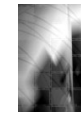

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Britain's older employees in decline, 1990–2006: a panel analysis of pay

Deborah Smeaton
University of Westminster, UK

Michael White
University of Westminster, UK

Abstract
Older employees' wages and earnings declined over the period 1991–2006, when compared with younger employees. The overall fall in relative wages was about 18 per cent, and for relative earnings 21 per cent. The article argues that this change was predictable in view of the pressures of 'globalization' resulting in increased competition, and intensified technological and organizational change, for many employers from the 1990s onward. The relative fall in older female and male employees' pay had set in by the mid-1990s and it proceeded over the whole period to 2006.

Keywords
age, gender, globalization, pay

Introduction

Sociology has viewed the position of the older worker as a relatively privileged one. The theory of the life course has indicated how State and employers made provisions for a smooth and predictable transition for workers into pensioned retirement. During the 1980s, even as precarity and 'destandardization' (or 'individualization') of the life course emerged as new paradigms (Beck, 1992; Guillemard and Rein, 1993; see also Hofäcker, 2010), older British employees often received substantial protection, especially through pensionable early retirement options offered by corporate pension funds, while in some

Corresponding author:
Michael White, Policy Studies Institute, University of Westminster, 35 Marylebone Road, London NW1 5LS, UK.
Email: whitemi@virginmedia.com

other European countries a similar protective role was played by State early retirement policies (Hofäcker, 2010).

On the other hand, certain groups of older workers in Britain, especially those at the less-skilled and low-paid margin, were affected by unemployment in the 1980s and by precarity in the 1990s (Lain, 2012; Lissenburgh and Smeaton, 2003; McLaughlin and Millar, 1989; Standing, 2011). Since about 2000, moreover, there has been mounting evidence of a crisis even for older British employees in 'regular' jobs. Policy-orientated studies, mounted around that time, consistently report that they are being adversely affected by increased work-strain, often leading to movement into non-employed status. Such evidence comes equally from case studies (e.g. McNair and Flynn, 2005), from qualitative work (e.g. Loretto and White, 2006; Roberts, 2006) and from large-scale survey analysis (e.g. Hintsa et al., 2015; Smeaton et al., 2010). There has also been growing evidence from attitudinal data of older employees becoming less happy and less committed (e.g. Felstead, 2010; White and Smeaton, 2016).

Our interpretation is that during the 1990s and early 2000s employers decided that their previous favourable treatment of older employees was no longer sustainable, and moved toward a tighter 'effort–reward bargain'. During this period several circumstances favoured such a tendency: increasing competitive and financial pressure on firms as economies became more open (the 'globalization' thesis – Dreher et al., 2008); analogous pressures on the public sector as government pressed on with quasi-markets and budgetary cuts (Morgan et al., 2000); new technology that made it easier for management to monitor performance (Green, 2006); and regimes of continuous change in work organization, with attendant pressures (Worrall and Cooper, 2001). This evidence and that cited in the preceding paragraph suggests that the route taken by employers in that period was to press upon the effort side of the effort–reward bargain, through work intensification coupled with reduced job protection (see also Burchell et al., 2002). Very little attention, however, has so far been paid to the reward side, i.e. to wages and earnings (for a partial exception, see George et al., 2015, who describe the incidence of low pay by age-group).

The main purpose of the present article is to fill this gap by providing estimates of older employees' wages and earnings over time, in comparison with younger employees. The chief new finding from this research is that older employees have been losing out financially, relative to younger employees, over a period starting in the mid-1990s and continuing through to a pre-recession terminal date of 2006. In making these estimates it is important to take account both of differences in observable attributes, such as qualifications and experience, between older and younger groups, and of the role of unobserved productive abilities. Panel data analysis methodology is used to meet this need. The article also provides separate age-specific estimates by gender. This is customary with analyses of wages and earnings, and permits a further test of the conceptualization. It incidentally responds to the criticism by Loretto and Vickerstaff (2015) that the gender dimension has been neglected in research on older-age employment.

This article is not concerned with the issues around 'ageism' and age stereotyping, although these may well be involved in the processes by which employers put pressure on older employees' effort–reward bargain (Loretto and Vickerstaff, 2015; Ng and Feldman, 2012). The point of the present article is that the relationship between employers and

employees as a whole is being altered by a changing distribution of financial rewards over the working life. This has long-term implications for employees of all ages.

From privilege to decline

To explain why the relative pay position of older employees is declining, we present a conceptual and theoretical argument in four steps, as follows. (1) Historical evidence and economic theory suggest that older employees have *until the recent past* had relatively favourable financial treatment, vis-a-vis younger employees. (2) Entering the 1990s many established employer policies, including treatment of older employees, are disturbed by socioeconomic change at a macro level. (3) A macro-to-micro link emerges as employers prioritize cost reductions in response to competitive and financial pressures, and make older employees a cost reduction target. (4) There are straightforward methods by which employers can reduce the relative pay of older employees, if or when they choose to do so.

(1) Employer-provided benefits and welfare provisions in Britain have often been conditional on length of service, thus favouring older employees (see, for example, Fitzgerald, 1988; Russell, 1991). Pay has also reflected length of service, through the use of annual increments, grade progression, enhanced chances of promotion with seniority, and increased protection against layoff or dismissal. Seniority benefits and rules are also prominent features of employment relations and 'internal labour markets' in the USA (Edwards, 1979).

An economic explanation for these observed tendencies is found in the theory of deferred compensation, that depicts service-based rewards for employees as solutions to an incentivization problem (see especially Lazear, 1981; for sociological perspectives, see also Goldthorpe, 2007: 114–16; Sørensen, 2000: 1546). Under the Lazear model, the individual accepts under-payment (relative to productivity) during the early years of organizational service in return for over-payment in later years (for evidence supporting this theory, see the review by Prendergast, 1999). This arrangement is rendered advantageous to both employer and employee through a sharing of rents from a reduction in supervisory and performance monitoring costs that it achieves. Individuals maintain performance because of the implied threat of dismissal for 'shirkers', who thereby forfeit deferred compensation.

