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Original Article

Does Your Class Give More than a Hint of Your Lifetime Earnings?: Assessing Indicators for Lifetime Earnings Over the Life Course for Sweden

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Abstract

From a sociological stratification perspective, we would expect occupationally based measures to be valid proxies for lifetime earnings, but recent research suggests that annual earnings outperform occupational measures. In this article, we examine how class, occupation, education, and annual earnings are associated with lifetime earnings across almost complete working lives, at ages of around 20–65 years for Swedish cohorts born in the 1940s. Our results indicate that while annual earnings are considerably more accurate proxies for the lion's share of working life, occupational measures are as expected more stable and somewhat better at the start and end of working lives. Our results also support the idea that micro-classes are better proxies of lifetime earnings than big classes. Contrary to some previous research, occupational measures perform better for women than for men in this respect, and occupational measures are better than education. Our main conclusions are that proxies for lifetime earnings have life-cycle biases that should be considered in, for instance, analyses of intergenerational mobility, and that occupationally based measures are more stable than annual earnings but, overall, are not very valid as indicators of lifetime earnings compared to annual earnings.

Introduction

Lifetime earnings can be viewed as the ultimate indicator of an individual's pecuniary success in the labour market. From the viewpoint of sociological stratification research, it is plausible that occupation and class predict lifetime earnings well. The idea is that individuals at an early phase of the working life sort into occupations/classes that have substantial differences in wages and typical wage trajectories, and that are also differently associated with unemployment risks (e.g. Goldthorpe, 2000; Goldthorpe and McKnight, 2006). Arguably, the common view among stratification researchers is that education gives a job and a certain class position, which gives differences in wages and eventually in wage growth, which over the long run sum up to substantial class differences in lifetime earnings. Hence, we would assume that occupation or class would definitely be a stronger predictor of lifetime earnings than annual earnings, particularly at young ages when the more

advantaged classes/occupations have yet to experience steep earnings growth, but also slightly stronger than education, since class/occupation is more directly linked to earnings than education. The assumption that class captures lifetime earnings is both at the core of contemporary class theory, with its emphasis on distinguishing between classes with short-term labour contracts and long-term service relationships (Goldthorpe, 2000), and also comes close to Weber's ideas, in which market position and life-chances are in focus for the class concept (Weber, 1968).

However, recent research casts doubt on the idea that class and occupation are strong predictors of lifetime earnings. On the basis of US data, Kim, Tamborini and Sakamoto (2018) have found that annual class and annual occupation clearly constitute worse predictors of lifetime earnings (or more precisely 20-year long-term earnings) than annual earnings, and are also worse than education. Brady *et al.* (2018) found a corresponding pattern for the United States and Germany in their examination of various proxies for long-term household disposable income. We add to this literature by examining various proxies for individuals' lifetime earnings across the life course, using rich Swedish registry data, since a life course perspective is of vital importance to reaching a deeper understanding of lifetime earnings. First, we study whether class and occupation are more stable predictors of lifetime earnings relative to annual earnings in the early phase of the working life, which would be expected on the basis of theory, and also in the final phase. Secondly, we are able to compare the relative predictive power of education in the later phase of the life course, during which sociologists would arguably assume that occupation/class would be more important. Thirdly, we compare the predictive accuracy of class and occupation or in other words of big versus micro-classes. Fourthly, we conduct separate analyses for women and men and thus provide a more thorough description than previously of gender-based variations in, for instance, class differences.

An important contribution of our study is that we are able to use earnings data for ages that correspond to the entire career and, hence, are able to come close to a complete measure of lifetime earnings in order to assess the relative importance of class and occupation across almost the full life course. However, this also means that our results are restricted to birth cohorts from the 1940s. The implications of restricting the analyses to these cohorts are discussed further in the concluding part of the paper.

