible to predict workplace closure with workplace features collected in WERS surveys. However, none of the SWB scales were statistically significant in any of the models (Table 3). The results contrast with the only other study we know of this kind, in which Bartel *et al.* (2011) study the association between the closing of branches in a large commercial bank and mean branch-level employee ‘positive attitudes’ two years earlier. They found the bank closed branches with more negative employee attitudes.

[Table 3 here]

Test for reverse causation

Finally, we used the panel data to test for reverse causality, in order to examine whether higher levels of workplace performance may give rise to higher levels of SWB. We tested for reverse causation by specifying models that seek to predict the level of SWB in 2011 with workplace performance in 2004. None of the models revealed a statistically significant positive relationship between workplace performance in 2004 and mean job satisfaction in 2011; if anything, the relationship was negative (Table 4). When we specified models that sought to predict the level of workplace performance in 2011 with measures of SWB for 2004, we obtained positive coefficients that were on the borderline of statistical significance in two of the four models (Table 5). These findings are broadly in line with those reported elsewhere by Harter *et al* (2010).

[Table 4 and Table 5 here]

Although we lack a robust means of truly identifying the causal effect of SWB on performance, our results tend to support the contention in our earlier conceptual framework and theoretical review, which is that the arrow of causation is more likely to run from SWB to workplace performance than it is to run in the other direction.

Conclusions

There is good reason to suspect that policies and practices which target improvements in SWB may raise workplace performance and result in economic growth. Yet there is relatively little empirical evidence on the relationship between employees' SWB and performance at the level of the workplace. To our knowledge, ours is the first study using nationally-representative, linked employer-employee data containing measures of both worker SWB and workplace performance, as is necessary to extrapolate to the workplace population at large.

We find a positive, statistically-significant relationship between mean job satisfaction at the workplace and workplace performance. This finding is present in both the cross-sectional and panel analyses and is robust to various estimation methods and model specifications.

Employee job satisfaction is positively associated with workplace financial performance, labour productivity and the quality of output and service. Workplaces experiencing an improvement in job satisfaction between 2004 and 2011 – measured at the mean, or measured in terms of an increase in the proportion ‘very satisfied’ or a reduction in the proportion ‘very dissatisfied’ – also experience an improvement in performance between the two years.

We cannot robustly demonstrate causality, and our longitudinal analyses are based on observations some years apart. Nevertheless, our findings are consistent with the proposition

that employers who are able to raise employees' job satisfaction may see improvements in the performance of their workplace across a variety of different performance metrics. These benefits appear to outweigh the costs employers may incur in trying to raise SWB since they are apparent not only in relation to labour productivity but also for workplace financial performance. The results are consistent with Bockerman and Ilmakunnas (2012) who found a positive association between mean job satisfaction and workplace performance in their manufacturing study for Finland.

By contrast, there is no association between job-related affect and workplace performance. This finding is noteworthy since other research (Green, 2010) indicates that job satisfaction is a better predictor of quits than job-related affect. We argued earlier that job-related affect captures employees' feelings about their job, while job satisfaction captures how the employee *evaluates* aspects of the job. Seeking to explain his job quits finding, Green (2010: 902) suggests that “despite the potential advantage of the well-being scales in covering the “arousal” as well as the “pleasure–displeasure” dimension of happiness [that is, levels of mental activation as well as the degree of positive affect (our clarification)], the evaluative nature of job satisfaction, whereby it compares the current job with outside opportunities, trumps the advantages of the well-being scales in the arena of mobility.” Our research suggests such evaluations may influence employees' decision making and thus their behaviour more broadly in ways that affect their productivity and that of the workplace. There is, however, an alternative proposition, which is that job-related affect may have counterveiling effects on worker behaviour that cancel one another out. There is a literature indicating that job-related anxiety is linked to higher wages (Bryson et al., 2012), something that may come about if it is productivity enhancing. But there are also studies suggesting anxiety can reduce productive output as individuals fail to overcome the negative impact of

stress on their performance (see Warr, 2007; also McCarthy et al, 2016). The non-significance of job-related anxiety in our study may result from the theoretical offsetting effects of anxiety on workers' productive output.