(2) There has been recognition among sociologists of macro-level change in socioeconomic relations commencing in the 1970s or 1980s and intensifying subsequently. This watershed has been characterized in various ways and referred to by various labels, among which we prefer 'globalization' on grounds of common usage. To render this somewhat broad term more precise, the Swiss Federal Institute of Technology (ETH) has developed the KOF index that combines numerous quantified indicators of economic, informational and cultural transactions at an international level (Dreher et al., 2008; www.globalization.kof.ethz.ch). Using this index one sees that world and European globalization trends steeply up in the 1990s, with the UK having consistently the highest KOF index among the four largest economies of Europe. Increased globalization implies increased openness to competition and likely increased competitive pressures on many firms. A simpler indicator of competitive pressure, the ratio of internationally traded goods to GDP, also rose over the same period (Ladipo and Wilkinson, 2002: 11–15).

The other main development that marked out the 1990s as a period of intensified change for the employment relationship was the advent of the 'network society' and the 'informational' era (Castells, 2000). Associated with this development of technology and communications infrastructure, many employers also chose to pursue a reshaping of work organization (Grimshaw et al., 2001).

(3) When employers are subjected to increased cost competition and increased demands from financial markets or State budgets, it is reasonable to suppose that they will look at areas of high labour cost for savings. The US manufacturing study of Koeber and Wright (2001) showed downsizing to be concentrated in industrial branches having high proportions of relatively high-paid older (male) employees. Employers are also likely to look to technological and organizational innovation to produce cost savings. Notably, the electronic surveillance of work spread rapidly in the 1990s, taking the place of costlier personal methods of monitoring and control, and supporting work intensification (Green, 2006: 68–93). This development implies reduced monitoring costs to offset against the costs of using deferred compensation. Deferred compensation practices accordingly become less cost-effective.

(4) From the viewpoint of the employer seeking cost savings, it is particularly easy to focus on older employees' pay if a regime of deferred compensation has been in place. The employer has only to even out age differences, and the relative position of the older employee deteriorates while costs are reduced. For instance, automatic service increments can be reined in by making increases contingent on performance assessment carried out through appraisals, or across-the-board increases can be replaced by individual and team incentives. Processes of 'de-layering' (e.g. cutting middle management jobs) may also be involved, at least until the late 1990s (Chartered Institute of Personnel and Development (CIPD), 2003). Furthermore, older employees have a relatively weak market position because of firm-specific skills, and in many cases are locked in by pension schemes. Provided that adjustment in pay relativities is made through agreed pay processes, unions are powerless to object.

Hypotheses and methodological issues

The foregoing discussion suggests that cost pressures and work restructuring, coupled with cost and performance aims of employers, encourage downward revision of pay relativities for older employees. To test this concept one needs a dataset that provides information on pay with comparisons by age and between different years, coupled with adequate control information. The British Household Panel Survey (BHPS) meets these requirements. We analyse the period 1991 to 2006 inclusive, leaving out 2007 and 2008 because these years are likely to be influenced by the early stages of the financial recession. Comparable information is not available beyond 2008, because in 2009 the BHPS was replaced by the Understanding Society longitudinal survey with many changes in questioning, and a decline in response rate.

Given this observation period, the following hypotheses are proposed:

H1: The pay of older employees is predicted to fall over time relative to those of younger employees. This hypothesis is tested in two ways:

H1a: A relative fall in the hourly rate of pay ('wages').

H1b: A relative fall in weekly earnings ('earnings').

Our idea that declining pay is driven by employers' cost reduction aims also has a gender-specific implication. Since older female employees are less costly than older male employees (as a result of the gender pay gap), employers are likely to pursue a reduction in their relative pay less strongly. We therefore frame a further hypothesis:

> H2: The decline in the pay situation of older employees is likely to be greater for male than for female employees. (H1 predicts that both female and male older employees experience declining relative pay, but H2 predicts female to a lesser and male to a greater extent.)

In planning tests of hypotheses, one should consider threats to validity. Analysis of effects on pay may be biased by persistent ability differences that affect economic outcomes but are not fully captured by qualifications. Ability bias is likely to be a serious problem in comparisons between older and younger groups because of secular change in educational provision. In the sample used for the present research, 46 per cent of observations on employees aged under 45 report a degree, sub-degree or advanced-level school-leaving qualification, while the corresponding figure for employees aged 45-plus is 28 per cent. Because of this disparity, uncertified ability manifesting itself in the work situation is likely to play a larger part in the pay outcomes for older employees. If this is not taken into account, the estimated effect of age on pay will be upwardly biased.

To minimize this difficulty, the present research adopts the 'fixed effect' (FE) model of panel data analysis (Allison, 2009; Wooldridge, 2002: 275–84). The FE model eliminates the biasing effect of unobserved constant variables. How this is done is described in more detail in the 'Data and analysis' section below.

The chief limitation of the FE method is that it rules out estimation of effects that are observable but fixed over time. The obvious problem here is gender: even in the absence of H2, it would not be sensible to conduct a pay analysis that ignores gender. We therefore introduce two methods that address gender difference despite the use of an FE framework. First, following a suggestion of Allison (2009), in a model that is pooled over gender we include the combined effect of gender and family variables, the required variation being supplied by the time-varying family variables. However, while this 'back-door' method of introducing gendered controls provides considerable protection against gender-bias in the estimation of age effects across the whole sample, it is not sufficient to yield estimates of the marginal or partial effect of gender itself, since the gender 'main effect' is excluded. Accordingly we also perform separate FE analyses for the female and male subsamples alongside the pooled analysis. One can then compare and test gender differences in the age effects over time to test H2.

Data and analysis

Data

The BHPS provided the dataset for this research. The initial sample for the BHPS was drawn in 1990 and consisted of full interviews with 9912 individuals from 5538 households that were drawn as a random stratified household sample. Members were

interviewed annually. Representativeness was maintained by rules concerning the interviewing of people moving from or joining households. The dataset and documentation for the BHPS are available through the UK Data Service. We have excluded from analysis all booster samples that were added to the source sample for reasons extraneous to the original sampling plan. We confined analysis to the years 1991–2006, thereby minimizing confounding from the run-in to the recession commencing 2007–8. Further, we limited the analysis to observations when individuals were aged 20–60 years. This reduced problems of selection into employee status that might bias estimates: ages 16–19 being peak student years and ages 61–65 being peak years for (early) retirement and disability/incapacity status.

