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# Performance pay, work hours and employee health in the UK ☆

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ABSTRACT

A large body of research links performance pay to poorer worker health. The mechanism generating this link remains in doubt. We examine a common suspect, that performance pay causes employees to work longer hours in pursuit of higher pay. Using UK data, we demonstrate that performance pay is associated with more work hours and a higher probability of working long hours. Yet approximately two thirds of these differences reflect worker sorting rather than behavioral change. The remaining effects are small except those for labourers. Indeed, controlling for hours of work does not diminish the link between worse self-reported health and performance pay.

## 1. Introduction

A growing research consensus links performance pay and poorer worker health. However, the behavioral changes that generate these links remain in doubt. We examine a common claim, that performance pay causes employees to work longer hours in pursuit of higher pay (DeVaro 2022; Andelic et al. (2023); Artz and Heywood 2015).

As with other aspects of performance pay, one should anticipate both a behavioral response and a sorting response. Thus, Lazear (2000) found that performance pay increased worker productivity but also attracted more productive workers as performance pay rewards their inherent productivity.[1] Similarly, the hours of existing workers may respond to performance pay and workers inherently willing to work more hours may sort into performance pay to be rewarded for this effort. It is the first behavioral response that we focus on.

Critically, there exists no theoretical or empirical agreement on the direction of this response to performance pay. While performance pay is designed to increase worker effort, work hours remain a poor proxy for this effort. Instead, the response may be working harder or smarter rather than longer. The additional earnings associated with performance pay represent an income effect suggesting fewer work hours. More generally, performance pay often replaces hourly wages that simply reward time on the job. This reduces adverse specialization in work hours (marginally productive contracted hours or even "face time" at an extreme). Also, performance pay that rewards groups is well known to create free-rider issues that likely undermine both effort and working hours. This can be overcome, and effort increased by profit sharing, if mutual monitoring is sufficient (Kandel and Lazear 1992). Yet, the literature suggests this effort increase may go into working more cooperatively rather than simply working extra hours (Drago and Garvey 1998). Added to this ambiguity, the very modest empirical literature which we will review presents both positive and negative associations between performance pay and hours.

We use UK individual panel data to trace the influence of two measures of performance pay on hours of work. These measures imperfectly distinguish between individual and group rewards yet the pattern they present remains remarkably similar. The initial pooled cross-section indicates performance pay is associated with 2.4 additional hours per week for one measure and 1.7 additional hours for the other measure. These rough magnitudes remain robust to the inclusion of personality traits and controls for earnings. Despite extensive controls, we examine the role of worker heterogeneity and the associated sorting. The worker fixed-effect estimates continue to reveal statistically significant increased hours associated with the measures of performance pay. They become 0.7 and 0.8 additional hours for the two measures. This pattern of fixed effect estimates being much smaller carries over to exam-

☆ We thank participants at the 2022 COPE (Aarhus University) and at the Interdisciplinary Approaches to Performance-Related Pay and Incentives in Work conference (Aberdeen University, June 2022) for comments and Benjamin Artz for helpful discussions. We are grateful to the editor and two anonymous referees for constructive comments.

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[1] While such positive selection may be a typical response, it need not apply to all workers. Heywood and Parent (2012) find no positive selection for US blacks into performance pay.

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inations of the probability of working long hours, for example, more than 50 hours per week. While the worker fixed effect estimates remain highly significant statistically, again they are small.

We examine whether these significant but small estimates could be responsible for worse health by returning to a measure of self-reported good health used by others (Bender and Theodossiou 2014). We confirm that moving to performance pay is associated with an increased probability of dropping out of good health. We then control for total hours worked and demonstrate that the increased probability is virtually unchanged. This helps confirm that our small hours response is unlikely to be large enough to explain the poor health associated with performance pay. This moves attention away from increased hours, one of the most common suggestions, and toward other causes such as working harder, taking fewer breaks, taking greater risks on the job as well as facing uncertainty and stress over performance and earnings.

## 2. Setting the stage

We investigate the extent to which worker hours increase under performance pay. This is only one type of effort response to performance pay but it has been identified as crucial as it is well known that long hours hurt worker health. The World Health Organization identifies long work hours (often fifty hours or more a week) as the single largest risk factor accounting for over 1/3 of all occupation disease burden (Pega et al., 2021). There were 745,000 deaths from stroke and heart disease in 2016 that resulted from long hours. This represents an almost 30 percent increase since 2000. Moreover, long hours are not risky simply because they are concentrated in inherently dangerous occupations and industries or because long hours workers spend more time at risk. Instead, long hours increase worker's underlying risk of illness per hour worked (Dembe et al., 2005). In a meta-analysis of the epidemiological evidence (drawing on studies in industrial democracies including the UK) Wong et al. (2019) make three critical points. First, long working hours remain ubiquitous across countries and studies. Second, long working hours routinely link to poorer health *outcomes* (cardiovascular diseases; chronic fatigue, stress; depression state, anxiety, hyper-tension, and all-cause mortality among others). Third, long working hours routinely link with worse health *behaviors* including lack of sleep, smoking, drinking and drug use.

Long working hours have been suggested as a reason why workers receiving performance pay have diminished health.[2] Under this view performance pay incentivizes working longer hours to the point of harming health (DeVaro and Heywood 2017). Pencavel (2015) stresses this mechanism when describing the long hours of piece rate munition workers during World War I. He makes clear that "employees at work for a long time may experience fatigue or stress that not only reduces his or her productivity but also increases the probability of errors, accidents, and sickness that impose costs on the employer (p. 2073)."

Building from Adam Smith's concern that workers on piece rates would be incentivized to ruin their health, a large literature examines the influence of performance pay on worker health. This literature stands beside evidence that performance pay increases productivity by aligning the interests of workers and firms.[3] Thus, Bender et al. (2012) demonstrate that piece rates increase the risk of workplace injury in Europe and Artz and Heywood (2015) confirm that US blue-collar workers paid output-based pay (piece rates or bonuses) have higher injury risk. DeVaro and Heywood (2017) demonstrate that UK workers have both greater sickness absence and health ailments at establishments using performance pay. These links persist despite accounting for establishment fixed effects.

These survey results are matched with case studies indicating that the transition to piece rates is associated with higher accident rates among Swedish loggers (Sundstroem-Frisk 1984), fertilizer industry workers in India (Saha et al., 2004) and tree cutters in Canada (Toupin et al., 2007). US truck drivers have more accidents when paid by the mile rather than by the hour (Monaco and Williams 2000) and German steel workers had increased sickness absence after introducing production bonuses (Frick et al., 2013). Similarly, the stress, emotional exhaustion, and sick days of sales workers increase with the relative importance of commissions (Habel et al., 2021). Davis (2016) reports that piece rate workers in Vietnam have both lower physical and emotional health.

Using earlier years of the same data we use, Bender and Theodossiou (2014) find that UK workers receiving broad measures of performance pay (including bonuses, commissions and other more common white-collar performance pay) are more likely to drop out of "good" self-reported health. We will return to this examination in our own work. Avgoustaki and Frankort (2019) use cross-country European survey data to show that productivity pay (piece rates and production bonuses) does not predict either stress or fatigue in specifications that control for both overtime and work intensity. Andelic et al. (2023) examine specific indicators of health but without controlling for work hours. Self-reported mental health is worse for UK workers receiving a broad measure performance pay. Medical tests also demonstrate significantly higher blood pressure and higher inflammation markers in the blood for workers receiving performance pay.[4] Baktash et al. (2022a) shows that German workers report greater stress when receiving a broad measure of performance pay even after controlling for working hours.