Our results thus provide a prima facie case for employers to seek to maintain and raise levels of job satisfaction among their employees. They also indicate that initiatives to raise aggregate job satisfaction should feature in policy discussions around how to improve levels of productivity and growth. There are, however, three important caveats to our study. First, we cannot state definitively that the link is causal, although the findings are consistent with the causal relationship suggested by conceptual work in this area and other, quasi-experimental evidence. Second, we do not explore the means by which employers may raise employees' SWB, nor the mechanisms by which increased SWB improves workplace performance. These are issues that could be fruitfully tackled in future research. Third, employer returns to improved worker job satisfaction may be heterogeneous across employers and the costs incurred to generate additional satisfaction may also vary. In many cases it may be too costly for employers to implement policies, practices and monitoring systems aimed at improving or maintaining job satisfaction. In these circumstances government intervention may be appropriate to assist employers in generating higher job satisfaction, leading to benefits for both workers and employers.

References

- Bartel, A. P., Freeman, R. B., Ichniowski, C. and Kleiner, M. M. (2011) "Can a workplace have an attitude problem? Workplace effects on employee attitudes and organizational performance", *Labour Economics*, 18, 411-423.
- Bockerman, P. and Ilmakunnas, P. (2012) "The Job Satisfaction-Productivity Nexus: A Study Using Matched Survey and Register Data", *Industrial and Labor Relations Review*, 65, 2: 244-262
- Bond, T. N. and Lang, K. (2014) *The Sad Truth About Happiness Scales*, NBER Working Paper No. 19950
- Bryson, A., Barth, E. and Dale-Olsen, H. (2012) 'Do Higher Wages Come at a Price?', *Journal of Economic Psychology*, 33, 1:251-263
- Clark A (2001) "What really matters in a job? Hedonic measurement using quit data", *Labour Economics*, 8: 223-242.
- Clark, A.E., Georgellis, Y., and Sanfey, P. (1998) "Job satisfaction, wages and quits: evidence from German panel data", *Research in Labor Economics*, 17: 95–121.
- Currell S, Towler A, Judge T and Kohn L (2005) "Pay satisfaction and organizational outcomes", *Personnel Psychology*, 58: 613-640.
- Dawson J, Powell M, Topakas A, Durose J and Fewtrell C (2014) "Staff satisfaction and organisational performance: evidence from longitudinal secondary analysis of the NHS staff survey and outcome data", *Health Services and Delivery Research*, Vol. 2, No. 50.
- Deaton, A. (2012) "The financial crisis and the wellbeing of Americans", *Oxford Economic Papers*, 64: 1-26

- Deepchand, K., Drever, E., Gilby, N., Prestage, Y., Prudon, S., Tipping, S. and Wood, M. (2013) *Workplace Employment Relations Study (WERS) 2011/12 Technical Report*, NatCen, London
- Department for Business Innovation and Skills (2013) *Workplace Employee Relations Survey 2011* [computer file]. 4th Edition. Colchester, Essex: UK Data Archive [distributor]. SN: 7226, <http://dx.doi.org/10.5255/UKDA-SN-7226-7>
- Diener E and Chan M (2011) “Happy people live longer: subjective wellbeing contributes to health and longevity”, *Applied Psychology: Health and Well-being*, 3: 1-43.
- Edmans A (2011) “Does the stock market fully value intangibles? Employee satisfaction and equity prices”, *Journal of Financial Economics*, 101: 621-640.
- Edmans A (2012) “The link between job satisfaction and firm value, with implications for corporate responsibility”, *Academy of Management Perspectives*, November, pp.1-19.
- Felps W, Mitchell T and Byington E (2006) “How, when and why bad apples spoil the barrel: negative group members and dysfunctional groups”, *Research in Organizational Behaviour*, 27: 175-222.
- Fisher, C. D. (2010) "Happiness at work", *International Journal of Management Reviews*, 12, 4: 384-412.
- Forth, J and McNabb R (2008) “Workplace Performance: A Comparison of Subjective and Objective Measures in the 2004 Workplace Employment Relations Survey”, *Industrial Relations Journal*, 39, 2: 104-123
- Freeman, R. (1978) “Job satisfaction as an economic variable”, *American Economic Review, Papers and Proceedings* 68 (2), 135–141
- Freeman, R. and Medoff, J.L. (1984) *What Do Unions Do?* Basic Books, New York
- Green F (2010) “Well-being, job satisfaction and labour mobility”, *Labour Economics*, 17, 6: 897-903.