Analysis

The FE panel model was applied in the analysis. In this model, all attributes that are constant over time (whether observed or unobserved) are eliminated. This is achieved by transforming all the variables in the analysis by subtracting the individual mean from the observed value. The method is often referred to as 'within regression' because one uses the variation around the mean within each individual. However, as this terminology can be confusing, it is perhaps more helpful to conceive the analysis simply as a clustered OLS performed with transformed variables, where the clusters are each individual's observations over time, and the transformation is achieved by individual de-meaning. It is the subtraction of the mean values that purges the data of unobserved effects that are constant over time, such as ability and personality. Estimated main effects for categorical variables (e.g. age-group) represent conditional mean differences averaged across years, as in pooled OLS. If one wishes to compare what happens over time (e.g. by how much the age-group difference changes), one has to introduce time (years) explicitly into the model in interaction with age-group.

The downward bias on estimated standard errors that arises from clustered data was removed by use of a robust variance estimator (for robust regression, see Berk, 1990). The robust estimator also takes account of heteroskedasticity arising from varying numbers of observations per person, and of serial error correlation (see Wooldridge, 2002: 282–3).

Panel data analysis can be applied either to a 'balanced' or an 'unbalanced' panel, where balanced means that all sample members are observed at all waves of the panel. We analysed the unbalanced panel, since balanced analysis would have excluded too many cases. We only analysed those years in which the individual had employee status. After a break in employment, subsequent observations of resumed employee status were included.

Because of the unbalanced nature of the panel to be analysed, it was not possible to weight the data. However, as detailed in the subsection on control variables (see later), the analysis included controls that were used in constructing the original panel (see Taylor et al., 2011 and the BHPS documentation).

Assessment of employment participation bias and attrition bias. A comparison of older with younger employees' wages may be affected by different employment participation rates in the two groups. A similar problem is that attrition from the sample may be higher in

Table 1. Descriptives for dependent variables.

	Log hourly wage	Log weekly earnings
Mean	1.951	5.518
Standard deviation	0.540	0.779
N of observations	49,853	51,138

Note: Unweighted statistics for employee respondents aged 20–60, filtered to 'non-missing' on the respective analyses with full controls.

one group than in the other. We sought to reduce employment participation bias by two means: by excluding ages 16–19 and 61–65, where non-participation rates are highest, and by the inclusion in all analyses of control variables that are known to influence both participation and pay (see below for details). We also checked more directly for the presence of participation bias and of attrition bias.

The method used was that recommended by Wooldridge (2002: 581–6). This was to include, additional to the model specification, a dummy variable that switches value from 0 to 1 in the year before an individual exits the panel or exits a given status. If the coefficient on this dummy is significant then there is a non-ignorable problem. We adopted this method in separate analyses relating to attrition and to participation. For the attrition analysis, the dummy variable was given value 1 in the year prior to exit from the panel (if any). For the participation analysis, the dummy variable was given value 1 in each year when an individual was an employee but became a non-employee in the following year. In both analyses, the indicator was interacted with age-group so as to investigate the extent of bias for each group.

Dependent variables. We estimated models of wage and earnings (in the most recent pay period at each wave of the panel survey) transformed in natural logarithms (Table 1). Some cases (n=62) with outlying values of these variables, including zero paid hours, were excluded following preliminary investigation.

Explanatory variables. Explanatory variables consisted of year dummies, an age-group dummy (younger (age under 45)=0, older (age 45-plus)=1) and the year by age interactions (see Allison, 2009 for the time-interaction method). Age-group was identified in the analysis because at each year some individuals crossed from the under-45 to the 45-plus age-group.

Age 45 years is taken as the cut-point between older and younger employees because lifetime earnings profile studies have tended to find that the rising curve of earnings flattens out in the mid-40s; also, it is from the mid-40s that employees becoming unemployed are at seriously increased risk of long-term unemployment. Thus, the mid-40s seem to provide a significant change-point. However, an age cut of 50 has been used by others (e.g. Claes and Van de Ven, 2008; Felstead, 2010) and this is also defensible: for example, some occupational pension schemes have provided for early retirement at 50, and popular stereotypes about 'older workers' seem often to refer to over-50s (Loretto and White, 2006). To check whether this choice matters, we ran models with both of the

cuts: 50-plus vs under 50 as well as 45-plus vs under 45. We found that the patterns of results (not tabulated here, but available on request) were closely similar.

Variant analyses were conducted for sub-samples split on gender (see the earlier section on 'Hypotheses and methodological issues'). Splitting the sample in this way allowed the covariances to differ between female and male employee subpopulations. Gender differences in estimated coefficients were established by two-sample tests of corresponding age-group × year interaction terms.

Control variables. Control variables were included in all analyses, in order that the effect of age-group could be estimated independently of other influences on wages and earnings. A full listing of the control variables is included in Table 1 of Appendix 1; here we explain the underlying rationale.

(1) We included variables that are commonly used in models of labour market participation and earnings. Individuals are less likely to participate in employment when the financial and psychic returns are low. By including variables that are predictive of returns to employment, we reduced potential bias from sample selectivity.

From economists' human capital models, chief variables are education and experience. For education, we used highest educational qualification (four levels); we also included a dummy for professional qualification. These qualifications were expected to increase earnings (Becker, 1993[1964]). Experience prior to panel entry is a fixed variable and is therefore eliminated with other constant attributes, but we represented experience gained subsequent to panel entry by counting (at each wave) the number of waves at which the individual had so far been observed in employee status, and also by the square of this number. Earnings usually are seen to increase initially with experience but eventually this effect flattens out and even declines somewhat (Mincer, 1974).

