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Occupational pensions: a bridge between social class before and after labour market exit?

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Abstract

Membership or not of an occupational pension scheme is a mechanism by which the years of working life influence life after labour market exit. The present paper reports the extent of variation in pension scheme membership by social class, in terms of type of scheme and economic sector, using a large, representative survey of UK employees (Annual Survey of Hours and Earnings) and a theoretically derived and empirically validated measure of social class (National Statistics Socio-Economic Classification).

We found a six-fold difference in the likelihood of membership of an occupational pension scheme between the most advantaged and the most disadvantaged NS-SEC social classes, with a slightly smaller social class difference in membership of a Defined Benefit pension scheme. Large social class differences were found within both the public and private sectors. This estimate of the size of the difference understates the real situation because the ASHE survey excludes the lowest paid 10 per cent of the workforce and because occupational pensions vary with what had been the level of a person's salary or wage during the years of their working life.

Occupational pension scheme membership is shown to be a mechanism by which the terms and conditions of employment can be transmitted into social class differences in the material circumstances of life after retirement – a phase of life lasting up to one-third of adult life in countries like present day UK. We conclude that it is reasonable for the analysis of class differences in mortality to continue using work-life social class despite the great majority of deaths occurring nowadays after labour market exit.

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Keywords

Social class; National Statistics Socio-economic Classification (NS-SEC); public sector; private sector; occupational pension; defined benefit pension; defined contribution pension.

Introduction

Death rates in England and Wales in the quinquennium before the State Pension Age have fallen by around two-thirds since the early 1970s, with some small variations by gender and labour market position (Akinwale et al., 2011). This extraordinary and most welcome demographic shift poses an interesting challenge to both sociology and the study of social class differences in mortality: can we continue to use measures of social class which are based on occupation when more than 80 per cent of deaths occur among people who have retired from paid employment (Human Mortality Database, 2016) with the danger that we may be missing important aspects of inequality at older ages? And, if not, are there measures of social class after labour market exit which would be more valid sociologically?

Certainly, innovative measures of social class after labour market exit are conceivable. Retired people could be assigned a social class on the basis of, for example: (a) the most advantaged social class among their offspring, thereby inverting the established rule for assigning a social class to children; or (b) the content and characteristics of all forms of socially productive activity at older ages - informal caring, volunteering and care of grandchildren, as well as paid employment; or (c) employer or employee status in relation to domestic servants, agency nurses, accountants, hedge fund managers and so forth; or (d) follow Lopes' suggestion (Lopes, 2013) that social contacts and networks constitute a dimension of social class position at older ages because of their importance to resilience and thereby health.

Alternatively, perhaps it is unreasonable to expect classical sociology to have considered the topic, because it developed when few people lived past retirement age; instead we may need to adapt classical theory to the new circumstances. The neo-Weberian position, as developed over the years by Goldthorpe, Llewellyn and Payne (1980), Marshall, Rose, Newby and Vogler (1988), Erikson and Goldthorpe (1992), Chan and Goldthorpe (2007) and Chan (2010) and applied within medical sociology and epidemiology by Bartley, Sacker, Firth and Fitzpatrick (1999), Sacker, Firth, Fitzpatrick, Lynch and Bartley (2000) and Sacker, Bartley, Firth and Fitzpatrick (2001), distinguishes between social class, social status and material circumstances; with social class conceptualised as location within the social division of labour, with its attached employment relations and conditions (Bartley, 2017).

Three things of relevance to the present article seem to follow from this line of thought. First, social class after labour market exit is fixed at the occupation of the last significant period of employment and, its corollary, that social mobility between social classes becomes impossible once paid employment has ceased. And third: that changes in socio-economic position after labour market exit are confined to the dimensions of social status and material circumstances.