Life Time Earnings in a Class Perspective

In more recent years, class theory has become oriented towards the way class is a driver of long-run earnings by referring to employment relationships (Goldthorpe, 2000, cf. Erikson and Goldthorpe, 1992; see also Tåhlin, 2007). The theory mainly concerns employees and is based on the ideas that work tasks of some occupations are both hard to monitor, and require a high level of specific human capital: i.e. a high level of human asset specificity. As a consequence, the employer offers incumbents of such occupations long-term rewards in order to give incentives for such employees to perform well and stay in the work organization. Based on this theory, classes with a service relationship (the service class/es or the salariat) have a relatively good earnings progression, while those with a labour contract (the working class/es) have relatively poor earnings growth and also recurrent episodes of unemployment. Although earnings growth and employment stability are not the only rewards the employer may offer for the service classes, they can easily be seen as the crucial ones and together they would result in substantial class differences in lifetime earnings in the long run. Classes with mixed contracts are characterized by outcomes somewhere in between these two contract forms. Besides classes for employees, there are also the self-employed for whom theoretical expectations are less clear. Nonetheless, the labour market is dominated by employees and differences in wage growth and unemployment risks between classes would be expected to result in substantial differences in lifetime earnings.

The empirical support is mixed, however. On the one hand, classes differ in earnings, earnings growth, and unemployment risks (e.g. McGinnity and Hillmert, 2004; Goldthorpe and McKnight, 2006; Weeden *et al.*, 2007; Bihagen, 2008; Lucchini and Schizzerotto, 2010; Lahtinen, Sirniö and Martikainen, 2020). On the other hand, as mentioned above, Kim, Tamborini and Sakamoto (2018) have shown on the basis of data that capture 20-year long-term earnings that class is not a strong predictor of such earnings, at least not compared with annual earnings and education. Our study contributes by focusing on the life course aspect, which plays a pivotal role in the way class is assumed to be a strong predictor of lifetime earnings.

One precondition for substantial class differentials in lifetime earnings is that career mobility across classes is limited. A common assumption is that the lion's share of people reaches occupational maturity quite early in working life, i.e. they end up in an occupation/class position that they then keep for the remainder of their

working lives (see Barone and Schizzerotto, 2011). This is also a general finding in earlier research, although it is difficult to establish the exact age at which this happens (e.g. Jonsson, 2001; Breen and Jonsson, 2007), in part as a result of changes across cohorts (Bukodi and Goldthorpe, 2011; Härkönen and Bihagen, 2011; Wolbers, Luijkx and Ultee, 2011). For Sweden, and based on the analyses of occupational prestige scores, Härkönen and Bihagen (2011) have reported the age for maturity to be somewhere between 30 and 40 years, with older cohorts reaching maturity earlier.

Figure 1 presents a graphical description of our expectations concerning how class may differ in predicting lifetime earnings across the life course. We also compare this with annual earnings. Hence, we assume that class is an increasingly good predictor up to the age at which occupational maturity is reached (at age 35 years in the figure), after which class is close to being a constant for the remainder of working life, and its predictive power is thus stable after this point. Concerning annual earnings, we assume that annual earnings are not as good as class in predicting lifetime earnings early on in working life since, from a class perspective, the more advantaged classes have not yet reached their peak earnings. Moreover, we expect that annual earnings will perform worse at the end of working life when some, but not all, reduce their work hours and some retire.

The expectations regarding annual earnings are supported by research in economics. First, it has been established that annual earning does not fully explain lifetime earnings: with dispersion of lifetime earnings being around 35–40 per cent lower than annual earnings (Björklund, 1993). Secondly, it has been shown that there is a life-cycle bias so that incomes around the ages of 30–40 years (for men) come closer to lifetime incomes than incomes at younger ages (Böhlmark and Lindquist, 2006; Haider and Solon, 2006). In this literature, annual income is seen as being consisted of a mixture of long-run incomes and transitory income shocks, and a common strategy to come closer to measuring lifetime/permanent income and to minimize the impact of transitory incomes is to average incomes across several years (see, e.g. Solon, 1992; Zimmerman, 1992; Mazumder, 2005; Kopczuk *et al.*, 2010). Thus, we are led to expect that annual earnings are not sufficient to proxy lifetime earnings, but that they are substantially better after a certain age.