We also included a condensed three-category class variable (Erikson and Goldthorpe, 1993). Economists usually omit variables of this type, on the assumption that occupational level is determined by human capital and ability. Sociologists have, however, argued that certain class positions permit incumbents to obtain additional 'rents', although this has also been disputed (Goldthorpe, 2007; Sørensen, 2000). If class is interpreted as a measure of attained skill (e.g. Tählin, 2007), and if skill is (largely) firm-specific, then class-based rents may be available for incumbents (Becker, 1993[1964]).

Family variables are also important for employment participation. In the present analysis they were separately defined for women and men: marital status, whether the spouse/partner was in paid employment, and the age of the youngest dependent child – a variable that affects childcare costs and constraints. Also included was non-labour income of the past year, which economic studies have shown to reduce the probability of participation.

(2) Wages and earnings can be influenced by employment conditions that vary over time, and may be differently distributed over age-groups. We included t*ype of contract* (permanent versus not) and taking part in a *bonus or incentive* scheme. Both were expected to increase pay.

(3) Also included in the specification were several workplace structural variables that usually affect pay; their inclusion reduces residual variation and thus increases the precision of the estimates that are of interest. The most important was the presence of a union

representing the job-type held by the employee; most research has shown a substantial union mark-up on the wage. Other variables under this heading were an 11-category industry variable, a seven-category workplace size (number of employees) variable and a dummy for private sector. The particular importance of industry for research on older employees has been signalled by studies such as Koeber and Wright (2001) or Roberts (2006), referred to earlier. Those studies suggest the potential value of explanatory research on industry variation in older-age effects, though that lies outside the scope of the present article.

(4) Finally, we included certain variables that reflect sample stratification based on economic resources: car ownership; housing tenure; and region (11 dummies). Inclusion of these variables was intended to compensate for the absence of weighting in the panel analysis (Taylor et al., 2011).

Sociologists have been interested in the influence of birth cohort and labour market cohort membership on life chances (e.g. Elder, 1974). The present study did not address these variables since they are fixed prior to the panel and therefore are eliminated by the FE method.

Presentation of results. We have presented the results of the panel analysis in both chart and tabular form. Each chart compares *mean marginal predictions* (or 'marginal means') for older and younger employee groups across the years of the panel. Each marginal mean (e.g. marginal mean for under 45 in year 3) was calculated by applying the model coefficients to the data, imposing the specified values of the focal regressors on all cases but leaving all other variables at their observed values (Wooldridge, 2002: 14–18). The charts therefore show how the model-generated means for older and younger groups move over the observed years. (Note that the marginal means incorporate main effects of the interacted variables.) Confidence intervals (95%) are shown on the charts but are not sufficient for evaluating significance with respect to the hypotheses. For significance testing, we tabulated the age-group × year coefficients in the model, relative to the base year. At each year, this permitted a test of whether the older versus younger effect differed significantly from that effect in the base year.

Results

Figure 1(a) and (b) show the marginal means for the wage and earnings outcomes, for the whole sample. Figure 1(a) reveals that older employees started out in 1991 with a higher wage, on average, than younger employees, but this advantage got progressively smaller until at year 1997–8 there was a cross-over, after which it was the younger employees who pulled ahead. Figure 1(b) shows a larger initial gap in earnings in favour of older employees, and it was not until 2003 that younger employees overtook them.

Table 2 summarizes the corresponding interaction coefficients and significance tests. The relative wage of older employees turned significantly (at the 1% level) negative from wave 7 (1997) and moved steadily down until it was about 18 per cent lower (relative to younger employees) in 2006 than in the base year. The relative shift in weekly earnings became significantly negative (5% level) from 1995 on, and ended about 21 per cent down (compared with the base-year relativity) at 2006. The statistical test results provide evidence that supports hypotheses H1a (wages) and H1b (earnings).

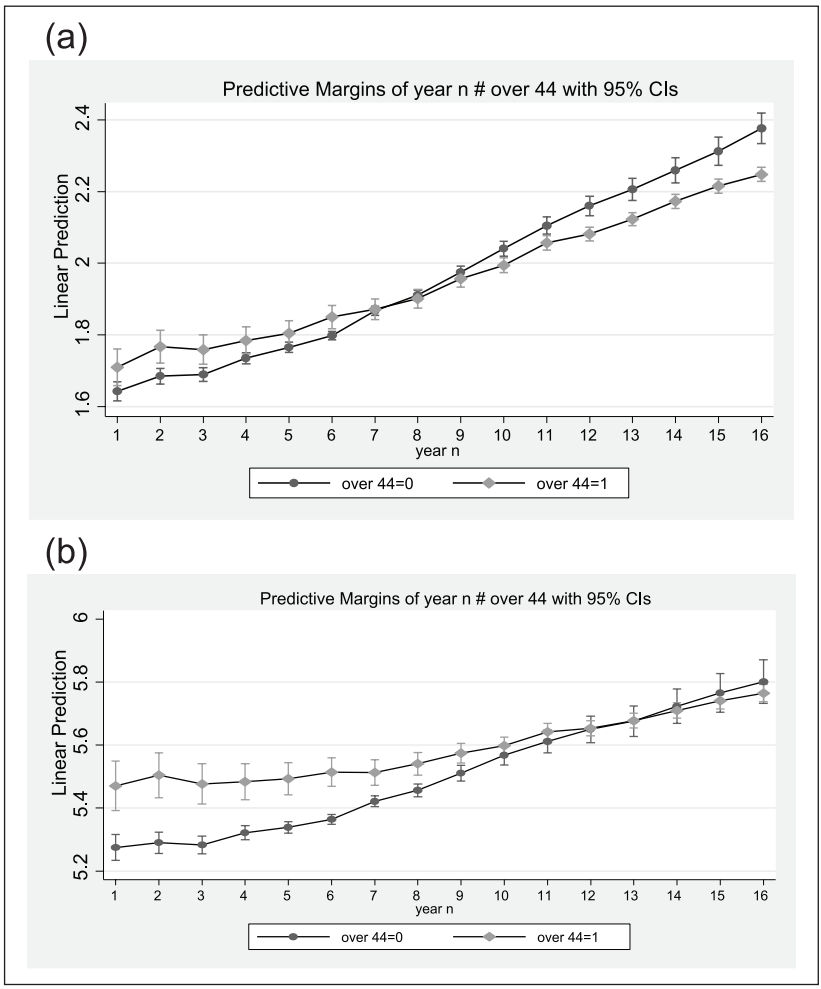

Figure 1. All employees: mean marginal predictions for age-group interacted with time (year): (a) log hourly wage; (b) log weekly earnings.
Notes: year 1=1991, year 16=2006; over 44=0 signifies age-group 20–44 and over 44=1 signifies age-group 45–60.