- Hacket R (1989) "Work attitudes and employee absenteeism: a synthesis of the literature", *Journal of Occupational Psychology*, 62: 235-248.
- Harter J, Schmidt F, and Hayes T (2002) "Business-unit relationship between employee satisfaction, employee engagement and business outcomes: a meta-analysis", *Journal of Applied Psychology*, 87: 268-279.
- Harter J, Schmidt F, Asplund J, Killham E and Agrawal S (2010) "Causal impact of employee work perceptions on the bottom line of organisations", *Perspectives on Psychological Science*, 5, 4: 378-389.
- Isen A, Daubman K and Nowicki G (1987) "Positive affect facilitates creative problem solving", *Journal of Personality and Social Psychology*, 52: 1122-1131.
- Judge TA, Thoresen CJ, Bono JE and Patten GK (2001) "The job satisfaction–job performance relationship: A qualitative and quantitative review", *Psychological Bulletin* 127(3): 376–407.
- Lawler E and Porter L (1967) "The effect of performance on job satisfaction", *Industrial Relations*, 7, 1: 20-28.
- Layard R. (2011) *Happiness: Lessons from a New Science*, 2nd edition, Penguin Books.
- Levy-Garboua, L., Montmarquette, C., and Simonnet, V. (2007) "Job satisfaction and quits", *Labour Economics*, 14, 2: 251–268
- Lyubmirsky S, King L and Diener E (2005) "The benefits of frequent positive affect: does happiness lead to success?" *Psychological Bulletin*, 131, 6: 803-855.
- Machin S. and Stewart M. (1996) "Trade Unions and Financial Performance", *Oxford Economic Papers*, 49: 213-241
- Machin, S. and Stewart, M. (1990) "Unions and the financial performance of British private sector establishments", *Journal of Applied Econometrics*, 5: 327-350.

- McCarthy J, Trougakos J and Cheng B (2016) “Are anxious workers less productive workers? It depends on the quality of social exchange”, *Journal of Applied Psychology*, 101, 2: 279-91.
- O’Donnell G, Deaton A, Durand M, Halpern R and Layard R (2014) *Well-Being and Policy*, London: Legatum Institute.
- OECD (2013) *OECD Guidelines of Measuring Subjective Well-Being*, Paris; OECD Publishing.
- Organ D and Ryan K (1995) “A meta-analytic review of attitudinal and dispositional predictors of organizational citizenship behaviour”, *Personnel Psychology*, 48: 775-802.
- Ostroff C (1992) “The relationship between satisfaction, attitudes and performance: an organization-level analysis”, *Journal of Applied Psychology*, 77: 963-974.
- Oswald, A. J., Proto, E. and SgROI, D. (2015) "Happiness and Productivity", *Journal of Labor Economics*, 33, 4: 789-822.
- Patterson M, Warr P and West M (2004) “Organizational climate and company productivity: the role of employee affect and employee level”, *Journal of Occupational and Organizational Psychology*, 77: 193-216.
- Proudfoot J, Corr P, Guest D and Dunn G (2009) “Cognitive-behavioural training to change attributional style improves employee wellbeing, job satisfaction, productivity, and turnover”, *Personality and Individual Differences*, 46: 147-153.
- Remington N, Fabrigar L and Visser P. (2000) “Re-examining the circumplex model of affect”, *Journal of Personality and Social Psychology*, 79, 2: 286-300.
- Robertson A, Gilloran A, McGlew T, McKee K, McInley A and Wright D (1995) “Nurses’ job satisfaction and the quality of care received by patients in psychogeriatric wards”, *International Journal of Geriatric Psychiatry*, 10: 575-584..