All in all, it is not evident what should be expected with regard to differences in the *general* levels of predictive power between class and annual earnings, although

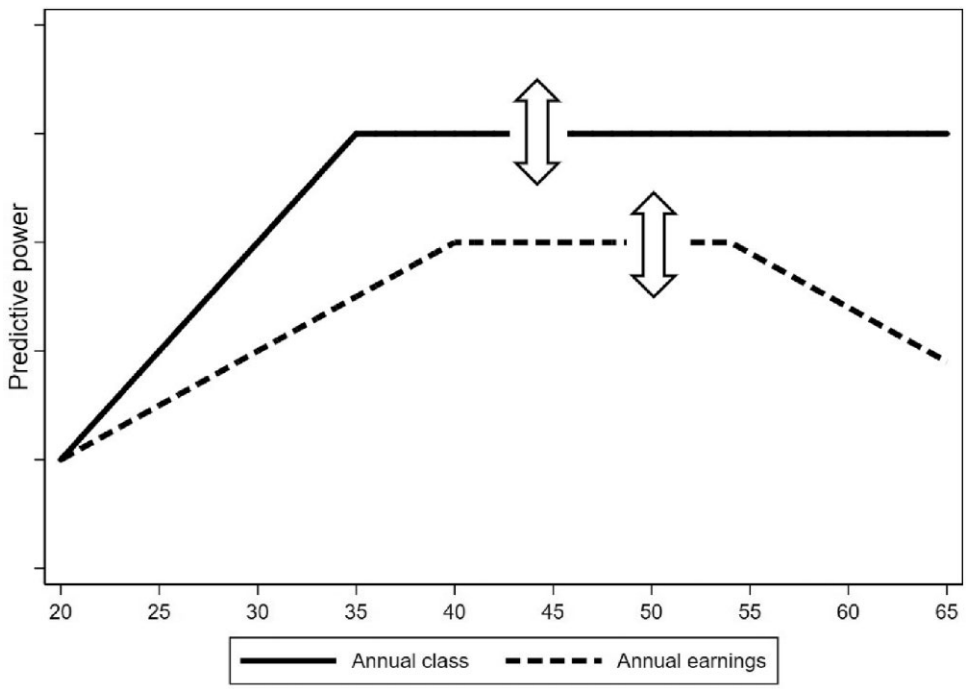

Figure 1. Expectations concerning predictive power (R^2) for predicting lifetime earnings by annual class and annual earnings at different ages. *Source*: Created by the authors.

from a sociologist's viewpoint, we would assume that class, or perhaps occupation (see below) would be a better proxy for lifetime earnings than annual earnings (e.g. Hauser and Warren, 1997; Hauser, 2010; Torche, 2015). However, given recent research (Kim, Tamborini and Sakamoto, 2018, using US data) and the fact that annual income is a valid proxy for lifetime earnings around the ages of 30–40 years for men (Böhlmark and Lindquist, 2006; Haider and Solon, 2006), we might also expect the opposite. Irrespective of this, the patterns, rather than the levels, across the life cycle that are outlined in Figure 1 could still be expected, although the relative predictive power of class and annual earnings may look different.

It is also worth considering occupations in themselves, rather than occupations aggregated to classes, as a predictor of lifetime earnings. If we believe that classes are overly crude as proxies for lifetime earnings and that 'micro-classes' are more accurate than 'big classes' (cf. Weeden and Grusky, 2005; Weeden *et al.*, 2007), we may assume that occupations would have substantially more predictive power than class. This is also supported by Kim, Tamborini and Sakamoto (2018). Occupations can be seen as micro-classes and in general we would expect similar life course patterns as for class. However, since there is some degree of occupational mobility within classes (e.g. people in the service class who are upwardly mobile and achieve positions as senior managers), it could be fruitful to distinguish between class maturity and occupational maturity, where it can be assumed that the latter will typically occur later.

The assumptions that could be made about class and occupation are also potentially valid for educational attainment, and we would expect to find very similar life course patterns in lifetime earnings for education as for class. Since education typically precedes the occupational career, it is plausible that educational maturity is reached before class/occupational maturity. Hence, education could be a better proxy for lifetime earnings in the start of careers (which we, due to data shortage, cannot test empirically unfortunately, see below). From the stratification researcher's point of view, we would assume that the difference between class and education in predicting lifetime earnings is mainly a question of over-education (Duncan and Hoffman, 1981), i.e. people with high education who do not reach a high class, or under-education, i.e. people who reach a high class without having high education (cf. Tåhlin, 2007). In line with the emphasis placed by stratification researchers on the role for earnings of having a given occupation/class, the expectation would be that class would over-all constitute a better predictor than education for lifetime earnings. However, this expectation is contrary to the findings of Kim, Tamborini and Sakamoto (2018) and it will be interesting to see whether their results are replicated in our analyses. Also, it is rather striking that class and occupation are almost completely absent from the economics literature. Instead of using such concepts, the economists' view is typically that skills, and often skills in terms of years of education, are of pivotal importance in themselves, since they increase productivity, which in turn increases income/earnings (Becker, 1964). All in all, we would argue that the mainstream sociological stratification researcher would assume that occupation/class is a better predictor of earnings than education, but it is far from certain that this is the case.