For presentational reasons the estimates for the control variables are not shown in Table 2. However, full results for the whole-sample analysis of wages are presented in Table 1 of Appendix 1; the corresponding table for earnings is available on request. The results for control variables were generally plausible. There were positive effects for holding a degree or a professional qualification, the linear effect of added experience was positive while the quadratic effect was negative, there was a pay advantage for those in the higher-skilled ('service') class of occupations, women with school-age dependent children were adversely affected in their earnings, and there were the expected positive

Table 2. 'Older worker' (45-plus vs under 45) effects over time: FE regression models of wage and earnings outcomes, all employees, full controls.

Effect of age (45-plus vs under 45), at each year relative to base year	Log wage		Log earnings	
At wave	b	|t|	b	|t|
2 (=1992)	0.015	1.17	0.019	1.31
3	0.002	0.18	−0.002	0.12
4	−0.017	1.16	−0.034	1.89
5	−0.028	1.72	−0.042	**2.17**
6	−0.015	0.93	−0.046	**2.22**
7	−0.062	**3.83**	−0.105	**4.81**
8	−0.077	**4.43**	−0.112	**4.90**
9	−0.085	**4.90**	−0.132	**5.63**
10	−0.113	**6.37**	−0.166	**7.01**
11	−0.116	**6.23**	−0.165	**6.76**
12	−0.146	**7.76**	−0.192	**7.61**
13	−0.151	**7.79**	−0.194	**7.40**
14	−0.154	**7.59**	−0.209	**7.83**
15	−0.165	**7.94**	−0.221	**7.88**
16 (=2006)	−0.195	**9.18**	−0.232	**7.86**
R^2 within	0.372		0.367	
N, rho	49,853, 0.689		51,138, 0.740	

Notes: Standard errors are computed with a robust estimator. Estimates significant at the 5 per cent level (or more significant) have emboldened *t*-statistic. 'Rho' is the proportion of error variance attributable to individual fixed effects.

effects of being in a large workplace, having a job covered by a union, being on a permanent contract, and receiving incentive pay.

Subpopulation analyses by gender

Summary charts of marginal age-year means are shown in Figure 2(a) and (b) for women, and Figure 3(a) and (b) for men. Older female employees began with slightly higher relative wages on average, but this gap declined until there was a cross-over in 2000–1. On earnings there was a larger initial gap and although younger women moved progressively closer to older women, the gap was not eliminated during the panel. For men, the initial wage gap in favour of the older group was small, and the cross-over took place by the mid-1990s. Older men's initial earnings advantage disappeared by about 1997 and the swing in favour of younger men was subsequently clear. The gender-specific results corresponding to Table 2 are shown in Table 2 of Appendix 1. The table shows that the interaction effects on wages and earnings were significant for both women and men from the mid-1990s through to 2006. The table also makes it possible to quantify the declines in pay by gender, and to perform tests relevant to H2. For older female employees, the start-to-finish relative decline was 14 per cent on wages and 18 per cent on earnings, but

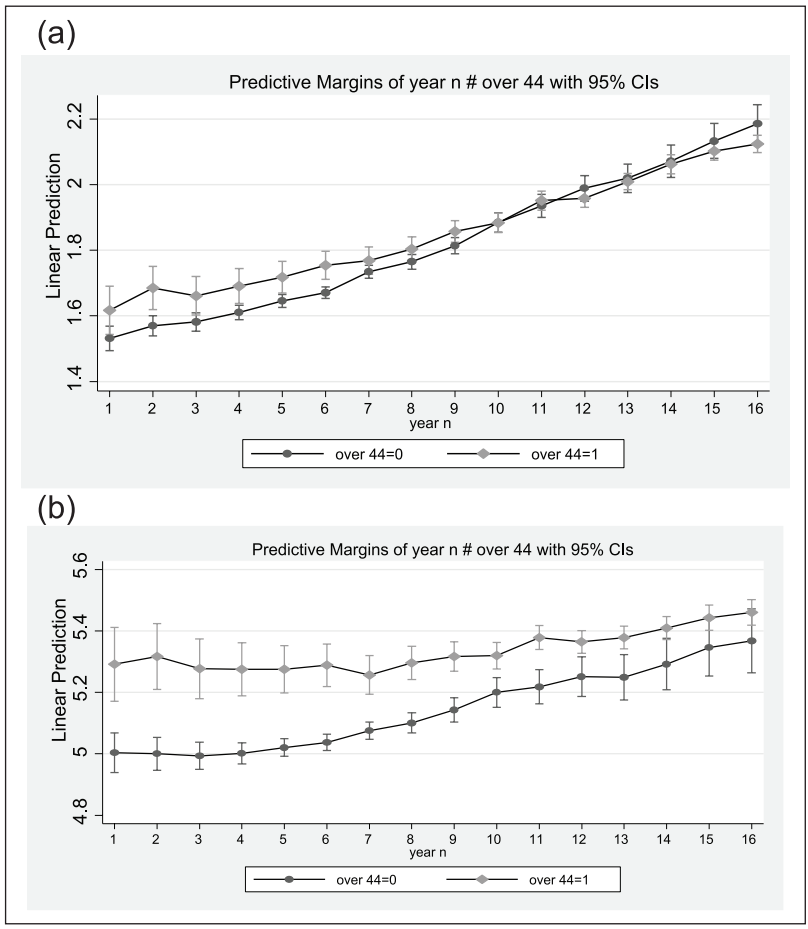

Figure 2. Female employees: mean marginal predictions: (a) log hourly wage; (b) log weekly earnings.
Notes: see Figure 1.

for older males the figures were considerably larger at 26 per cent and 32 per cent, respectively. The relative shift in wages was significantly greater for older males than for older females at each year from 1999 on, and the corresponding shift in earnings at each year from 2001 on, evaluated at the 5 per cent significance level. The comparisons thus provided evidence in support of H2.