Cadsby et al. (2016) show that in laboratory experiments performance pay increases self-reported stress. Allan et al. (2021) demonstrate that performance pay in the lab increases stress measured by cortisol hormone levels. This confirms field experiments by Timio and Gentilit (1976) showing that manufacturing workers randomly assigned to piece rates recorded greater stress hormone levels. Relatedly, medication has been seen as a response to the stress and anxiety associated with performance pay. Workers switching to broad measures of performance pay increase drug and alcohol use and (Artz et al., 2021, and Baktash et al., 2022b) and increase use of prescription anti-anxiety drugs and anti-depressants (Dahl and Pierce 2020) even when controlling for individual fixed effects.

The associations of poor health with both long hours and performance pay make reasonable the hypothesis that performance pay generates poor health through incentivizing longer hours. Yet, an essential building block not sufficiently examined is that performance pay increases work hours. The evidence is not persuasive. Jones (2013) examined working hours under performance pay for US schoolteachers. In 49 states, teachers responded to performance pay by working fewer hours per week. Jones takes this to be free riding dominating mutual monitoring as much of the performance pay was at the school or team level. Florida allows only individual level performance pay and their teachers responded by working more hours per week. Pay-for-performance contracts were introduced in 2004 for general practice medicine in the UK. Gemmell et al. (2009) use time diaries and employment records to show that the response of practices was not to increase hours but to increase staff size. Piece rates were Adam Smith's concern but Bilikopf and Norton (1992) and Bilikopf (1995) show that farmworkers trimming California vineyards worked fewer hours per acre when paid piece rates. Their hourly wage and productivity were higher, but their total hours

[2] Albaek et al. (2022) identify five potential mechanisms: increased risk taking, increased workload (hours) and work pace, increased income uncertainty, reduced cooperation from co-workers, and reduced income for low performers.

[3] Survey and experimental evidence support the claim that productivity increases (Banker et al. 1996, Lazear 2000 , Bandiera et al. 2005, Gielen et al. 2010, Heywood et al. 2011) and that the more productive are attracted to peformance pay (Lazear 2000, Cadsby et al. 2007, Dohmen and Falk 2011 and Shaw 2015).

[4] After correcting for sample selection, performance pay was associated with a 16-point increase in systolic blood pressure, enough to move from "normal" through "elevated" to "hypertension stage one."

remained roughly the same but showed more variability. They work "faster and smarter" but not longer.

Pekkarinen and Riddell (2004, 2008) use linked employee-employer panel data from the Finnish metal industry. They find that the average piece rate worker works slightly fewer hours than the average worker on hourly wages. Yet, this results even as those moving from hourly to piece rate payment increase their hours during this transition. This supports the view that the workers that transition to piece rates come from the lower end of the hours distribution among hourly workers and respond to piece rates by working more. This supports the incentive effects that interest the authors but gives no suggestion that the influence of piece rates on hours is sufficient to drive health consequences.

DeVaro (2022) uses linked employer-employee data to tie together performance pay, working hours and sickness absence. He provides modest evidence of a link between long hours within establishments and performance pay. Specifically, while performance pay does not increase the share of long hours if the cut-off is 40 or more hours, it does for smaller cut-offs of 35 to 39 hours. In echoes of the Finnish study, performance pay may move workers up to full time but not move them to the very long hours needed to harm health.

Artz and Heywood (2022) use US longitudinal survey data. They find that in pooled estimates US workers on performance pay work about three hours longer and are substantially more likely to work long hours (45 or more and 50 or more). Critically, self-selection (the tendency of those likely to work long hours to choose performance pay) is simply not as evident as in the UK evidence we will present. This may reflect their use of a measure that more nearly captures individual level schemes.

Andelic et al. (2022) use UK data to examine the influence of performance pay on time use. While not examining work hours, they confirm the type of time reallocations suggested by Becker (1965). Performance pay workers attend fewer leisure events and also exercise and sleep less. They do, nonetheless, eat and drink out more frequently. These reallocations would be anticipated if performance pay increased both work hours and earnings.

We draw two critical conclusions from this review. First, both long hours and performance pay are frequently but not always associated with diminished worker health.[5] This remains the case with and without controls for hours and for different measures of performance pay. Second, despite the suggestion that long hours are a mechanism for the frequent association of diminished health and performance pay, the basic building block of performance pay being associated with long hours has not been convincingly shown. We examine that basic building block as the first to use longitudinal UK worker survey data. Also, to the extent our data allow, we integrate this into an exploration of the influence of performance pay on health.

## 3. Data and empirical approach

Our data combines the British Household Panel Survey (BHPS; 1991–2008) with the Understanding Society (USoc) data set (2009–2018) (University of Essex, 2022). The BHPS is a random sample of approximately 10,000 individuals in 5500 households, which was increased to 16,000 individuals in 9000 households in 1999. USoc is the follow-on to the BHPS starting in 2009 and covers approximately 100,000 individuals in 40,000 households. The BHPS households comprise a subset of the USoc sample and can be followed in the latter, except for the first USoc wave where the BHPS households were not interviewed. We initially use the full sample of respondents from the BHPS and USoc. However, some of the key variables are only available in certain waves of the BHPS/USoc. In particular, questions on performance and bonus pay are only available from 1998 on, and in every second USoc wave. As such, some analyses cover different periods in the data, as we will highlight in the text. Reflecting our focus on workers, we exclude those not in employment, and retain individuals aged from 18 to 65.

The BHPS /USoc contains information on performance-related pay (see for instance Green and Heywood 2008, and Bryan and Bryson, 2016), although the format of the questions has changed over time. Initially in 1991–1997 there was one catch-all performance-pay question. We drop all observations for this earlier period. From 1998–2008, respondents were asked two separate questions: "Does your pay include performance-related pay?"; and "In the last 12 months have you received any bonuses such as a Christmas or quarterly bonus, profit-related pay or profit-sharing bonus, or an occasional commission? [excludes overtime payments]". We observe responses to both questions for all waves from 1998 to 2018 inclusive. These questions produce binary indicators of the receipt of performance related pay (PRP) and of bonus/profit share receipt respectively. We recognize that these imperfectly divide individual and group performance pay but the latter indicator clearly captures two prominent forms of group-based payment, profit-related pay and profit shares.[6] Piece rates would seem more likely identified in the first measure.

Table A1 provides summary statistics split by those not in receipt of performance pay, those in receipt of PRP only, and those in receipt of bonuses or profits shares only, and those in receipt of both. Workers on any form of performance pay schemes work longer hours than workers not on these schemes and work more overtime hours. They are also younger and more likely to be male. Patterns with respect to education are less clear. For instance, workers on performance related pay schemes are substantially more likely to be highly education, but this is not true of those receiving bonus payments or profit shares.

To further explore distributional differences in hours worked, Fig. 1 provides kernel density estimates of differences in total hours worked according to contract type. While all share a mass around full-time hours, there is a higher density of hours worked beyond this amount for PRP and bonus/profit share workers. This provides the first indication that performance pay may lead to longer hours of work.