Finally, it is of great interest to compare results for women and men. For a long time, it was often assumed that the class schemas were gender biased, and the same has been claimed for occupational classifications, the idea simply being that such classifications were constructed at a time when labour markets were dominated by men and in particularly by men with manual jobs in manufacturing (Savage *et al.*, 1992. Cf. Bihagen, 2008; Crompton, 1998; Oesch, 2006). Hence, measurements of both occupations and classes were perhaps not made with typical female occupations in mind. Another possibility is that women's occupations were relatively less important for labour market outcomes for women, since they often worked part-time or in general had more scattered careers than men. In line with this, research has shown that patterns in lifetime earnings are quite different between men and women (Böhlmark and Lindquist, 2006; Brenner, 2010). Although women in Sweden still do more part-time work than men when they become parents, there has been a trend towards convergence, as in many other countries, with smaller gender differences in working hours over time (Goldin, 2014; Olivetti and Petrongolo, 2016). For the cohorts born in the 1940s, who are analysed in this article, part-time work was common and we can assume that lifetime earnings proxies in general had low predictive power in relation to ages at which part-time work was common (cf. Kim, Tamborini and Sakamoto, 2018). However, at least if part-time work was limited in time, it could actually be the case that class and occupation would be relatively strong predictors for women, compared to annual earnings, during such years. Potentially, our results may shed light on the issue of gender biases in stratification measures. If such biases were to turn out to be small for the birth cohorts from the 1940s, they are probably even smaller for subsequent cohorts.

Research Question and Hypotheses

Our main research question involves examining how well class and occupation capture lifetime earnings across the life course, i.e. at different ages, in comparison to especially annual earnings (expressed as H1a and H1b). Besides this focus, we are also interested in the relative predictive power of education but due to a shortage of data on education at young ages for these birth cohorts, some hypotheses are restricted to class and occupation (H2 and H6 could be reformulated with regard to education). Based on the reasoning outlined in the section above, we would expect the following:

H1a/b/c: Class/occupation/education is a more stable predictor of lifetime earnings across the life course than annual earnings (most obvious at young ages but also at old ages)

H2: The predictive power of class stabilizes at a younger age than that of occupation.

H3: Occupation is a stronger predictor of lifetime earnings than class.

H4a/b: Class/occupation is a stronger predictor of lifetime earnings than education at old ages.

H5a/b: Class/occupation is a stronger predictor of lifetime earnings for men than for women.

H6a/b: Class/occupation is a relatively stronger predictor of lifetime earnings than annual earnings for women than for men at ages when it is typical to have young children.

Method and Data

Our empirical strategy involves constructing a measure of lifetime earnings and running separate Ordinary Least Squares (OLS) regressions using class/occupation, education, and annual earnings, respectively, as the independent variables for each cohort–age–gender combination for the birth cohorts born between 1943 and 1947. Hence, we study the predictive power of annual measures of class, occupation, education, and earnings for lifetime earnings, i.e. for most ages prior to the point at which complete lifetime earnings have been accumulated. We report adjusted R^2 as explained variance. Due to limitations in the data, we cannot report R^2 values for education prior to the 1990s, i.e. prior to the age of around 45 years in our cohorts. In the following, we first describe the variables included in our analyses and then how we deal with selection issues relating to our population.

Lifetime Earnings and Annual Earnings

For the cohorts born between 1943 and 1947, we have close to full information on lifetime earnings up to retirement age from taxation records. More precisely, we cover ages 21–65 years for the cohort born in 1943, and 25–65 years for the cohort born in 1947. The reason for focusing on the cohorts born in 1943–1947 is related to data restrictions: administrative tax records started in 1968 and we have access to them until the year 2012. In this article, we report the results for the 1945 cohort, while the results for the other cohorts are reported in the Supplementary Appendix.