It is important to acknowledge the strengths of this line of thought. It is consistent with classical social theory. It is consistent with the UK Office for National Statistics' long-standing practice of using a person's last significant period of employment to assign social class at ages 65-74 years. And it receives empirical support, in relation to health at older ages, from several longitudinal studies. In the Whitehall I Study, the death rate at ages 70-89 years of those who had worked formerly as clerical grade civil servants was twice that of their former administrative grade colleagues (Marmot and Shipley, 1996). In the GAZEL study of gas and electricity workers in France (Wahrendorf, et al., 2012) and in the Survey of Health, Ageing and Retirement in Europe (Wahrendorf, Blane, Bartley, Dragano and Siegrist, 2013), those whose work-life paid employment had been characterised by effort-reward imbalance were more likely after labour market exit to experience depressive symptoms and other functional limitations. And in the Office for National Statistics Longitudinal Study, differences in contemporaneous material circumstances - housing tenure (wealth); motor car access (income) - were weaker predictors of death rates at ages over 75 years (Smith and Harding, 1997) than the associations with work-life occupational position found in Whitehall I (Marmot and Shipley, 1996). The aim of the present paper gains context from the life course aspect of these longitudinal studies, with their emphasis on the accumulation of advantage or disadvantage.

There are several mechanisms by which health and mortality risk at older ages could be linked in ways which are socially and biologically plausible to earlier work-life employment relations and conditions. Exposure to workplace hazards, whether physical, chemical or psycho-social, can affect health after labour market exit; examples include heavy lifting and later musculo-skeletal disorders, occupational dust and later respiratory disease and effort-reward imbalance and later clinical depression. Furthermore, members of the

disadvantaged social classes who become unemployed in the five or 10 years before the state pension age often are classed as permanently sick, subsisting on welfare benefits that are less than the Minimum Income for Healthy Living – MIHL (Morris, Donkin, Wonderling, Wilkinson and Dowler, 2000), the health-damaging effects of which will cumulate with any time after labour market exit spent below this minimum level.

Morris and his colleagues also demonstrated that a conservatively estimated Minimum Income for Healthy Living for older people is larger than the UK State Old Age Pension and its means-tested supplements, such as rent and council tax rebates (Morris, Wilkinson, Dangour, Deeming and Fletcher, 2007), with the corollary that an older person's health is likely to suffer, by being below the MIHL, when they lack an occupational pension or some other source of additional income (the same applies to those whose occupational pension pays a small stipend, due to a disrupted employment history or low wages when in work, which can remove their eligibility for means-tested supplements without raising their final income).

The present paper asks whether occupational pensions could be a third mechanism linking work-life terms and conditions of employment to health after labour market exit. Its specific research question is: are work-life social class differences in occupational pension scheme membership and type patterned in a way that is consistent with the social class differences in health and mortality risk found a decade and more after labour market exit? Any such patterning of occupational pensions would influence the material conditions of a person's life after labour market exit, by determining their income from retirement until death, as well as having the potential to cumulate and possibly interact with the long-term effects of occupational hazards and the impact of any years spent before labour market exit on an income below the MIHL level.

Please note that the paper presents only pension data, taking for granted the well documented social patterning of health and mortality risk at older ages.

Data, variables and methods

In order to answer this research question, cross-sectional information collected by the 2013 Annual Survey of Hours and Earnings, at the time the most recent available, was enhanced by the addition of the National Statistics Socio-Economic Classification (NS-SEC) and analysed.

Data

The Annual Survey of Hours and Earning (ASHE) is a UK national survey of employees aged 16 years to 65 years & older carried out annually since 1997 by the Office for National Statistics (ONS); as was its forerunner from 1970, the New Earnings Survey (ONS, 2011). ASHE's sample is drawn randomly from a national taxation database (the PAYE Pay-As-You-Earn database of HM Revenue and Customs), which contains all currently employed taxpayers, normally about 90 per cent of those working in the UK (United Nations Economic Commission for Europe (UNECE), 2003). ASHE's achieved sample size is approximately 180,000 people each year, representing a response rate of close to 70 per cent of the target sample of 260,000 employees (Tucker and Gibbs, 2015). ONS collects the data from employers, not from the individual employee sample members. The ASHE questionnaire collects, for each employee included, detailed information on many aspects of their employment and remuneration, including membership and type of occupational pension scheme; information about the employer, such as company size and industry, is held separately by ONS and added later to the dataset. In order to ensure population representativeness, completed responses are weighted in strata based on age, sex, region and Standard Occupational Classification (SOC), with further weighting for non-response bias (ONS, 2011).