Our main estimating equations take the form:

$$Hours_{it} = \alpha_1 PerfPay_{it} + \gamma_1 Bonus/Profit_{it} + \beta' \boldsymbol{X}_{it} + \boldsymbol{y}_t + \boldsymbol{m}_t + \varepsilon_{it} \qquad (1)$$

Where hours is an indicator of hours worked (normal hours, overtime, total hours), $\boldsymbol{X}$ is a vector of controls, including age, occupation, industry, gender, highest educational level and marital status. We also include a set of controls for year of interview ($\boldsymbol{y}$) and calendar month ($\boldsymbol{m}$). Our parameters of interest are $\alpha_1$ and $\gamma_1$. We estimate variants of (1) without and with worker fixed effects. The estimates with worker fixed effects provide the change in working hours when a given worker changes their contract type. Comparing these estimates to those without worker fixed effects measure the role of sorting in generating differences in hours worked across contract types. Naturally, changes in contract type may also reflect other time-varying changes that may influence working hours. While we cannot be exhaustive on this front, we later explore event study estimates variants of (1) which aim to examine whether there is evidence of selection into contractual type in terms of time-variation of hours worked and (2) the time-profile of hours worked changes (if any) following changes in contractual type.

A second variant of (1) uses as a dependent variable a dichotomous indictor of long hours. These include whether the worker has worked more than 40 hours, more than 45 hours and more than 50 hours on average in a week. Using a linear probability model, these estimates indicate the extent to which perform pay increases the likelihood of harm inducing long hours. Again, cross-sectional, and fixed-effect estimates will be contrasted.

[5] Despite the apparent influence on health, performance pay has often been shown to be positively related to overall wellbeing and job satisfaction. See for instance Heywood and Wei (2006) Green and Heywood (2008), Cornelissen et al. (2011), Bryson et al (2016) and Ledić (2018).

[6] Consequently, existing literature has often interpreted this question as capturing group and profit share payment (see for instance Gielen, 2011, and Green and Heywood, 2010 and 2011).

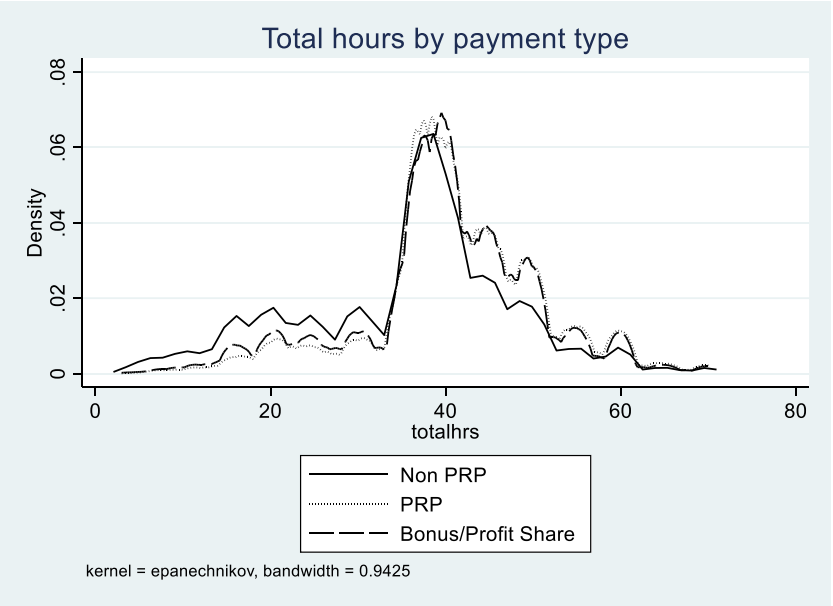



**Fig. 1.** Distribution of total hours worked by contract type.

**Table 1**
Performance pay and hours worked, 1998–2018.

| | (1) Usual Hours | (2) Overtime | (3) Total Hours | (4) Usual Hours | (5) Overtime | (6) Total Hours | (7) Usual Hours | (8) Overtime | (9) Total Hours |
|---|---|---|---|---|---|---|---|---|---|
| PRP | 1.541*** | 0.883*** | 2.424*** | 1.161*** | 0.765*** | 1.926*** | 0.378*** | 0.264*** | 0.642*** |
| | (0.0837) | (0.0644) | (0.109) | (0.0812) | (0.0615) | (0.104) | (0.0609) | (0.0466) | (0.0741) |
| Bonus/Profit Share | 1.166*** | 0.413*** | 1.580*** | 0.809*** | 0.486*** | 1.296*** | 0.441*** | 0.286*** | 0.727*** |
| | (0.0771) | (0.0497) | (0.0949) | (0.0742) | (0.0473) | (0.0898) | (0.0519) | (0.0397) | (0.0631) |
| Constant | 30.41*** | 3.191*** | 33.60*** | 33.93*** | 3.894*** | 37.82*** | 33.57*** | 5.805*** | 39.38*** |
| | (0.370) | (0.224) | (0.455) | (0.455) | (0.271) | (0.548) | (2.347) | (1.795) | (2.855) |
| Occupation & Industry Fixed Effects | | | | X | X | X | X | X | X |
| Worker Fixed Effects | | | | | | | X | X | X |
| Sample Average | 33.77 | 3.45 | 37.22 | | | | | | |
| Observations | 131,452 | 131,452 | 131,452 | 131,452 | 131,452 | 131,452 | 131,452 | 131,452 | 131,452 |
| R-squared | 0.207 | 0.045 | 0.208 | 0.260 | 0.080 | 0.268 | 0.022 | 0.008 | 0.026 |
| Number of workers | | | | | | | 39,190 | 39,190 | 39,190 |

All include controls for year of interview, month of the year, age, educational level, gender and marital status. Occupation and industry fixed effects are the 1 digit level (9 categories for each) Robust standard errors in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level respectively.

## 4. Initial results

In what follows, we first examine the link between performance pay and hours of work. We follow this with an examination of performance pay and working long hours.

### 4.1. Hours of work

Table 1 presents initial estimates of the relationship between performance pay receipt and hours worked. We present estimates for standard hours worked, over time, and finally total hours worked. This is done in three increasing complex specifications. The first presents the more parsimonious estimates and demonstrates large differences in average hours worked by workers on performance pay. PRP is associated with 2.4 more hours per week, of which around 1/3 of this increase is in reported overtime hours. The estimate of 2.4 hours on an average of 37 hours is reminiscent of the US and Finnish findings that performance pay increases average hours to approximately full time at or near 40 hours. The results for bonus/profit share move in the same direction. The increase in hours is smaller than that for PRP with increase of 1.6 h.

The right-hand side of Table 1 includes a range of controls for both occupation and industry at a one-digit level. The fundamental pattern of increased hours remains suggesting that the differences in hours worked does not simply reflect differences in the occupational and industry mix of workers in and out of PRP.[7] The fundamental pattern also remains if we include the big five personality traits that have been thought to influence both sorting into performance pay and effort levels (Heywood et al., 2017).[8]

The final set of results introduce worker fixed effects retaining the industry and occupation controls. These are within worker comparisons of PRP on hours and so have the advantage of removing the influence of time-invariant unobservable characteristics. This helps hold constant the tendency of those inherently willing to work longer hours to sort into performance pay to be rewarded for this effort enhancing characteristic. The estimates are thus more nearly the behavioral response to performance pay and are substantially smaller. The total PRP influence is only 0.61 of an hour, less than two percent of the mean number of

[7] In unreported estimates we also included industry controls at a 4 digit-level and occupational controls at a 3 digit-level (occupations are more difficult to match over the entire time period). The resultant estimates of PRP effects were slight smaller than in the estimates reported in Table 1 (1.75 more total hours for PRP and 1.43 for Bonus/Profit Shares). This suggests that our results do not simply reflect across occupation and industry differences in working hours and the prevalence of PRP.

[8] Note that we observe personality traits only once for each worker in our data so following from Cobb-Clark and Schurer (2012, 2013), we take them as given and reasonably stable over time.