Investigation of attrition bias and participation bias

Table 3 displays coefficients and *t*-statistics from the investigation of attrition bias and participation bias, as outlined in the 'Data and analysis' section. Panel (a) of the table shows that attrition bias is significant and positively signed for the under-45 age-group in

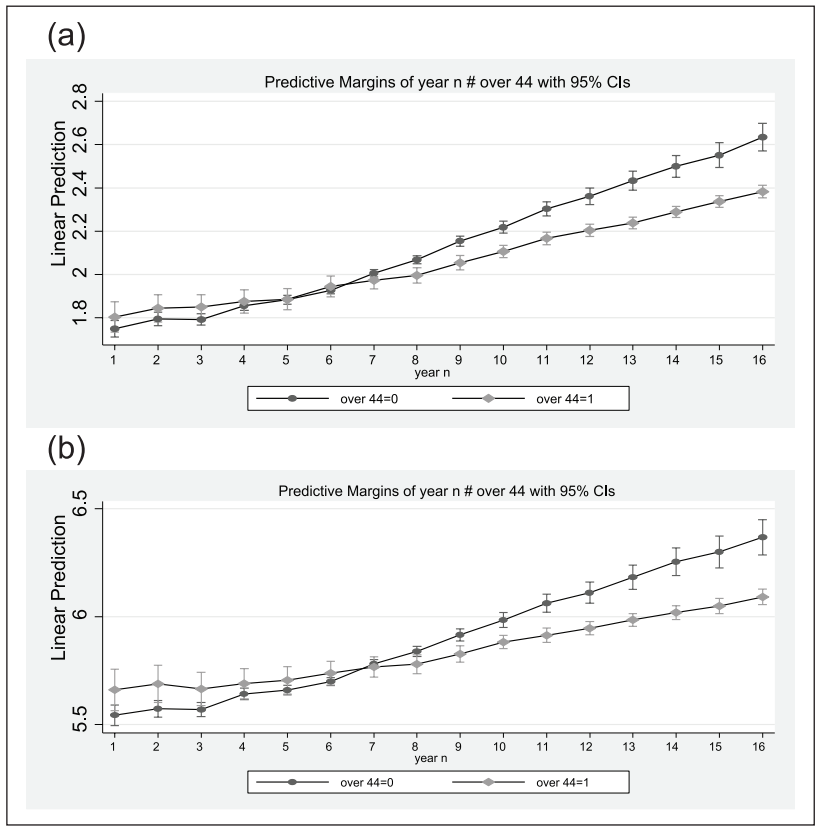

Figure 3. Male employees: mean marginal predictions: (a) log hourly wage; (b) log weekly earnings.
Notes: see Figure 1.

all the analyses, while it is negatively signed but mostly non-significant for the 45-plus age-group. If exiting sample members had remained in the panel, the younger age-group's average wage and earnings would have been somewhat higher, while that of the older age-group would have been about the same. Thus, the estimated effects of age-group in the main analyses were probably biased downward (i.e. conservatively toward zero).

Panel (b) shows that the estimates of the effects associated with exiting employee status were non-significant. There was no indication that the estimates were biased by sample selectivity into employee status.

Summary of findings

The research provides strong evidence of declining wages and earnings for older (aged 45–60) British employees during the period 1991–2006, relative to younger employees. Specifically, hypotheses H1a and H1b are supported. The research also clarifies the

Table 3. Estimates of attrition bias and sample selection (participation) bias effects, by age-group.

	Pooled sample		Female subsample		Male subsample	
	Wage (b, t)	Earnings (b, t)	Wage (b, t)	Earnings (b, t)	Wage (b, t)	Earnings (b, t)
(a) Attrition						
Leave and under 45	0.032, 4.03	0.038, 3.98	0.033, 2.90	0.048, 2.97	0.032, 2.94	0.041, 3.54
Leave and 45-plus	−0.014, –0.87	−0.033, –1.83	−0.031, –1.22	–0.057, –1.98	0.002, 0.10	−0.022, –0.98
(b) Participation						
Exit and under 45	0.006, 0.65	−0.011, –0.90	0.001, 0.10	−0.030, –1.85	0.018, 1.20	0.024, 1.41
Exit and 45-plus	−0.006, –0.39	−0.015, –0.77	0.016, 0.79	−0.019, –0.70	−0.029, –1.25	−0.008, –0.29

Notes: The model specification is as for the main analyses, reported in the Figures and in Table 2, except for the addition of an exit-indicator dummy that is interacted with age-group. See the 'Data and analysis' section for further details. Standard errors are computed with a robust estimator. *N*s are as shown in Table 2.

time-course of older employees' declining situation. Pay relativities for older employees decline progressively over the entire observation period, and the shift becomes significant by the middle of the 1990s – consistent with the time-course of the macrosocial developments outlined in the section headed 'From privilege to decline'. The magnitude of the relative decline, around 20 per cent, is indicative of the practical significance of these findings.

The relative wages and earnings of older male employees move more negatively over time than in the case of older female employees. This is consistent with H2, and with our conception of employers being focused on cost reductions and hence pressing down less heavily on older female employees' pay, since older men have relatively high pay (via the gender pay gap). Nonetheless, older female employees, as well as older male, experience significant and substantial declines in their relative wages and earnings.

These conclusions regarding relative financial reward complement earlier research concerning work-strain and psychic rewards (see 'Introduction'), and so complete the picture of a declining effort–reward bargain for older employees. The research has been guided by a 'macro-to-micro' heuristic in developing its conceptualization, and illustrates the value of panel data analysis in eliminating unobserved constant effects that may otherwise bias findings.