The categories of occupational pension scheme as recorded by ASHE are: **Defined benefit** scheme, where the rate of pension benefit is specified by the scheme rules, for example as a percentage of average salary over a certain number of years before retirement; **Defined contribution** scheme, where the benefits are not specified in advance of retirement, depending on the return on investment of the contributions paid in; **Group personal pension** or **group stakeholder pensions**, which are investment-based personal private

pensions arranged by the employer on behalf of their employees. The two types of 'group' schemes make up only a small part of the total.

Analyses of ASHE's pension data by income level, occupation and so forth have been published (Tucker and Gibbs, 2015), but not by social class, because the data available from ASHE do not include NS-SEC. In order to answer the present research question, NS-SEC operational categories and social classes were added to the confidential ASHE microdata which are available under special license through the UK Data Service (UKDS). The work was carried out using the UKDS Remote Login Service and the ONS Virtual Microdata Laboratory.

NS-SEC was added to the ASHE dataset following the instructions published by ONS for the derivation of NS-SEC, re-based on SOC2010 (ONS, 2010) - the originally published NS-SEC derivation was based on SOC2000 (Rose, Pevalin and O'Reilly, 2003). Each ASHE sample member was assigned to an NS-SEC social class on the basis of their: (1) occupation, as given by their employer's payroll or other record system; (2) their supervisory status, as inferred from answers to the ASHE questionnaire item *Did the employee have direct supervisory or managerial control of any other employees?*; and (3) size of organisation, from the ASHE dataset. The NS-SEC derivation matrix, which is published by ONS as a Microsoft Excel spreadsheet, was imported into SPSS and merged onto the ASHE dataset using the SOC2010 occupation code as a non-unique key variable. The relevant NS-SEC social class was then allocated following the ONS algorithm, using the employee's SOC2010 code, supervisory status, and the derived *large organisation* code.

Variables

Outcome measures: For the purpose of testing the hypothesis that there is an NS-SEC pattern in pension membership and type, two simple but clear, dichotomous outcome measures were chosen:

1. Membership of any workplace pension scheme with main employer. In 2013, the proportion of employees with membership of a pension scheme was exactly 50 per cent (Tucker, 2014).
2. Membership of a defined benefit (DB) pension scheme with main employer. DB pensions are both the most common type and the most generally advantageous for the employee, and in 2013 accounted for 59 per cent of pensions (Tucker, 2014).

The two outcomes were tested independently: that is, outcome (2) was tested for all employees, not only for those for whom outcome (1) was true. In each case, the null hypothesis was that there is no significant difference in outcome according to NS-SEC social class. The avoidance of nesting was preferred as it maintained the full statistical power of the sample, reduced potential disclosure control risks and reduced somewhat a potential issue with odds ratio interpretation.

Independent variables: The main independent variable in the presently reported analysis is social class, measured as NS-SEC. The NS-SEC measure has several advantages over its predecessor Registrar General's Classification (RG). Unlike RG, NS-SEC is derived explicitly from social theory and operationalised in terms of employment relations and conditions, expressed as seven occupational characteristics involving various aspects of job security and work autonomy, which are used to allocate an occupation to a social class; allocations subsequently validated independently in the Labour Force Survey (Bartley, 2017). *Appropriately constructed pension schemes* can be seen as a component of these NS-SEC criteria (Goldthorpe, 2007) The predictive power of the NS-SEC measure in relation to such things as mortality risk during the years of working life (ONS, 2013a) and quality of life around labour market exit (Blane, Netuveli, and Bartley, 2007) is impressive because neither health nor quality of life are among the criteria used to allocate an occupation to a social class. Since the millennium, NS-SEC has been adopted for use in UK official statistics (Rose and Pevalin, 2003) and been adapted into a mainland Europe version, E-SEC (Rose and Harrison, 2010), for use in European comparative research. NS-SEC exists at several levels of aggregation; the present analysis used the seven class version, with class 1 (the most advantaged social

class) sub-divided into 1.1 and 1.2 on the basis of managerial versus professional employment.