**Table 2**
Performance pay, hours worked: controlling for wages, 1998–2018.

| | (1) Usual Hours | (2) Overtime | (3) Total Hours | (4) Usual Hours | (5) Overtime | (6) Total Hours | (7) Usual Hours | (8) Overtime | (9) Total Hours |
|---|---|---|---|---|---|---|---|---|---|
| PRP | 1.178*** | 0.668*** | 1.846*** | 0.971*** | 0.622*** | 1.593*** | 0.315*** | 0.208*** | 0.523*** |
| | (0.0841) | (0.0663) | (0.111) | (0.0817) | (0.0638) | (0.106) | (0.0596) | (0.0491) | (0.0745) |
| Bonus/Profit Share | 0.887*** | 0.281*** | 1.168*** | 0.582*** | 0.338*** | 0.920*** | 0.340*** | 0.223*** | 0.563*** |
| | (0.0757) | (0.0520) | (0.0950) | (0.0729) | (0.0496) | (0.0900) | (0.0512) | (0.0422) | (0.0640) |
| Log Hourly Wage | −0.0124 | 0.676*** | 0.663*** | | 0.643*** | 0.349*** | −0.835*** | 0.590*** | |
| | | | | −0.294*** | | | | | −0.245*** |
| | (0.0495) | (0.0291) | (0.0596) | (0.0510) | (0.0299) | (0.0600) | (0.0325) | (0.0268) | (0.0406) |
| Constant | 32.66*** | 2.084*** | 34.74*** | 35.85*** | 2.817*** | 38.67*** | 36.12*** | 4.358** | 40.48*** |
| | (0.378) | (0.249) | (0.474) | (0.459) | (0.292) | (0.562) | (2.334) | (1.925) | (2.918) |
| Occupation & Industry Fixed Effects | | | | X | X | X | X | X | X |
| Worker Fixed Effects | | | | | | | X | X | X |
| Observations | 116,174 | 116,174 | 116,174 | 116,174 | 116,174 | 116,174 | 116,174 | 116,174 | 116,174 |
| R-squared | 0.195 | 0.052 | 0.196 | 0.239 | 0.086 | 0.247 | 0.026 | 0.014 | 0.023 |
| Number of workers | | | | | | | 35,613 | 35,613 | 35,613 |

All include controls for year of interview, month of the year, age, educational level, gender and marital status. . Occupation and industry fixed effects are the 1 digit level (9 categories for each). Robust standard errors in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level respectively.

hours. The total bonus/profit share influence shrinks also but is now larger than that for PRP at 0.74 of an hour. In both estimates the share contributed by increased overtime is larger than in estimates without the fixed effects.[9] As the worker fixed effect estimates come from only those workers who change payment type, one could be concerned that they are a selected sample. Estimating our OLS models only on this sample of changers generates results remarkably similar to the OLS estimates in Table 1 (available upon request).

A related point is that the payment change identifying the FE estimates could occur with or without a job change. A job change may bring a change in hours correlated with, but not caused by, a move to performance pay. We cannot directly observe job changes but explore this issue by investigating whether an individual changed either occupation or industry at the same time as the change in payment type. We re-estimated our individual FE models separately for those that changed either occupation and industry at the time of payment change and those that did not. These results are reported in Appendix Table A2. In both sets of results, performance pay leads to higher hours worked, but as might be anticipated, the coefficients are smaller among those in the same occupation and industry (and so likely in the same job).

Several points deserve emphasis as they will be repeated in robustness results. First, the role of sorting is fundamental. The decline from over two additional hours to only six-tenths of an hour indicates that most of the original influence of PRP and bonus/ profit shares on hours reflects sorting of those more likely to work greater hours in any event. Again, this is important as the hours associated with sorting would be worked even without PRP and so do not influence health.[10] Second, while the results that reflect sorting suggest a larger influence for PRP than bonus/profit share, the actual behavioral response suggests the second influence is as large or larger.

Our main approach treats the two performance pay indicators separately. This implies that if someone received both types, the influence would be additive. In Appendix Table A3 we report estimates of total hours using two alternative formulations. The first and third columns show the OLS and FE including those uniquely receiving each type and those receiving both types. The influence is less than additive as receiving both is associated with fewer additional hours than the sum of receiving each. We also present a single variable formulation that assumes any exposure to either or both types has the same influence. It emerges with a coefficient that looks roughly like a weighted average of the three individual coefficients. The substantial role of sorting remains with reductions in coefficients of between 50% to 75%. Moreover, the FE estimates remain modest in size with only the indicator of receiving both types exceeding a full hour.

Another natural concern recognizes that performance pay increases earnings. Thus, whatever influence it has in increasing incentives to work longer at the margin, it also brings with it an income effect that might work in the opposite direction. As a short cut, we examine this by including hourly wages into our main equations. The results are in Table 2. Focusing on the worker fixed effect estimates, the relationship between our PRP measures and hours worked are largely unchanged. The final estimate suggests a fixed effect influence of 0.5 an hour for PRP and 0.6 an hour for bonuses.[11]

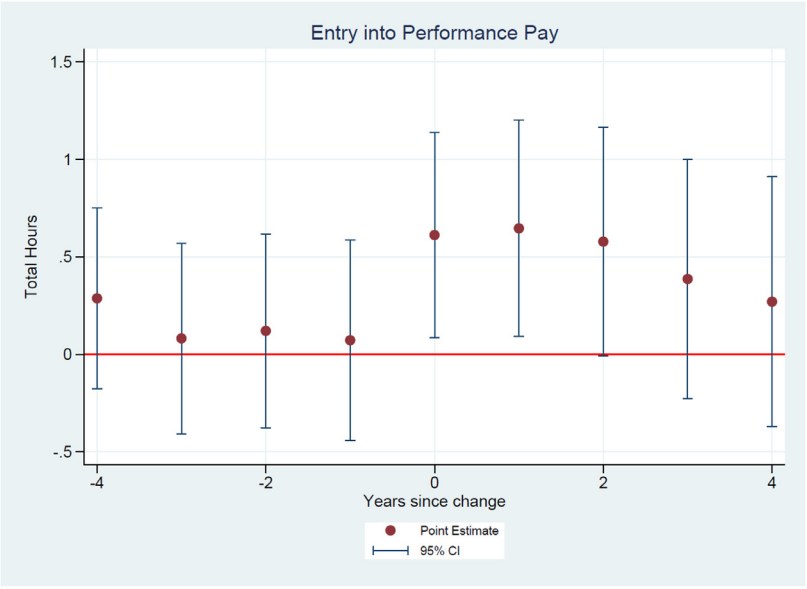
We further explore the influence of performance pay on (total) hours worked through event study estimation. This makes two contributions. First, the event study can incorporate time-varying factors that may explain individual hours worked, and selection into performance pay. For example, changes in family structure and home-production responsibilities may lead to changes in both the willingness to work longer hours and the willingness to receive performance pay.[12] Second, the event study allows us to examine the pattern of adjustment underlying the initial estimates in Table 1. The increase in hours worked may happen immediately with new performance pay arrangements, or it may be much more gradual and be spread out over time.

[9] There is not a routine premium for UK workers associated with overtime – no equivalent of the US FLSA time and a half. Indeed, for many UK workers additional hours are not explicitly paid (salary workers). Nonetheless, paid overtime hours may be differentially available by performance pay status. We currently examine regular hours (associated with a contract) and total overtime hours (above the contract). We also have access in the data to hours of paid overtime and have estimated a specification for only these hours. In the fixed effect estimates the coefficients on performance pay emerge as very small, less than .2 of an hour, and of offsetting signs for the two PP measures. With a net effect of essentially zero, differential access to paid overtime by PP status that influences working hours appears unlikely. These estimates are available upon request.