Discussion

The findings have broad implications for employment relationships and service contracts in the UK and raise the prospect of increased labour commodification. There is also a need to investigate the impact on employers' performance that arises from change in structures of incentive. The conclusion from an experimental study, that tested the relationship between the time structure of wages and worker effort, was 'an almost complete breakdown of worker–firm relations and a dramatic loss in efficiency in the absence of credible deferred incentives' (Huck et al., 2011: 840).

The erosion of age-related wage and earnings differentials points to a weakening if not abandonment of the deferred compensation paradigm, less employer tolerance for poorly aligned performance and rewards, and therefore fewer 'safe havens' (Vickerstaff, 2015) in late career; older workers are likely to be enduring more pressured working environments as a consequence with implications for well-being. As addressed in previous issues of this journal, tensions between equality and fairness arise alongside questions of dignity at work; systematic performance management and staff appraisal have become more widespread (particularly following the abolition of compulsory retirement age) and as conceptualized by Beck and Williams (2015: 271):

> synchronous equality based on continual comparison has replaced an a-synchronous, or processional approach in which younger people eventually benefit from a provision which favours older employees … a considerable departure from how age-groups have been managed to date.

Achieving equality (of pay, treatment or performance criteria) may therefore be at the expense of protecting older workers. Roberts (2006) has similarly argued that maximizing the efficiency of individual employees within the 'new capitalism' undermines traditional intergenerational relationships within the workplace with adverse implications for employment sustainability and the welfare of older employees; this is of particular concern given the policy priority of extending working lives.

On a more positive note, while developments in the pay/productivity relationship undermine older worker retention rates (see 'Introduction'), recruitment prospects later in life are probably improved by the same circumstances, and when (older) employees are mobile, employers face the costs of replacing firm-specific skills and thus come under pressure to maintain compensation. Studies have demonstrated a negative relationship between incremental pay scales, steep wage tilts and the probability of recruiting older workers (Hirsch et al., 2000). Good pension arrangements have similarly been shown to diminish the chances of older workers being recruited (Daniel and Heywood, 2007). Insofar as these financial barriers to mobility are being systematically eroded, older workers will find it easier to change jobs to match their needs or re-secure employment in the event of redundancy. However, there remain barriers to mobility, and these merit further investigation. Increased employment participation rates among the 50-plus over recent years have primarily been a retention phenomenon, with older workers delaying retirement from their career jobs (Smeaton, 2015). While employers are now more willing to retain older workers, so far the impetus to recruit has not increased to the same extent (Kidd et al., 2012). Greater labour market mobility at older ages would benefit national economic performance by allowing better job matching in terms of skills, productivity and preferences. Such a strategy does carry risks, however, at the individual level – of increased marginalization and the potential 'McDonaldization' of old age. To ensure opportunities later in life are not confined to positions of lower status, pay and skill, it is important that government bodies, unions and campaigning organizations continue to seek out and identify age discrimination, and work to change negative attitudes towards older workers that may be involved in their declining pay.

There are several ways in which it is desirable to take this research further in the future, including extending the examination of age-related changes in economic

situation to cover the recessionary and post-recessionary period in Britain. There are already signs that the trends evident from this study will have been consolidated over the past 10 years: pay progression is increasingly determined – particularly across the public sector (Income Data Services (IDS), 2013) – by appraisals and individual performance rather than length of service.

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Deborah Smeaton is a Principal Research Fellow in the Faculty of Social Sciences and Humanities at the University of Westminster. She is a mixed methods researcher with experience in survey design/quantitative data analysis and qualitative interviewing and analysis (including case study and focus group design). Deborah has been involved in a range of policy evaluations for the Department for Work and Pensions, and the Food Standards Agency. She is currently principal investigator of an Economic and Social Research Council (ESRC) project examining later life labour markets and the health implications of extended working life.

Michael White is an Emeritus Fellow of the Policy Studies Institute (PSI), University of Westminster. He is a quantitative researcher specializing in the analysis of large and complex datasets. He chiefly studies older workers, human resource management and industrial relations issues. He is a co-author of *Restructuring the Employment Relationship*, Oxford University Press (1998), *Managing to Change?*, Palgrave Macmillan (2004) and *Market, Class, and Employment*, Oxford University Press (2007), and has authored several other books as well as numerous articles.

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Appendix 1

Table 1. Full FE regression estimates for effects on log wage, all employees.