Subsidiary independent variables were chosen for their known importance or probable confounding role (ONS, 2012; Tucker, 2014; Tucker and Gibbs, 2015), as follows.

Sector of the economy. The situation of public sector and private sector employees as regards pensions is known to be very different; for example, in 2013, 85 per cent of public sector employees but only 36 per cent of those in the private sector had a workplace pension (Tucker, 2014). Recent changes in pension law have had greater effect in the private sector, where there has been an increase in pension scheme membership, compared to the public sector where pensions are already well-established. At the same time, the last decade has seen a sharp decline in the generosity of pensions and, particularly in the private sector, a move away from defined benefit DB pensions, where the pension stipend is a proportion of final salary (Cribb and Emmerson, 2016; Cribb and Joyce, 2015; Tucker and Gibbs 2015). The importance of the public-private dichotomy for pensions and different patterns in the two sectors suggest that the variable should be included in the model. To allow for the possibility that the association between NS-SEC and pension scheme membership is different in the public and private sectors, regression models were calculated for each sector separately, as well as for all employees together.

Age. Age is a possible confounding factor, in that it may have a systematic effect on both NS-SEC and probability of pension membership. In 2013, employees aged 65 and over were the least likely to have a workplace pension, followed by those aged under 30 (Tucker, 2014). Age may affect pension membership through several mechanisms, such as exposure to different waves of change to the pension system, changes to the state retirement age based on birth cohort, or individual preference where there is an element of choice. Employees of retirement age may already have finished paying into a pension scheme or no longer be eligible, thus being in a qualitatively different position from others. NS-SEC may be directly influenced by age, for example by career progression into progressively more senior roles. For the purposes of the present analysis, three categorical age groups (16-29 years, 30-64 years, 65 years and older)

were used, rather than age in years, to avoid the assumption of linear relationship and because of the qualitative difference of those aged over the state retirement age.

Gender and Working Hours. Gender is a potential confounding factor, through various possible routes, and is known to interact with working pattern in particular. Pension scheme membership may be affected by gender differences in occupations and career patterns. In 2013, full-time workers were more likely to have workplace pensions than part-time. Among full-time workers there was little gender difference, but among part-time workers female employees were more likely to have pensions than males (Tucker, 2014). There are historically different patterns of male and female employment in many industries and occupations which are likely to affect any analysis by NS-SEC (Lambert and Bihagen, 2014; ONS 2010; Rose et al., 2003). In the present analyses, gender (male/female) and working hours (full-time/part-time) were both included as independent variables, with a gender-working hours interaction term added to allow for complexity in the relationship between these two factors. No other interaction terms were included.

Analysis

First, the NS-SEC distribution of the ASHE sample was compared with the nearest decennial census, to allow judgement of the generalisability of results based on ASHE. Second, the NS-SEC distribution of pensions was examined for membership of any type of occupational pension scheme as well as, separately, defined benefit and defined contribution schemes. Third, logistic regression models were used to investigate whether any social class differences in membership of an occupational pension scheme, and type, survived when influential and potentially confounding factors were simultaneously taken into account. These analyses were carried out using SPSS version 22.

Results

Distribution of pension scheme membership and type by NS-SEC social class

The distribution of the sample by NS-SEC social class was as shown in Table 1. Because the ASHE sample includes only employees, the self-employed of NS-SEC class 4 (*Small*

employers and own account workers) are not represented. The percentage distribution of the workforce by NS-SEC social class at the 2011 Census is shown for comparison, both including NS-SEC class 4 (column b) and excluding it (column c). The Census figures are for persons in England and Wales who were in work in the week before the Census, while the ASHE figures are for the whole UK sample. There is broad similarity between the distributions, allowing for such methodological differences.

Table 1. Comparison of the social class (NS-SEC) distribution of the 2013 ASHE sample (UK) with the 2011 decennial census population (England and Wales).