[10] We note that even though the hours increase in minimal, workers may increase the variance in their hours by working long when times are good and short when they are not. This would be an example of working harder or smarter rather than simply longer.

[11] In otherwise identical estimates in which we use the log of hours we find that PRP and bonuses each result in an 0.02 increase in the log of hours. These are available upon request and again show that including wages does not dramatically change the results.

[12] We re-estimated our main models including controls for house ownership (owned outright and with a mortgage) and whether there were dependent children at home. While these themselves are associated with hours worked, the estimates of performance pay ceofficients were essentially unchanged.



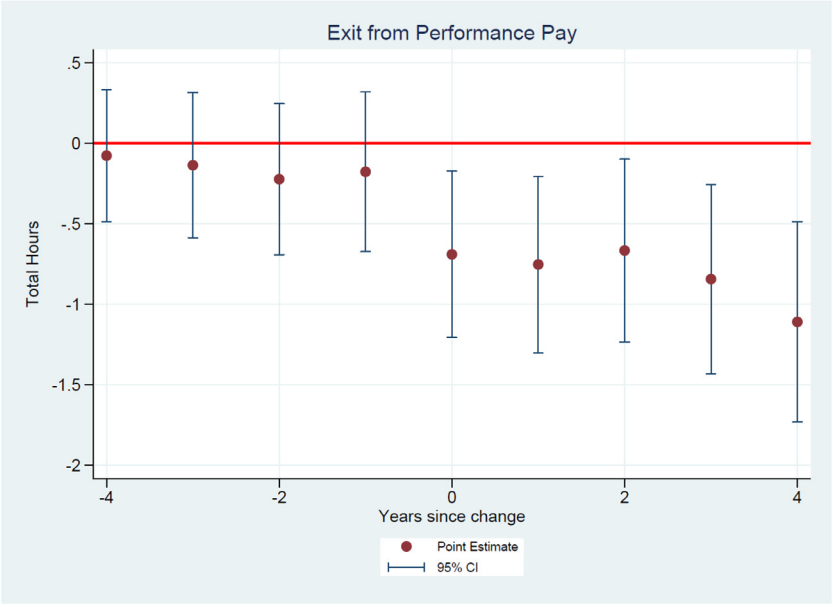




**Fig. 2.** Event studies – changing contract type and worker hours.

Fig. 2 presents event study estimates of the influence of entry into performance pay (panel A). We examine workers initially not in any form of performance pay who move into either type of performance pay. These are matched by estimates of those initially in any form of performance pay but who exit (Panel B).[13] These event study estimates control for individual fixed effects as do our main estimates but include lead and lag periods centered around the change (time zero is the period after the change). They confirm both the significant increase in hours associated with performance pay and the fact that the increase is small, less than 1 hour per week. The latter remains inconsistent with a large deterioration in worker health.

The estimates reveal several additional points. First, they show no evidence of 'off-trend' variation in hours prior to changes in payment method. This suggests a lack of *time-varying* selection on workers' propensity to work longer hours. Second, the effect of moving into or out performance pay appears immediate and broadly symmetrical across entry and exit. Third, the effects persist. For entry, the influence remains at least over the first 3 years. For exit, the influence remains essentially constant over the next 4 years.

### 4.2. *Working long hours*

While the overall increases in hours are modest and those in the fixed effect estimates (including the event study) smaller still, the important issue may not be what is happening on average. The negative influence of working time on health is likely to be concentrated in generating long hours. Indeed, Fig. 1 suggests that the influence of performance pay on hours of work may be concentrated in the upper right tail. Thus, the role that PRP and bonus/ profit shares play in moving workers into the long hours may be critical. To examine this, Table 3 reports a range of estimates of the probability of working more than a given threshold of hours (greater than 40 hours, greater than 45 hours, and greater than 50 hours).

[13] Unreported estimates separately examining each type of performance pay demonstrate similar results.

**Table 3**
Performance pay and the probability of working long hours.

| Greater than… | (1) 40 hours | (2) 40 hours | (3) 45 hours | (4) 45 hours | (5) 50 hours | (6) 50 hours |
|---|---|---|---|---|---|---|
| | OLS | FE | OLS | FE | OLS | FE |
| PRP | 0.0663*** | 0.0194*** | 0.0488*** | 0.00924** | 0.0296*** | 0.00926*** |
| | (0.00512) | (0.00429) | (0.00456) | (0.00383) | (0.00327) | (0.00303) |
| Bonus/Profit Share | 0.0598*** | 0.0304*** | 0.0312*** | 0.0190*** | 0.00709*** | 0.00642*** |
| | (0.00421) | (0.00365) | (0.00365) | (0.00318) | (0.00253) | (0.00243) |
| Constant | 0.264*** | 0.460*** | 0.160*** | 0.386*** | 0.101*** | 0.155 |
| | (0.0182) | (0.161) | (0.0157) | (0.140) | (0.0112) | (0.106) |
| Sample proportion | 0.350 | | 0.195 | | 0.089 | |
| Observations | 138,998 | 138,998 | 138,998 | 138,998 | 138,998 | 138,998 |
| R-squared | 0.125 | 0.005 | 0.077 | 0.004 | 0.038 | 0.003 |
| Number of workers | | 39,761 | | 39,761 | | 39,761 |

Notes: Estimated linear probability models. All include controls for year of interview, month of the year, age, educational level, gender and marital status. All models include occupation and industry fixed effects at the 1 digit level (9 categories for each). Robust standard errors in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level respectively.

**Table 4**
Performance pay and long hours: constrained in starting/stopping times.

| Greater than… | (1) 40 h | (2) 40 h | (3) 45 h | (4) 45 h | (5) 50 h | (6) 50 h |
|---|---|---|---|---|---|---|
| | OLS | FE | OLS | FE | OLS | FE |
| PRP | 0.0796*** | 0.0330*** | 0.0629*** | 0.0214*** | 0.0328*** | 0.0147*** |
| | (0.00827) | (0.00777) | (0.00758) | (0.00670) | (0.00544) | (0.00502) |
| Bonus/Profit Share | 0.0854*** | 0.0347*** | 0.0539*** | 0.0293*** | 0.0188*** | 0.00559 |
| | (0.00729) | (0.00710) | (0.00653) | (0.00612) | (0.00460) | (0.00459) |
| PRP x constraint | 0.0190* | −0.0116 | 0.00967 | −0.00591 | 0.00975 | 0.00178 |
| | (0.0115) | (0.0107) | (0.0101) | (0.00925) | (0.00738) | (0.00694) |
| Bonus x constraint | −0.0576*** | −0.00365 | −0.0617*** | −0.0180** | −0.0370*** | −0.00815 |
| | (0.00942) | (0.00910) | (0.00812) | (0.00784) | (0.00567) | (0.00588) |
| Constraint | −0.0331*** | −0.00765 | −0.0200*** | −0.0131*** | −0.00559** | −0.00928*** |
| | (0.00489) | (0.00543) | (0.00398) | (0.00469) | (0.00271) | (0.00351) |
| Constant | 0.185*** | 0.235 | 0.1000*** | 0.0981 | 0.0499*** | 0.167 |
| | (0.0202) | (0.348) | (0.0165) | (0.300) | (0.0113) | (0.225) |
| Observations | 66,472 | 65,596 | 66,472 | 65,596 | 66,472 | 65,596 |
| R-squared | 0.110 | 0.012 | 0.067 | 0.008 | 0.029 | 0.004 |
| Number of workers | | 29,793 | | 29,793 | | 29,793 |

Notes: Estimated linear probability models. All include controls for year of interview, month of the year, age, educational level, gender, marital status. All models include occupation and industry fixed effects at the 1 digit level (9 categories for each). Robust standard errors in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level respectively.