The most straightforward way to construct a measure of lifetime earnings is to simply sum the earnings, adjusted for inflation, from the beginning to the end of working life. However, real earnings fluctuate over historical time such that annual deflated earnings will potentially contribute differently to lifetime earnings in *specific* years, which correspond to different ages for different cohorts. From the mid-1990s, there was a substantial increase in real earnings in Sweden (Bengtsson, Edin and Holmlund, 2014). This may potentially distort the measure of lifetime earnings such that earnings from the mid-1990s and onwards influence this measure more than earnings from earlier decades. Earlier, from the 1970s, inflation was substantial by comparison with the period after 1995. One way to standardize earnings over time is to transform annual earnings into 'percentile earnings', so that each individual's annual earnings are relative to those of the *complete workforce* in that particular year and vary between 1 and 100. This is also a way of dealing with extreme earnings that may distort associations, as well as of reducing the impact of changes in the definition of earnings that may have taken place over the course of the long periods on which we base our results. Instead of summing the percentiles, we take the average for the years for which we have information for each individual. One way to understand this measure of 'percentile earnings' is in terms of the lifetime relative rank in earnings or even the average lifetime position in the earnings hierarchy (cf. Jäntti and Jenkins, 2015).

Another issue when constructing a measure of lifetime earnings is that of how zero earnings should be dealt with. We include zero earnings for individuals who are officially in the country, since zero earnings are the outcome of not working and should arguably also be counted. This also makes sense on the basis of the idea that the working class typically have recurrent unemployment episodes that lower their earnings. Nonetheless, there will be some measurement error for those with registered zero incomes, since some may still have been outside Sweden or may not have reported earnings as a consequence of tax evasion. As a way of reducing such errors, individuals with less than 20 years of positive earnings are excluded from the analyses (see further below).

Earnings are also used as independent variables in the regressions measured at each age (corresponding to year). Throughout the analyses, it is plausible that using the equivalent measure of earnings to that on which the lifetime earnings measure is based, e.g. annual 'percentile earnings', given that the lifetime measure is based on percentiles, will produce the highest R^2 values and this approach has therefore been used.

In the Supplementary Appendix, we report results based on the more straightforward measure of summed deflated earnings, although logged, by convention, as a way of downplaying the impact of very high earnings. This is the common approach in these type of studies (see Haider and Solon, 2006), and by default those who have zero earnings in a given year are excluded when using this approach (which mainly concern annual logged earnings as independent variable as very few have zero earnings across all years measured in the lifetime measure). Basically, all our results are replicated using this approach although with a somewhat greater level of instability.

Class and Occupation

Class is mainly measured using occupational information from the censuses for 1970, 1975, 1980, 1985, and 1990. No census has been conducted in Sweden since 1990 and we therefore use information from the so-called occupational registry from the year 2001. Hence, we have missing observations for occupation both between each census and prior to the initial year of the occupational registry. While the censuses are completed by respondents themselves, the occupational registry is based on information from employers. The occupational registry is mainly based on information from the Wage Structure Statistics (Lönestrukturstatistiken), which are in turn based on information for all employees in the public sector and at firms with +500 employees in the private sector, while information on employees at smaller private firms is based on random samples of firms. Occupational information is coded in accordance with ISCO-88(com) with translation keys (Bihagen, 2007), and has then been transformed into the European Socio-economic Classification (ESeC) class schema (Rose and Harrison, 2010). Unfortunately, the occupational registry does not cover the self-employed. Hence, to achieve comparability, we have used a proxy for the self-employed that is similar for all years, i.e. a measure based on earnings from one's own firm, and when these earnings account for 50 per cent or more of total earnings, a person is denoted as self-employed irrespective of what the occupational information indicates.[1] This means that the measure of self-employment also includes individuals who are usually included in ESeC I/Service I, e.g. dentists with their own practice. To shed light on whether this measure reduces the predictive power of class, we have also conducted the analyses with the self-employed excluded (see Population 3 below). We have compared the class distribution across the years for which there is valid information and there are no large differences between the 1990 census and the first year for which the information is based on the occupational registry. Hence, it appears as though the information is equivalent, but this should nonetheless be borne in mind when interpreting the results. We distinguish up to eight different classes (ESeC 1, ESeC 2, ESeC 3, ESeC 6, ESeC 7, ESeC 8, ESeC 9, and self-employed, where the classes of employees correspond to the following Erikson-Goldthorpe classes: I, II, IIIa, V, IIIb, VI, and VII) and also compare with a more aggregated version ($1+2$: 'salariat', $3+6$: 'mixed classes', $7+8+9$: 'working classes', and self-employed). For the regressions in which occupation is used as an independent variable, the ISCO-88 codes are also used as dummies at the three-digit level, with around 120 values, and with the self-employed category added.