	ASHE (a)	Census (b)	Percent Census (c)
1.1 Large employers, higher managerial, administrative occupations	5.5	2.9	3.3
1.2 Higher professional occupations	9.2	10.3	11.6
2 Lower managerial, administrative, professional occupations	29.3	25.4	28.7
3 Intermediate occupations	19.6	14.2	16.0
4 Small employers and own account workers	n/a	11.37	n/a
5 Lower supervisory, technical occupations	6.9	7.6	8.6
6 Semi-routine occupations	17.1	14.0	15.8
7 Routine occupations	12.5	10.1	11.4

Source: ONS

Note: Because of the large sample size of ASHE, confidence intervals on simple estimates at national level are small ($< \pm 0.1$) and not presented.

Table 2 shows the percentage of employees with (a) any pension (b) a defined benefit pension (c) a defined contribution pension with their main employer, by NS-SEC social class. In each case, the percentage for each NS-SEC class was distinct from that of all other classes ($p < 0.05$). Overall: 54.0 per cent of all employees in the NS-SEC coded sample had any pension; 34.8 per cent had a defined benefit pension (size of pension stipend a proportion of final salary, usually 50 per cent or more); and 7.8 per cent had a defined contribution pension (size of pension stipend annuitised from accumulated working-life pension contributions), the next most common type. There were clear social class differences within each type of pension scheme membership, with the percentage of employees having membership being generally higher in the more advantaged social classes (1&2) and lowest in the most disadvantaged social class (7).

Table 2. Social class (NS-SEC) distribution of ASHE sample employees with (a) any pension (b) a defined benefit pension (c) a defined contribution pension with their main employer, UK, 2013.

	<i>Percent</i>		
	Any pension	Defined benefit	Defined contribution
1.1 Large employers, higher managerial, administrative occupations	74.8	32.1	15.5
1.2 Higher professional occupations	78.5	49.5	10.7
2 Lower managerial, administrative, professional occupations	69.1	50.3	6.8
3 Intermediate occupations	60.2	42.3	7.9
5 Lower supervisory, technical occupations	40.2	18.9	7.2
6 Semi-routine occupations	35.4	19.1	8.2
7 Routine occupations	27.3	13.7	4.9
All employees	54.0	34.8	7.8

Source: ONS

Results of logistic regression models

Logistic regression models containing social class (NS-SEC), age, economic sector, gender and working hours predicted accurately the pension status of at least two-thirds of the ASHE sample employees; the proportion varying between 68.1%, when predicting any private sector pension, and 89.6% when predicting a private sector defined benefit pension. See Table 5 for summary characteristics of the regression models.

Table 3 reports the social class differences in membership of any type of occupational pension scheme, after taking account of age, economic sector, gender and working hours, with a gender-working hours interaction term. A more than six-fold difference is found between the most advantaged and most disadvantaged social classes.

Table 3, column (a) also shows the sizeable difference (Odds Ratio 10.28) in pension membership between the public and private sectors of the economy. When examined separately, as reported in columns (b) and (c), the social class difference in membership of any type of occupational pension scheme was somewhat larger in the private than the public sector of the economy.

Table 3. Differences in membership of any type of occupational pension scheme, UK employees in all sectors, ASHE 2013

Variables	(a) All employees			(b) Public sector only			(c) Private sector only		
	95% conf. int.			95% conf. int.			95% conf. int.		
	Odds ratio	lower	upper	Odds ratio	lower	upper	Odds ratio	lower	upper
Public sector	10.28	10.25	10.32	-	-	-	-	-	-
<i>Age (relative to 65 and over)</i>									
- under 30	2.61	2.58	2.63	3.84	3.78	3.90	2.02	2.00	2.05
- 30-64	5.78	5.72	5.83	7.36	7.26	7.47	4.65	4.60	4.70
Full-time	2.18	2.17	2.18	2.30	2.28	2.31	2.09	2.08	2.10
Male	.59	.58	.59	.57	.56	.58	.60	.59	.60
Full-time male	2.10	2.08	2.11	2.36	2.33	2.39	2.08	2.06	2.09
<i>NS-SEC Social Class (relative to 7: Routine occupations)</i>									
- 1.1	6.21	6.18	6.25	4.94	4.83	5.05	6.22	6.19	6.26
- 1.2	6.73	6.69	6.76	5.63	5.55	5.72	6.86	6.82	6.90
- 2	3.13	3.12	3.14	3.60	3.57	3.63	2.99	2.97	3.00
- 3	2.79	2.78	2.80	2.54	2.52	2.57	2.90	2.89	2.92
- 5	1.82	1.81	1.83	1.60	1.57	1.63	1.83	1.82	1.84
- 6	1.63	1.62	1.63	1.73	1.71	1.75	1.60	1.59	1.60