These confirm that performance related pay receipt is associated with a higher probability of working long hours. For instance, PRP receipt is associated with a near 7 percentage point higher chance of working more than 40 hours in the week. Bonus/profit-shares is associated with a 6-percentage point higher chance of working more than 40 hours a week. These magnitudes decrease as we move to more extreme hours worked. Yet, there remain sizeable influences relative to the underlying rate of working these hours for all workers. Thus, in the estimate of working more than 50 hours, PRP has a 3 percentage point influence and bonus/profit share has a 1 percentage point influence. These are on a base of only 9 percent of employees working more than 50 hours.

As before, a large proportion of the effects described above result from sorting. The fixed effect estimates are substantially smaller at each threshold even as they retain high statistical significance. Thus, in the FE model workers who receive PRP are just under 1 percentage point more likely to work more than 50 hours in a week suggesting two-thirds of the original 3 percentage point influence reflects sorting.

While the FE estimates are highly statistically significant and not irrelevant relative to their respective bases, they are small in magnitude. This leaves open whether they are large enough to generate the health deterioration that others have associated with performance pay. This could reflect institutional constraints that limit the desired hours response. In this way our estimates would not be those of the true underlying behavioral response to performance pay but only those allowed by firm and policy constraints on allowed hours of work. This difference has been noted in other contexts. For example, in examining a substantial Danish tax change, Labanca and Pozzoli (2022) demonstrate a much larger hours response by those workers in firms without institutional hours constraints than in those with such constraints.

The estimates we have presented on the increase in long hours combine those constrained (perhaps not changing at all) and those unconstrained (presumably changing much more). The second is the behavior response to performance pay identified originally by Adam Smith and it could be among this unconstrained group that dramatic changes happen.

The measures to proxy institutional hours constraints in the data are imperfect but we identify workers who are constrained in their starting and stopping times each day. While this constraint is not identical to a limit on hours of work, it certainly implies one. Thus, workers who are required to start and stop at the same time each day have a *de facto* hours limit. It remains possible that there exist workers not limited in their starting time that also face a total hours limit per week or month.

We return to the estimates in Table 3 and add the constraint indicator (one if facing a constraint). We also interact the constraint indicator with each of the performance pay variables. The results highlighting a fixed starting and stopping time are shown in Table 4.

Those workers constrained to fixed starting and stopping times are significantly less likely to work long hours. This is apparent in both the

Panel A – Overall Effect


Panel B – Including Total Hours Worked

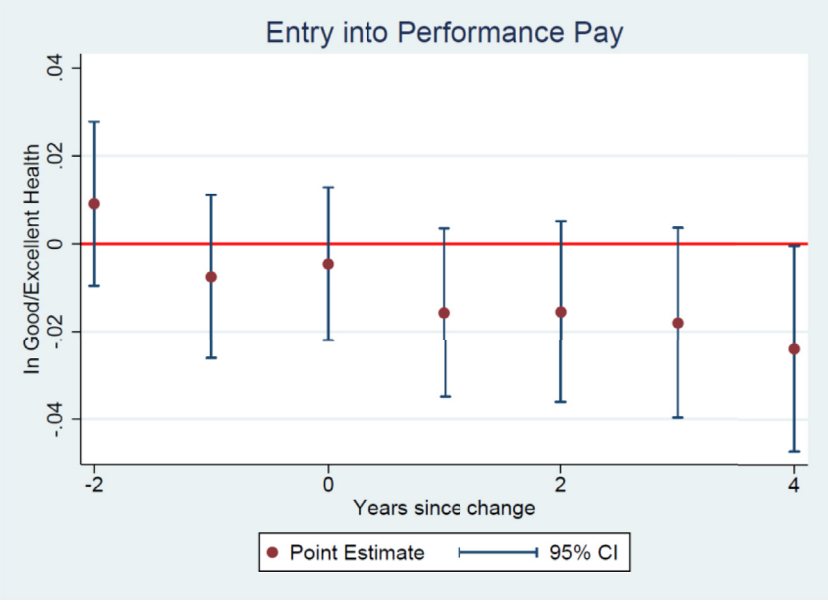



**Fig. 3.** Event study estimates of the effects of entering performance pay on reporting being in good / excellent health.

OLS and FE estimates and across all three long hours measures, working more than 40, 45 or 50 hours. The constrained workers also appear to respond less to performance pay as anticipated. The coefficients on the interactions with the two performance pay measures are typically negative. They are always significantly so for the profit sharing/bonus indicator but not for the performance related pay indicator.

Including the indicator for the constraint and its interaction causes the size of the coefficients for those not constrained to increase. This resulting estimate may be closer to the true behavioral response of workers absent institutional constraints. As an illustration, focus on the coefficients in the fixed effect estimate for working more than 50 hours. Across the entire sample in Table 3 it was 0.009 for performance-related pay suggesting an increase in long hours of less than one percentage point. The unconstrained estimate in Table 4 is 0.014 or almost half again as large. Across the entire sample in Table 3 it was 0.007 for bonuses. The <unconstrained estimate in Table 4 is 0.008.

These larger estimates appear to confirm that the original estimates are biased down because of institutional constraints.[14] We remain un-

[14] We also experimented with a proxy that identified whether workers desired to work more hours on the assumption that such out of equilibrium workers might face an institutional constraint. The results are broadly similar, but we do not show them at as only five percent of workers reported desiring more hours limiting its relevance.

Panel C – Including Total Hours Worked and Controlling for Working Greater than 50 hours

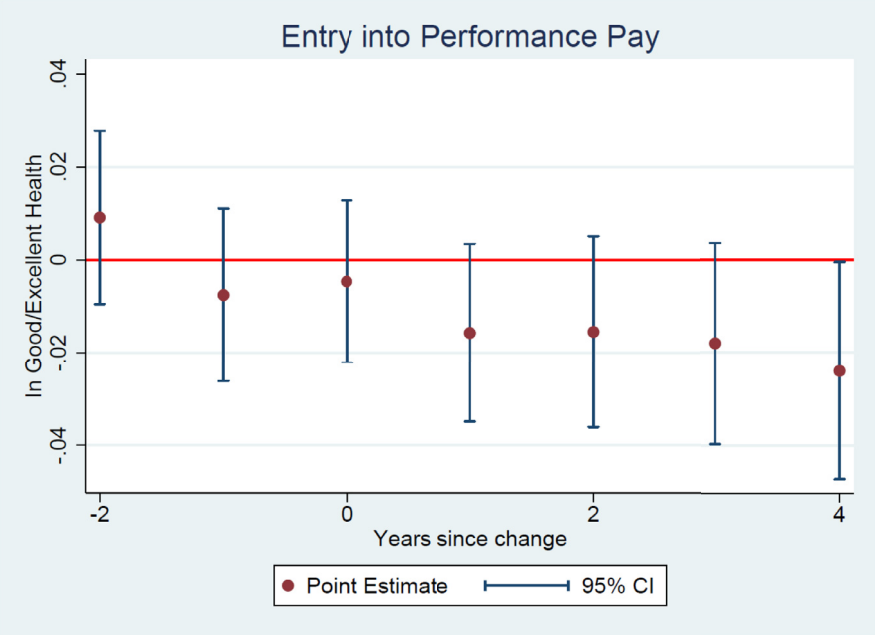



**Fig. 3.** Continued

sure where the constraints originate. They could be in the interest of firms to limit worker earnings costs or insure joint production (workers on an assembly line at the same time). They could also be imposed by governments or unions. They could even be agreed to in contract by workers who do not want to respond to incentives to work longer hours in a self-binding mechanism. Regardless of the source, these constraints both limit hours and reduce the response to performance pay.