Education

We use a very detailed measure of annual education that distinguishes between 97 different educational groups. Hence, it comes close to the number of categories in the occupational variable (see Supplementary Table SA1). These 97 groups have been produced by Statistics Sweden, based on both potentially important horizontal and vertical differences, in order to capture important divisions in the Swedish labour market. Unfortunately, education has only been recorded annually since 1990.

Samples and Selection Issues

It is important to consider how selection issues may distort our results. First, people in some occupations, such as those in the working class, may be unemployed more often, retire earlier, and also die younger (see above, and for mortality, see e.g. Torssander and Erikson, 2010). As a consequence, restricting inclusion criteria to individuals being alive and gainfully employed, with valid occupational codes throughout their working life, may potentially produce overestimates of the lifetime earnings of the working class. Secondly, the occupational registry that has been used to measure class from the 2000s onwards has more missing data for small private firms. Hence, we use different populations in order to see whether our results are robust (see Table 1). Population 1 consists of all individuals in the data who have at least 20 observations of annual earnings, i.e. individuals with earnings above zero for at least 20 years. Thus in this population, some die and some are abroad for a period of time but they have at least had earnings in Sweden for 20 years. Population 2 is similar to Population 1 but includes only those with valid occupational information for all years when measured. This population may be used to compare the results of annual earnings between Populations 1 and 2 in order to see whether those with valid occupational information are a selected group in terms of earnings. Population 3 is similar to Population 2 but excludes all those who were self-employed in any year. This is of interest, since the group of self-employed has been operationalized in a way that is slightly different from the usual method employed (see above), and this group is probably heterogeneous with regard to earnings. Looking at Population 3 in comparison to Population 2 enables us to see how much results are affected by the self-employed. Population 4 is the most restrictive and only includes individuals with full information on annual earnings and occupation, i.e. *N*s are identical across years. Population 5 is similar to Population 4, but individuals in Population 5 may have missing information on occupation from the year 2001 onwards. This is of interest since there is a substantial proportion of missing cases with regard to occupation after 1990 and thus a comparison of Populations 4 and 5 will indicate whether results from 2001 are biased. Finally, Population 6 is similar to Population 1 but excludes those with very low earnings in each year (below 100,000 SEK, approx. €10,000, 2017 values) in order to see how much the explained variance increases when those with earnings that are generally lower than those for full-time employment are excluded. In general, the results across all these populations are similar and in this article, we present the results for Population 4, since it represents the population that is fixed over

Table 1. Populations used in the analyses

Population	Being alive between 20 and 65 years	Being registered in Sweden between 20 and 65 years	Valid income (above 0)	Valid occupation/ class	Self-employed
Pop 1	Can die before 65	No restriction	At least 20 years	No restriction	Included
Pop 2	Can die before 65	No restriction	At least 20 years	Valid info all years	Included
Pop 3	Can die before 65	No restriction	At least 20 years	Valid info all years	Not included
Pop 4	Only those who are alive	Registered in Sweden all years	Valid info all years	Valid info all years	Included
Pop 5	Only those who are alive	Registered in Sweden all years	Must have valid info all years as occ/class	Valid info in all censuses 1970–1990, ok to have missing after 2001	Included
Pop 6	Can die before 65	No restriction	At least 20 years + excludes those with income less than 100,000 SEK	No restriction	Included