- Russell J (1980) "A circumplex model of affect", *Journal of Personality and Social Psychology*, 39, 6: 1161-1178.
- Russell J (2003) "Core affect and the psychological construction of emotion", *Psychological Review*, 110, 1: 145-172.
- Schneider, B., Hanges, P. J., Smith, D. B., and Salvaggio, A. N. (2003) "Which Comes First: Employee Attitudes or Organizational Financial and Market Performance?", *Journal of Applied Psychology*, 88, 5: 830-851
- Staw B, Sutton R and Pelled L (1994) "Employee positive emotion and favourable outcomes at the workplace", *Organization Science*, 5: 51-71.
- Stiglitz J., Sen A. and Fitoussi J.P. (2009) *Report by the Commission on the Measurement of Economic Performance and Social Progress*.
- Tinkler L and Hicks S (2011) *Measuring Subjective Well-Being*, Supplementary Paper, Office for National Statistics.
- Totterdell P, Wall P, Holman D and Diamond H (2004) "Affect networks: a structural analysis of the relationship between work ties and job-related affect", *Journal of Applied Psychology*, 89, 5: 854-867.
- Van Wanrooy, B., Bewley, H., Bryson, A., Forth, J., Freeth, S., Stokes, L. and Wood, S. (2013) *Employment Relations in the Shadow of Recession: Findings from the 2011 Workplace Employment Relations Study*, Palgrave MacMillan.
- Warr P (2007) *Work, Happiness and Unhappiness*, London: Lawrence Erlbaum.
- Warr P, Binl U, Parker S and Ingeoglu I (2013) "Four-quadrant investigation of job-related affects and behaviours", *European Journal of Work and Organizational Psychology*, 23, 3: 343-363.

Watson D, Clark L and Tellegen A (1988) "Development and validation of brief measures of positive and negative affect: The PANAS scales", *Journal of Personality and Social Psychology*, 54, 6:1063-1070.

Zelenksi J, Murphy S and Jenkins D (2008) "The happy-productive worker thesis revisited", *Journal of Happiness Studies*, 9: 521-537.

Table 1. Cross-sectional regressions

	Financial performance		Labour productivity		Quality of product or service		Additive performance scale	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Mean JS	0.023 *	0.040 ***	0.036 **	0.031 **	0.067 ***	0.053 ***	0.076 ***	0.073 ***
	(1.72)	(2.99)	(2.28)	(1.97)	(5.10)	(4.10)	(3.59)	(3.67)
Mean JRA	-0.005	-0.010	-0.013	-0.015	-0.030 *	-0.022	-0.027	-0.029
	(-0.21)	(-0.44)	(-0.69)	(-0.81)	(-1.66)	(-1.30)	(-0.93)	(-1.08)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
<i>Obs.</i>	<i>1,764</i>	<i>1,760</i>	<i>1,732</i>	<i>1,728</i>	<i>1,833</i>	<i>1,828</i>	<i>1,690</i>	<i>1,690</i>

Source: 2011 WERS Cross-Section Survey

Notes:

- a.* Models [1] to [6] estimated via ordered probit; Models [7] and [8] estimated via OLS.
- b.* JS: Job satisfaction; JRA: Job-related affect
- c.* Controls: single establishment; number of employees (6 dummies); workplace age (2 dummies); industry (12 dummies); public sector; region (11 dummies); union recognition (2 dummies); largest non-managerial occupational group (9 dummies); mean hourly wage.
- d.* Unstandardized coefficients. T-statistics in parentheses. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 2. Panel first-difference regressions

	ΔFinancial performance		ΔLabour productivity		ΔQuality of product or service		ΔAdditive performance scale	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ΔMean JS	0.049 *** (2.60)	0.051 *** (2.72)	0.031 (1.63)	0.029 (1.55)	0.058 *** (3.39)	0.058 *** (3.38)	0.133 *** (2.83)	0.135 *** (2.89)
ΔMean JRA	-0.000 (-0.01)	-0.005 (-0.08)	-0.001 (-0.02)	-0.002 (-0.04)	-0.005 (-0.13)	-0.005 (-0.12)	0.015 (0.11)	0.006 (0.04)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
<i>Observations</i>	<i>484</i>	<i>484</i>	<i>468</i>	<i>468</i>	<i>527</i>	<i>527</i>	<i>439</i>	<i>439</i>

Source: WERS 2004-2011 Panel Survey

Notes:

- a.* JS: Job satisfaction; JRA: Job-related affect
- b.* Controls: change in number of employees; change in mean hourly wage.
- c.* Unstandardized coefficients. T-statistics in parentheses. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 3. Panel regressions of workplace closure