Source: ONS

Table 4, column (a) reports social class differences in membership of a defined benefit (DB) occupational pension scheme, which prove to be smaller than for all types of pension taken together, with something like a thrice difference, rather than six-fold, between the most advantaged and most disadvantaged social classes. Similarly, the impact of the public versus the private sector of the economy is larger for defined benefit pension (Odds Ratio 44.69) than for all type of pensions together.

Table 4 also reports social class differences in membership of a defined benefit (DB) occupational pension scheme in, separately, the public (column b) and private (column c) sectors of the economy. These prove to be smaller than for all types of pension taken together, with something like a thrice difference, rather than six-fold, between the most advantaged and most disadvantaged social classes. Similarly, the impact of the public versus the private sector of the economy is larger for defined benefit pension than for all type of pensions together.

Table 4. Differences in membership of *defined benefit occupational pension scheme*, UK employees in all sectors, ASHE 2013

Variables	(a) All employees			(b) Public sector only			(c) Private sector only		
	95% conf. int.			95% conf. int.			95% conf. int.		
	Odds ratio	lower	upper	Odds ratio	lower	upper	Odds ratio	lower	upper
Public sector	44.69	44.54	44.85	-	-	-	-	-	-
<i>Age (relative to 65 and over)</i>									
- under 30	1.97	1.94	1.99	2.88	2.84	2.92	.91	.89	.93
- 30-64	5.96	5.89	6.03	6.15	6.07	6.24	4.36	4.26	4.46
Full-time	1.76	1.75	1.76	1.98	1.97	1.99	1.36	1.35	1.37
Male	.55	.54	.55	.60	.60	.61	.41	.41	.42
Full-time male	2.18	2.16	2.20	1.90	1.88	1.92	3.12	3.06	3.17
<i>NS-SEC Social Class (relative to 7: Routine occupations)</i>									
- 1.1	2.78	2.76	2.80	2.28	2.24	2.31	2.90	2.87	2.93
- 1.2	3.92	3.89	3.95	3.89	3.84	3.94	4.00	3.96	4.03
- 2	2.82	2.80	2.83	2.76	2.73	2.78	2.73	2.70	2.75
- 3	2.62	2.60	2.63	2.14	2.12	2.16	3.16	3.13	3.18
- 5	2.60	2.58	2.62	1.66	1.64	1.70	2.82	2.80	2.85
- 6	1.73	1.72	1.74	1.79	1.77	1.81	1.64	1.63	1.66

Source: ONS

Table 5. Summary characteristics of logistic regression models

Mode I	Outcome	Sector	Percent predicted	Overall tests of model			
				-2 log likelihood	Chi-square	df.	sig.
1 *	Any pension	All	73.9	17416842	5749303	11	0.000
2 *	Any pension	All	74.0	17370329	5795816	12	0.000
3	Any pension	Public	86.7	3799079	482181	11	0.000
4	Any pension	Private	68.1	13554188	1922119	11	0.000
5	Defined benefit	All	87.3	11800495	9529222	12	0.000
6	Defined benefit	Public	82.6	4647478	380370	11	0.000
7	Defined benefit	Private	89.6	7101362	582907	11	0.000

* As described in the text, models 1 and 2 differed only in the inclusion of an interaction term for sex and work pattern.

Discussion

Analysis of ASHE pension data showed large social class differences in membership of an employer-based pension scheme as well as the likelihood that any such membership will be of the most advantageous type, defined benefit.