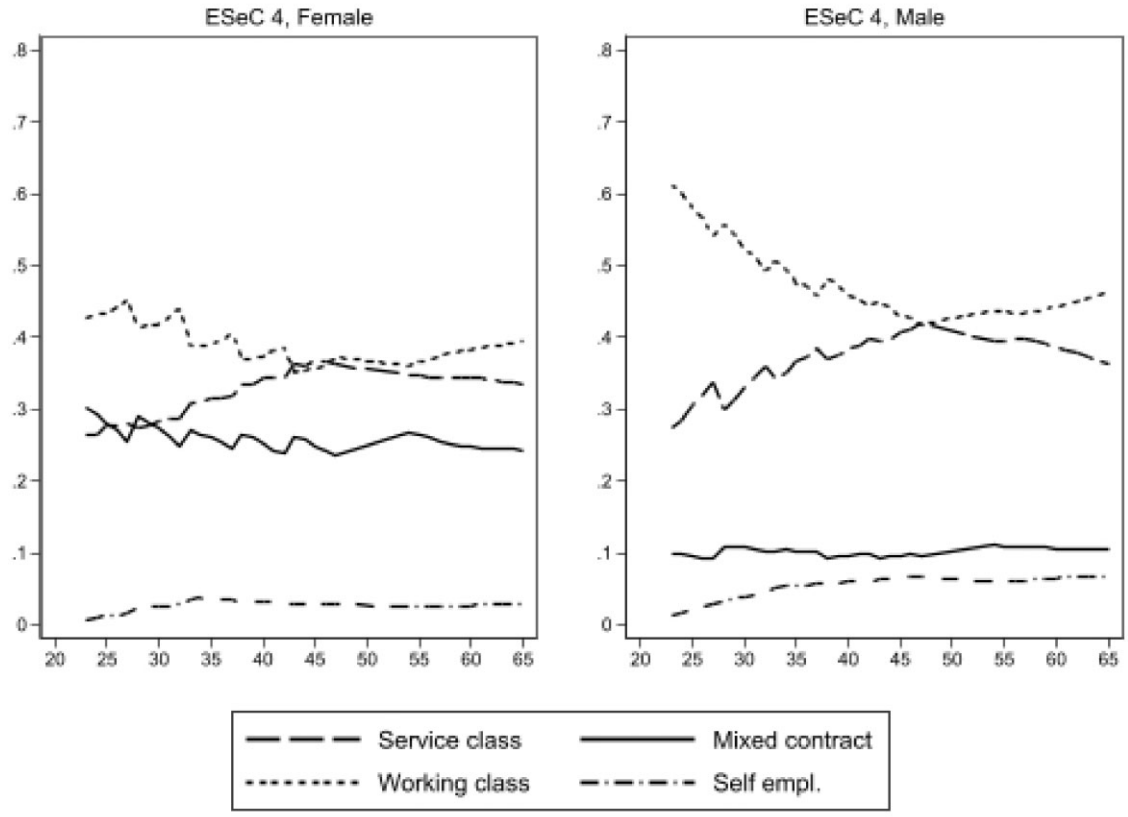

Figure 2. The class distribution for cohorts born between 1943 and 1947 across the life course. Separately for women and men

Note: The *y*-axis is proportions (from 0 to 1) and the *x*-axis is the ages from 20 to 65 years.

time, and we comment when results are different for other populations (all results for the other populations are presented in the Supplementary Appendix).

Results

Class Distribution across the Life Course

Figure 2 presents the annual class distribution by age with the cohorts pooled. This gives an illustration of occupational maturation across the career and we would expect a rather sharp incline in the size of the service classes up to an age somewhere between the ages of 30 and 40 years, and for this to be paralleled by a decline in the working classes. This is not really the case, however; instead, we see gradual shifts across the life course, but with more stability for women. For both women and men, however, the service classes peak in size around the age of 45 years, while the working class is at its minimum at this age. This is later than expected, and after this point, the trends are reversed, which is also unexpected. Hence, all in all, developments are more dynamic than would have been expected. The results are basically similar across the different populations (see Supplementary Appendix).[2] There is a small decline in the working class, especially for women, when the more restrictive populations are used, and particularly when the population is restricted to those who were alive throughout the entire observation period. The small decline in the service class at the highest ages, as well as the incline in the size of the working class, is not seen when using Population 6. Hence, this specific pattern seems to be driven by individuals working extra in less-qualified jobs following retirement, which for many probably occurred before 65 years of age. Finally, in Figure 2, we see that the class