Variable	b,s.e	*t*	Variable (*continued*)	b,s.e.	*t*
Year 2	0.042, 0.008	5.43	Professional qualification	0.023, 0.010	2.35
Year 3	0.047, 0.010	4.74	Degree	0.090, 0.031	2.90
Year 4	0.092, 0.011	8.04	Sub-degree/A-level/ equivalent	−0.038, 0.026	−1.44
Year 5	0.123, 0.014	9.07	O-level/equivalent	−0.042, 0.023	−1.78
Year 6	0.155, 0.015	10.41	Has car/van	0.035, 0010	3.64
Year 7	0.225, 0.017	13.41	Non-labour income/year	−00006, –0.00002	−3.18
Year 8	0.268, 0.019	14.48	North-west	0.027, 0.068	0.40
Year 9	0.333, 0.020	16.42	Yorks/Humberside	0.078, 0.074	1.05
Year 10	0.398, 0.022	17.93	East Midlands	0.062, 0.073	0.85
Year 11	0.463, 0.024	19.29	West Midlands	0.008, 0.078	0.11
Year 12	0.518, 0.026	20.18	East England	0.086, 0.075	1.14
Year 13	0.564, 0.027	20.57	London	0.151, 0.072	2.10
Year 14	0.617, 0.030	20.87	South-east	0.136, 0.071	1.92
Year 15	0.670, 0.031	21.31	South-west	0.068, 0.076	0.90
Year 16	0.734, 0.033	22.09	Wales	0.082, 0.079	1.04
Over 44	0.067, 0.019	3.52	Scotland	0.058, 0.083	0.69
Year 2, over 44=1	0.015, 0.13	1.17	Outright owner	0.0002, 0.013	0.02
Year 3, over 44=1	0.002, 0.014	0.18	Mortgage	0.030, 0.011	2.69
Year 4, over 44=1	−0.017, 0.015	−1.16	Public rental	0.014, 0.014	1.02
Year 5, over 44=1	−0.028, 0.016	−1.72	Incentive paid	0.043, 0.004	9.89
Year 6, over 44=1	−0.015, 0.017	−0.93	Permanent contract	0.029, 0.011	2.56
Year 7, over 44=1	−0.062, 0.016	−3.83	Union coverage	0.069, 0.007	10.43
Year 8, over 44=1	−0.077, 0017	−4.43	Utilities	0.208, 0.050	4.18
Year 9, over 44=1	−0.085, 0.017	−4.90	Manufacturing	0.104, 0.033	3.13
Year 10, over 44=1	−0.113, 0.018	−6.37	Construction	0.132, 0.036	3.64
Year 11, over 44=1	−0.116, 0.019	−6.23	Distribution	−0.007, 0.033	−0.21
Year 12, over 44=1	−0.146, 0.019	−7.76	Transport/communications	0.063, 0.035	1.79
Year 13, over 44=1	−0.151, 0.019	−7.79	Finance/business services	0.094, 0.034	2.81
Year 14, over 44=1	−0.154, 0.020	−7.59	Government	0.082, 0.034	2.39
Year 15, over 44=1	−0.165, 0.021	−7.94	Education	0.020, 0.036	0.55
Year 16, over 44=1	−0.195, 0.021	−9.18	Health	0.016, 0.034	0.46
Experience (years)	0.016, 0.003	5.83	Other services	0.022, 0.033	0.66
Experience-squared	−0.0010, 0.0001	−6.67	Size 25–49	0.026, 0.007	3.95
Intermediate skilled	−0.067, 0.006	−11.53	Size 50–99	0.036, 0.008	4.71
Lower skilled	−0.131, 0.008	−15.99	Size 100–199	0.054, 0.008	6.81
Female, with			Size 200–499	0.067, 0.008	8.26
− youngest child 0–2	−0.020, 0.014	−1.42	Size 500–999	0.066, 0.010	7.18
− youngest child 3–4	0.002, 0.012	0.20	Size 1000+	0.065, 0.010	6.58
− youngest child 5–11	−0.049, 0.012	−4.24	Private sector	−0.022, 0.013	−2.12
− youngest child 12–16	−0.029, 0.010	−2.73	Constant	1.368, 0.076	17.91
− youngest child 16–18	−0.025, 0.014	−1.78			
− non-employed partner	−0.003, 0.014	−0.23			
− employed partner	−0.010, 0.011	−0.93	R^2 within	0.372	

(Continued)

Table 1. (Continued)

Variable	b,s.e	*t*	Variable (*continued*)	b,s.e.	*t*
Male, with			*N*	49,853	
− youngest child 0–2	0.044, 0.010	4.51	Rho	0.689	
− youngest child 3–4	0.053, 0.011	4.73			
− youngest child 5–11	0.037, 0.011	3.34			
− youngest child 12–16	0.033, 0.011	2.96			
− youngest child 16–18	−0.015, 0.014	−1.07			
− non-employed partner	0.046, 0.016	2.92			
− employed partner	0.040, 0.013	3.05			
continued in next column					

Notes: Reference categories are: year 1 (1991), higher skilled, no dependent child, no partner, highest qualification is below O-level/equivalent, north region, agricultural/fishing, less than 25 employees. 'Rho' is the proportion of error variance attributable to individual fixed effects.

Table 2. 'Older worker' (45-plus vs under 45) effects over time – FE regression models of pay outcomes, employee subpopulations by gender, full controls.

Effect of age (45-plus vs under 45), at each year relative to base year				
At wave	Log wage		Log earnings	
	b	|t|	b	|t|
Female employees				
2 (=1992)	0.029	1.57	0.029	1.28
3	−0.006	0.30	−0.004	0.18
4	−0.006	0.26	−0.015	0.52
5	−0.014	0.58	−0.034	1.12
6	−0.003	0.13	−0.037	1.16
7	−0.051	**2.18**	−0.107	**3.20**
8	−0.047	1.91	−0.092	**2.64**
9	−0.043	1.74	−0.115	**3.22**
10	−0.087	**3.43**	−0.168	**4.59**
11	−0.070	**2.67**	−0.128	**3.48**
12	−0.117	**4.37**	−0.175	**4.55**
13	−0.097	**3.62**	−0.159	**3.96**
14	−0.096	**3.32**	−0.171	**4.20**
15	−0.117	**4.16**	−0.191	**4.53**
16 (=2006)	−0.147	**5.27**	−0.195	**4.46**
R^2 within	0.351		0.345	
N, rho	26,040, 0.662		26,628, 0.736	

Table 2. (Continued)

Effect of age (45-plus vs under 45), at each year relative to base year				
At wave	Log wage		Log earnings	
	b	|t|	b	|t|
Male employees				
2 (=1992)	−0.004	0.22	−0.002	0.10
3	0.004	0.20	−0.022	1.07
4	−0.035	1.61	−0.070	**3.02**
5	−0.051	**2.36**	−0.072	**2.94**
6	−0.036	1.48	−0.078	**2.98**
7	−0.087	**3.88**	−0.132	**4.66**
8	−0.126	**5.17**	−0.176	**5.99**
9	−0.153	**6.17**	−0.205	**6.75**
10	−0.166	**6.88**	−0.219	**7.40**
11	−0.190	**7.21**	−0.266	**8.32**
12	−0.212	**7.81**	−0.282	**8.66**
13	−0.249	**8.65**	−0.315	**9.43**
14	−0.265	**9.06**	−0.353	**10.21**
15	−0.269	**8.60**	−0.367	**9.87**
16 (=2006)	−0.305	**9.14**	−0.393	**10.03**
R^2 within	0.391		0.368	
N, rho	24,006, 0.757		24,717, 0.772	

Notes: Standard errors are computed with a robust estimator. Estimates significant at the 5 per cent level (or more significant) have emboldened *t*-statistic. 'Rho' is the proportion of error variance attributable to individual fixed effects.