Limitations of the analysis

Issues related to the data source: As described above, the large sample size and other characteristics of ASHE lead it to be generally considered as a highly reliable data source. However, the difference between the sampling unit (the employee) and the data collection unit (the employer) makes the methodology complex and difficult to assess, as do the confidentiality inherent in the use of a tax register sampling frame and the restrictions imposed by the [Statistics of Trade Act 1947](#) under which ONS carries out the survey. ONS publishes little information on non-response bias; for example, whether smaller companies are less likely to return their questionnaires and the possible consequences of such effects. Easily used estimates of sample variability are not published.

More importantly, a weakness of ASHE for use in social analysis is its limited coverage of the most and least advantaged parts the workforce. First, since only employees (PAYE taxpayers) are sampled, self-employed persons, company directors and certain types of contractors are excluded. According to the 2011 Census, 3.6 per cent of those residents of England and Wales aged 16-74 who were economically active (and not full-time students or temporarily unemployed) were employers, while 12.1 per cent were self-employed without employees (ONS, 2013b). In 2014, 4.6 million people in the UK (15 per cent of those in work) were self-employed in their main job according to the Labour Force Survey – LFS (ONS, 2014a) - the Census is known to generally show slightly higher rates of overall economic activity than the LFS due to measurement issues (White, 2012).

Second, employees with very low earnings below the National Insurance Lower Earnings Limit (also called the PAYE threshold) are also excluded – this limit was £111 per week for the tax year 2014/15 (HM Treasury 2013). Other low paid or casual

employees may also be excluded from the PAYE system, particularly in the hotel and catering industries (ONS, 2013c) and in smaller numbers in agriculture and domestic service (UNECE, 2003). In addition, as ASHE data are collected in April, some seasonal workers are excluded, such as those in casual summer or Christmas jobs. Since workers who fall outside the National Insurance and tax systems are, by definition, difficult to count, estimates of the numbers affected are speculative. McKnight and colleagues estimated in 1998 that there were some 3 million workers in the UK below the PAYE threshold (some 11.2 per cent of the total workforce), the majority being women and part-time (McKnight, Elias and Wilson, 1998). Unpublished ad hoc analysis by the authors of the April-June 2015 Labour Force Survey dataset, accessed through the UK Data Service, suggests that some 8.8 per cent of individuals in the UK who are currently employed earn less than £111 gross per week in their main job.

For the purposes of the present analysis, the salient question is the likely effect of the exclusion of these groups of workers on the results. The direction of bias is likely to vary with excluded group but taken together their net effect will be to under-estimate the size of social class differences, as considered next.

Social Class 1. The exclusion of large employers, including company directors, and self-employed professionals from NS-SEC class 1 in the ASHE data is likely to produce a modest, because they are a relatively small proportion of the workforce, under-estimate of the size of social class differences in pension scheme membership.

Social Class 4. The size and direction of bias introduced by the absence from ASHE data of NS-SEC social class 4 - *small employers and own account workers*, such as the owners of non-professional small businesses, shop-owners, self-employed craftsmen and taxi drivers (ONS, 2010, 2014a) is more difficult to estimate, because it will depend upon the size of savings accrued in a private pension scheme (the median size private pension pot is relatively modest so, when annuitized, may double or treble the State Old Age Pension).

Social Class 7. The number of workers excluded from the analysis because they fall below the PAYE threshold is potentially rather large, and it would be a reasonable

assumption that such low paid or casual workers would be concentrated in routine or, less probably, semi-routine occupations which would not normally have occupational pension provision. Thus, the exclusion of this group from ASHE data is likely to have caused a systematic under-estimate of the size of NS-SEC differences in occupational pension scheme membership.

An issue related to the analytical approach: A limitation of the analysis is the extent to which it is based on a snapshot of employees in work at a given point in time. The pension landscape is constantly changing due not only to increases in the state pension age and other legislation (Blake, 2003; Hills, 2006) but also to a drive by employers, at least since the financial crisis of the early 2000s, to reduce occupational pension provision and particularly to end or restrict advantageous direct benefit DB pension schemes (Ginn and Arber, 1999; ONS, 2014b; Phillipson, 2013). It is likely that a similar analysis based on an earlier year would reflect lower overall pension membership in the private sector, but also higher membership of DB pension schemes.