Yet, given the health motivation of our paper, even the larger and more nearly behavioral responses remain small. First, they only apply to the population of unconstrained workers and the health deterioration identified by other was not constrained to this population. Second, even for this smaller population the point estimates of just over or just under a percentage point increase in long working hours appear too small to have confidence that they drive health effects.[15]

As another general concern, it might be argued that we should focus on the combined influences of both performance pay measures. Indeed, while 6.3 percent of all worker observations receive performance related pay alone and 18.8 receive bonuses alone, 8.8 percent do receive both. The influences are, however, not additive. As an example, performance related pay alone is associated with a 1.2 percentage point increase in the likelihood of working more than 50 hours in the fixed effect estimate. Bonuses alone are associated with 0.8 percentage point increase. Receiving both is associated with a 1.4 percentage point increase, only weakly larger than performance related pay alone.

## 5. An illustration of performance pay and health

One of the few consistent health measures over the length of the BHPS/US is self-reported health. Bender and Theodossiou (2014) examined this measure, and we now return to it. Our objective is to broadly confirm their evidence that performance pay is associated with reduced worker health. Having accomplished that, we will add hours as a control variable to explain health. At issue is how large the mediating influence of hours will be. Our evidence to date suggests it should be modest.

Fig. 3 provides event study estimates of the effect of entering any form of performance pay on the probability of reported good or very good health. Panel A reports individual fixed effects estimates that demonstrate that entry into performance pay is associated with a reduction in health that appears to modestly increase in size over time. This fits with the evidence in Bender and Theodossiou (2014) that prolonged exposure to performance pay generates negative health outcomes. Panel B and Panel C add controls for total hours worked, and working more than 50 hours, respectively. These results are essentially unchanged. We recognize that this serves as only an illustration, but it confirms a link between performance pay and health and, at least suggests, it is not driven by hours.

## 6. Patterns of heterogeneity

There likely exist large difference across occupations in terms of what precisely performance related pay contracts involve, and the extent to which hours are readily varied by workers. As a starting point, Table 5 reports estimates split broadly into white-collar and blue-collar workers according to occupational codes. These demonstrate higher effects on total hours worked for blue-collar workers. They also continue to demonstrate the importance of sorting as the fixed effect estimates remain much smaller. The fixed effect estimates for blue-collar workers are almost twice the size of those for white-collar workers for both PRP and bonus/profit shares. Yet, the pattern is interesting as the larger blue-collar estimate is on a small base of only 34 hours compared to the smaller white-collar estimate which is on a base of 38 hours.[16]

To investigate and illustrate this point further Table 6 provides estimates for workers at two broad ends of these occupational spectrum, managers and labourers. The picture is more extreme version of that just examined. The PRP estimates for labourers are three times those of managers. Sorting continues to explain most of the initial estimates within each occupational group. In the fixed effect estimate the influence of

[15] A full set of such interactive estimates is available upon request and routinely show that the influences fall far short of additive.

[16] Venkatesh (2022) documents a growing work hours difference in favor of those in more educated occupations.

**Table 5**
Performance pay and total hours worked, blue vs white collar workers.

| | (1) White Collar OLS | (2) White Collar FE | (3) Blue Collar OLS | (4) Blue Collar FE |
|---|---|---|---|---|
| PRP | 1.744*** | 0.446*** | 2.509*** | 0.789*** |
| | (0.116) | (0.0839) | (0.215) | (0.176) |
| Bonus/Profit Share | 0.927*** | 0.474*** | 2.194*** | 0.911*** |
| | (0.105) | (0.0761) | (0.166) | (0.128) |
| Constant | 43.59*** | 39.23*** | 35.39*** | 43.36*** |
| | (0.610) | (3.658) | (0.880) | (6.336) |
| Sample Mean | 38.77 | | 33.77 | |
| Observations | 81,026 | 81,026 | 41,685 | 41,685 |
| R-squared | 0.214 | 0.020 | 0.316 | 0.024 |
| Number of workers | | 25,841 | | 16,838 |

All include controls for year of interview, month of the year, age, educational level, gender, marital status. All models include occupation and industry fixed effects at the 1 digit level (9 categories for each). Robust standard errors in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level respectively.

**Table 6**
Performance pay and total hours worked, managers and labourers.

| | Managers | | Labourers | |
|---|---|---|---|---|
| | OLS | FE | OLS | FE |
| PRP | 1.165*** | 0.221 | 3.434*** | 0.784* |
| | (0.189) | (0.155) | (0.505) | (0.412) |
| Bonus/Profit Share | 1.536*** | 0.422*** | 3.148*** | 1.223*** |
| | (0.180) | (0.143) | (0.331) | (0.267) |
| Constant | 42.66*** | 47.63*** | 31.04*** | 18.31 |
| | (1.099) | (7.067) | (1.586) | (15.10) |
| Sample Means | 42.57 | | 32.05 | |
| Observations | 19,484 | 19,484 | 11,295 | 11,295 |
| R-squared | 0.129 | 0.012 | 0.360 | 0.024 |
| Number of workers | | 7566 | | 5733 |

All include controls for year of interview, month of the year, age, educational level, gender and marital status. All models include occupation and industry fixed effects at the 1 digit level (9 categories for each). Robust standard errors in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level respectively.

PRP on hours is, for the first time, both very small and insignificantly different from zero. This happens despite a sizable share of managers receiving PRP. The fixed effect estimates for labourers remain significantly different from zero at about 0.8 of an hour for PRP and 1.2 hours for bonus/profit shares. Critically, the near absent effect for managers is on a base of over 43 hours while the larger estimates for labourers are on very small base of only 32 hours.

The picture of the harried manager working long hours as a response to incentives from performance pay is simply not evident.

This picture remains absent in examining the determinants of working long hours. Table 7 present OLS and fixed effects estimates of the probability of long hours by managers and by labourers. Focusing on the last four columns, performance related pay is associated with a significant increase of 1.9 percentage points in the probability of working more than 50 hours in the OLS estimate but an insignificant increase of less than 0.8 of a percentage point in the fixed effect. These are on a base of 14.8 percent of all managers reporting working more than 50 hours.

The evidence on labourers again paints a very different picture. Performance related pay is associated with a significant increase of 5.1 percentage points in the probability of working more than 50 hours in the OLS estimate. This drops only modestly to a 4.3 percentage point increase in the fixed effect estimate. This is large both absolutely and in terms of the underlying probability as 7.1 percent of all labourers report working more than 50 hours.