	Workplace closure 2004-2011	
	[1]	[2]
Mean JS in 2004	0.001 (0.04)	-0.005 (-0.20)
Mean JRA in 2004	0.024 (0.80)	0.013 (0.43)
Controls	No	Yes
<i>Observations</i>	<i>1,712</i>	<i>1,712</i>

Source: WERS 2004-2011 Panel Survey

Notes:

- a. JS: Job satisfaction; JRA: Job-related affect
- b. Probit regression. Controls (measured in 2004): single establishment; number of employees (6 dummies); workplace age (2 dummies); industry (12 dummies); public sector; region (11 dummies); union recognition (2 dummies); largest non-managerial occupational group (9 dummies); mean hourly wage.
- c. Unstandardized coefficients. T-statistics in parentheses. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 4. Panel model of influence of workplace performance in 2004 on SWB in 2011

	Mean job satisfaction in 2011	Mean job satisfaction in 2011	Mean job satisfaction in 2011
Financial performance in 2004	-0.657 *		
	(-1.68)		
Labour productivity in 2004		-0.528	
		(-1.38)	
Quality of product or service in 2004			-0.017
			(-0.05)
<i>Observations</i>	<i>506</i>	<i>491</i>	<i>529</i>

Source: WERS 2004-2011 Panel Survey

Notes:

- Standard controls (all measured in 2004): single establishment; number of employees (6 dummies); workplace age (2 dummies); industry (12 dummies); public sector; region (11 dummies); union recognition (2 dummies); largest non-managerial occupational group (9 dummies); mean hourly pay.
- Unstandardized coefficients. T-statistics in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.10.

Table 5. Panel model of influence of SWB in 2004 on workplace performance in 2011

	Financial performance in 2011	Labour productivity in 2011	Quality of product or service in 2011	Additive performance scale in 2011
Mean job satisfaction in 2004	0.025	0.063 **	0.033	0.040
	(0.77)	(2.10)	(1.15)	(1.56)
Mean job-related affect in 2004	0.000	-0.139	0.042	-0.032
	(0.00)	(-1.59)	(0.52)	(-0.41)
<i>Observations</i>	<i>440</i>	<i>440</i>	<i>440</i>	<i>440</i>

Source: WERS 2004-2011 Panel Survey

Notes:

- Standard controls (all measured in 2004): single establishment; number of employees (6 dummies); workplace age (2 dummies); industry (12 dummies); public sector; region (11 dummies); union recognition (2 dummies); largest non-managerial occupational group (9 dummies); mean hourly pay.
- Unstandardized coefficients. T-statistics in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.10.

ⁱ Factor analysis of the nine items reveals a single factor with an eigen value of 5.34 accounting for 59 percent of the variance in job satisfaction scores. The additive scale also has a high scale reliability coefficient, or alpha, of 0.90.

ⁱⁱ As in the case of the job satisfaction scale, this is supported by factor analyses which revealed a single factor with an eigen value of 4.42 accounting for 74 percent of the variance in workplace-level wellbeing. The alpha scale reliability coefficient is 0.93 for the six items.

ⁱⁱⁱ The correlation coefficients in the unweighted data are: financial performance and labour productivity 0.47; financial performance and quality 0.30; labour productivity and quality 0.40. They are all statistically significant at the 1 per cent level. The scale reliability coefficient, or alpha, for the three performance items is 0.79.

^{iv} Employee questionnaires were returned from 1,923 (72 per cent) of the 2680 workplaces that were surveyed (Deepchand *et al.*, 2014: Table 4.14). It is conceivable that workplace non-response to the employee survey may have been correlated with employees' SWB, potentially biasing the estimated levels of SWB upwards. This does not necessarily mean that the estimated relationship between wellbeing and workplace performance is biased in any way. Nevertheless, the non-response weights that we use adjust for this to some extent by ensuring that workplaces with at least one employee respondent resemble all workplaces on observable features such as the manager's perception of the climate of employment relations.

^v Focusing on the tails in this way can help to avoid some of the assumptions that are needed about the underlying distribution of SWB when constructing mean SWB (Bond and Lang, 2014).

^{vi} We added a control for the proportion of employees in the workplace with a long-standing health problem or disability at the suggestion of a referee; however, the results were substantively the same.

^{vii} Recall that, although the survey questions also include the category "a lot below average", few managers give this rating, so these responses have been combined with those saying performance was "below average".