Interpretation of the results

The presently reported analysis of a large and representative sample of UK employees found an around six-fold difference in the likelihood of membership of any occupational pension scheme between the most and least advantaged NS-SEC social classes, and a less clear but still substantial difference in membership of the most advantageous *Defined Benefit* type of pension scheme. In all cases, irrespective of outcome measure and sector, the most advantaged NS-SEC social class was class 1.2 (*Higher professional*) and the least advantaged was class 7 (*Routine*). The hypothesis that differential access to occupational pensions is a contributor to inequalities by NS-SEC class after retirement is therefore supported. This six-fold difference, for the reasons given above, is more likely to be an under-estimate than an over-estimate of the real situation.

This interpretation is consistent with what is already known about the transmission of socio-economic inequalities into older ages, including significant gradients in pension wealth by income level from ASHE itself (ONS, 2012) and, in various forms of assets by

NS-SEC social class, from smaller survey data sources (Ginn and Arber, 1999; Hills et al., 2010; Phillipson, 2013; Storelli and Williamson, 2013; Tucker, 2014).

The social class differences shown are not the actual extent of inequality in pension provision, since the amount of pension accrued is invariably related to income level during working life. Equally, they do not reflect the much greater extent of inequalities in retirement wealth from personal (non-occupational) pensions, share ownership or property (Hills et al., 2010; Phillipson, 2013). These are a second type of reason for thinking that our six-fold differences are an under-estimate of the size of inequality in material circumstances after retirement.

The reason for the more advantaged position of NS-SEC class 1.2 (professional) compared to 1.1 (managerial) in terms of pension membership is not clear but may be related to the previous point about personal (non-occupational) pensions, share ownership and property. (ONS, 2014c).

Social class differences in membership of any occupational pension scheme were substantial in both the public and private sectors of the economy, although somewhat less in the public sector, presumably reflecting the history of widespread pension provision in public sector organisations (Clayton and Pontusson, 1998; Cribb and Emmerson, 2016). Further, the likelihood of having a Defined Benefit type of pension was 44 times greater in the public sector than the private sector, highlighting the historical importance of public sector employment as a generator of greater equality at older ages.

Two caveats are worth considering. Given the changing landscape of pensions, it might be sensible to repeat our analyses each decade, in order to monitor any significant changes in the social class distribution of membership and type of occupational pension scheme. Second, given the wide variation in pension arrangements between the countries of Europe, it might be wise to see whether our present conclusions, based on the UK National Statistics Socio-economic Classification, apply equally to the European Socio-economic Classification.

Summary and Conclusions

The 2013 Annual Survey of Hours and Earnings showed a six-fold difference in the likelihood of membership of an occupational pension scheme between the most advantaged and the most disadvantaged NS-SEC social classes, with a slightly smaller social class difference in membership of a Defined Benefit pension scheme. This estimate of the size of the difference understates the real situation because the survey excludes the lowest paid 10 per cent of the workforce and because occupational pensions vary with what had been the level of a person's income during the years of their working life. Many UK employees who are not members of an occupational pension scheme will rely on the State Old Age Pension for their income after retirement; an income which is below the Minimum Income for Healthy Living (Morris et al, 2007), with those who are disabled of particular concern (Hancock, Morciano and Pudsey, 2016). Similarly, even those with the most advantageous Defined Benefit pension, may face material adversity if they were low paid during their working life (Evandrou and Falkingham, 2009).

Social class differences in membership and type of pension, combined with the low level of the UK State Old Age Pension and the vulnerability of even the most advantageous type of pension scheme to low pay during working life, mean that social class based on occupation during the last significant pre-retirement period of employment will influence strongly the conditions of life after labour market exit; and that this influence will continue until death. *Work-life casts a long shadow forward*, making work-life social class a strong predictor of life circumstances after retirement. For this reason, it makes sense for the analysis of class differences in mortality to continue using work-life social class despite the great majority of deaths occurring nowadays after labour market exit.

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