This pattern is repeated in examining the bonus variable. The fixed effect estimate for managers is small and insignificant while that for labourers is large and statistically significant. Thus, if managers are

**Table 7**
Probability of working long hours, managers and labourers.

| Greater than… | (1) 40+ manager OLS | (2) 40+ manager FE | (3) 40+ labourer OLS | (4) 40+ labourer FE | (5) 45+ manager OLS | (6) 45+ manager FE | (7) 45+ labourer OLS | (8) 45+ labourer FE | (9) 50+ manager OLS | (10) 50+ manager FE | (11) 50+ labourer OLS | (12) 50+ labourer FE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRP | 0.0306*** | −0.00617 | 0.0633*** | 0.0280 | 0.0293*** | 0.00192 | 0.0703*** | 0.0373* | 0.0194** | 0.00962 | 0.0523*** | 0.0406** |
| | (0.0102) | (0.00942) | (0.0206) | (0.0241) | (0.0105) | (0.00982) | (0.0195) | (0.0226) | (0.00781) | (0.00825) | (0.0158) | (0.0203) |
| Bonus/Profit | 0.0948*** | 0.0297*** | 0.0873*** | 0.0342** | 0.0661*** | 0.0176** | 0.0542*** | 0.0357** | 0.0307*** | 0.00370 | 0.0168* | 0.0303*** |
| | (0.00937) | (0.00884) | (0.0131) | (0.0159) | (0.00903) | (0.00887) | (0.0122) | (0.0150) | (0.00682) | (0.00781) | (0.00906) | (0.0117) |
| Constant | 0.433*** | 0.925** | 0.183*** | 0.229 | 0.287*** | 0.593 | 0.130*** | 0.636 | 0.215*** | −0.120 | 0.0756** | 0.390 |
| | (0.0489) | (0.439) | (0.0453) | (0.599) | (0.0480) | (0.458) | (0.0405) | (0.492) | (0.0361) | (0.381) | (0.0306) | (0.424) |
| Observations | 20,121 | 20,121 | 11,209 | 11,209 | 20,121 | 20,121 | 11,209 | 11,209 | 20,121 | 20,121 | 11,209 | 11,209 |
| R-squared | 0.092 | 0.006 | 0.200 | 0.012 | 0.066 | 0.007 | 0.134 | 0.016 | 0.039 | 0.006 | 0.068 | 0.014 |
| Number of workers | | 7586 | | 5599 | | 7586 | | 5599 | | 7586 | | 5599 |

Notes: Estimated linear probability models. All include controls for year of interview, month of the year, age, educational level, gender, marital status. All models include occupation and industry fixed effects at the 1 digit level (9 categories for each). Robust standard errors in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

working themselves into ill health, it is not because of performance pay. Instead, it is labourers that "when liberally paid by the piece, are very apt to overwork themselves, and to ruin their health and constitution in a few years (Smith 1776, p. 83)."

## 7. Conclusions

Performance pay has been linked to a wide range of worse worker health outcomes. Yet, the mechanisms that cause these worse outcomes remains in doubt. One candidate emphasized, but rarely tested, claims that the hours of work increase under performance pay and that the increase is sufficient to harm health. Despite this claim, standard theoretical treatments of performance pay provide ambiguous predictions on the effect of hours worked. At a minimum, if results are rewarded rather than hours, the influence on hours remains unclear. This paper explored performance pay and hours worked using representative longitudinal data for the UK.

On average, performance pay is robustly associated with both longer worker hours and a higher probability of working very long hours, the margin at which we think negative effects of hours worked may be concentrated. Yet, standard worker fixed effects estimates suggest that most of the influence of performance pay results from sorting. Workers who prefer to work longer hours sort into payment by performance, and performance pay perhaps allows them to receive a (more direct) return on their desire to work long hours. While the remaining effects (after sorting) are statistically significant, they appear to be too small to likely generate the range of negative health effects documented in the literature. This is confirmed by our event study.

Heterogeneity in the average result exists. Performance pay has larger links to working hours for blue-collar workers. The extent of sorting appears far less than that for white-collar workers. Thus, for blue-collar workers it remains possible that performance pay could drive hours and these extra hours help cause poorer worker health.

This becomes even more evident when focusing on extremes within blue- and white-collar workers. At the most damaging margin of working more than 50 hours, there is little or no evidence that performance pay for managers plays a role beyond sorting. Managers would work long hours independent of payment method. At that same margin, blue-collar labourers on performance pay exhibit little sorting. The influence of performance pay increases the probability of long hours dramatically.

Reductions in worker health may generate externalities when the related expenses and trauma are not part of the employment relationship and are instead borne by families, communities, and governments. To the extent this is true, there may be a policy rationale for regulating the causes of such reductions. Our evidence suggests that while limiting the extent of performance pay could reduce the health harming long hours of blue-collar labourers, it is unlikely to change the health harming long hours of managers.

## Data availability

The authors do not have permission to share data.

## Appendix

Tables A1, A2 and A3

**Table A1**
Summary statistics, 1998–2018.

| | No PRP | | Performance Related Pay Only | | Bonus / Profit Only | | Both Bonus/Profit & Performance Related Pay | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std.Dev | Mean | Std.Dev | Mean | Std.Dev | Mean | Std.Dev |
| Normal Hours | 32.77 | 10.25 | 35.66 | 8.04 | 35.41 | 8.75 | 36.96 | 7.47 |
| Overtime | 3.10 | 5.22 | 4.58 | 6.46 | 3.84 | 5.48 | 4.60 | 5.94 |
| Age | 41.65 | 11.40 | 40.47 | 10.82 | 40.41 | 11.24 | 38.95 | 10.43 |
| A Level | 0.22 | | 0.19 | | 0.26 | | 0.21 | 0.41 |
| Diploma | 0.21 | | 0.22 | | 0.26 | | 0.27 | 0.44 |
| Degree or Higher | 0.39 | | 0.50 | | 0.31 | | 0.43 | |
| Male | 0.41 | | 0.47 | | 0.56 | | 0.62 | |
| Married | 0.57 | | 0.59 | | 0.57 | | 0.59 | |
| Observations | 91,943 | | 8876 | | 26,363 | | 12,266 | |

**Table A2**
The Effect of performance pay on total hours worked split by occupation/industry changes, worker fixed effects estimates.

| | (1) Changes Occupation / Industry | (2) Did Not Change Occupation / Industry |
|---|---|---|
| PRP | 0.805** | 0.537*** |
| | (0.313) | (0.0815) |
| Bonus/Profit Share | 1.378*** | 0.517*** |
| | (0.259) | (0.0698) |
| Constant | 30.22*** | 39.05*** |
| | (10.01) | (3.405) |
| Observations | 34,839 | 96,613 |
| R-squared | 0.064 | 0.022 |
| Number of Workers | 27,505 | 27,366 |

All include controls for year of interview, month of the year, age, educational level, gender, marital status. All models include occupation and industry fixed effects at the 1 digit level (9 categories for each). Robust standard errors in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

**Table A3**
Alternative measures of performance pay and total hours worked.

| | (1) OLS | (2) OLS | (3) FE | (4) FE |
|---|---|---|---|---|
| Performance Related Pay Only | 2.909*** | | 0.873*** | |
| | (0.147) | | (0.101) | |
| Bonus / Profit Share only | 1.687*** | | 0.820*** | |
| | (0.0992) | | (0.0690) | |
| Both Payment Types | 2.655*** | | 1.245*** | |
| | (0.130) | | (0.0971) | |
| Performance Pay (Either Type) | | 2.174*** | | 0.906*** |
| | | (0.0854) | | (0.0591) |
| Constant | 37.71*** | 37.72*** | 39.32*** | 39.34*** |
| | (0.548) | (0.549) | (2.855) | (2.855) |
| Observations | 131,452 | 131,452 | 131,452 | 131,452 |
| R-squared | 0.269 | 0.268 | 0.027 | 0.026 |
| Number of Workers | | | 39,190 | 39,190 |

All include controls for year of interview, month of the year, age, educational level, gender, marital status- All models include occupation and industry fixed effects at the 1 digit level (9 categories for each). Robust standard errors in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

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