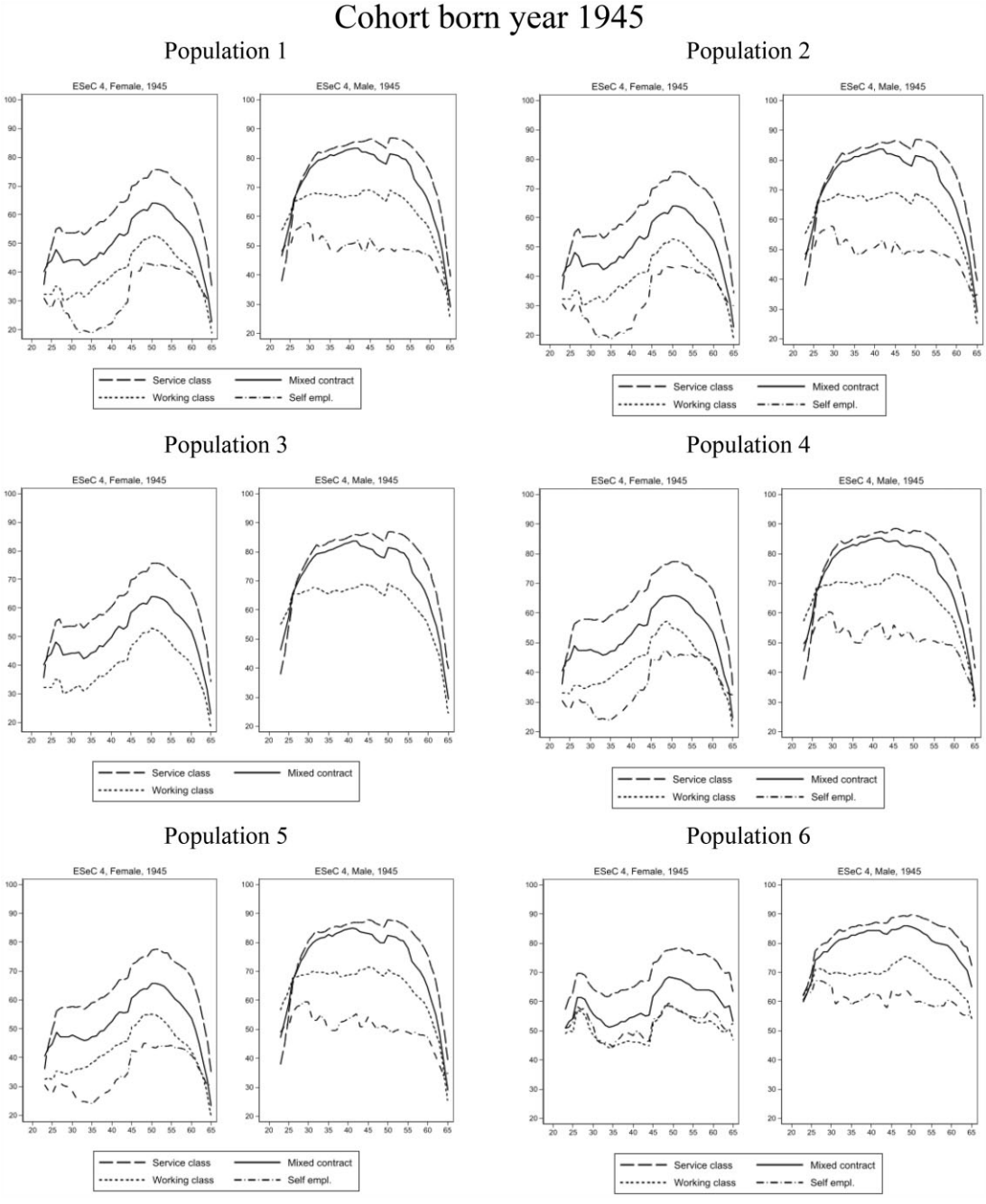

Figure 3. Annual earnings by class (ESeC 4 categories) for the 1945 cohort across the life cycle. Separately for women and men

Note: The *y*-axis is earning percentile (20–100) and the *x*-axis is the ages from 20 to 65 years.

distributions differ substantially between men and women, with women more often being found in mixed classes and men in the working class and the service class.

Earnings Differentials across the Life Cycle

Figure 3 presents the annual mean percentile values for earnings by age for the cohort born in 1945 (the results for other cohorts are reported in the Supplementary

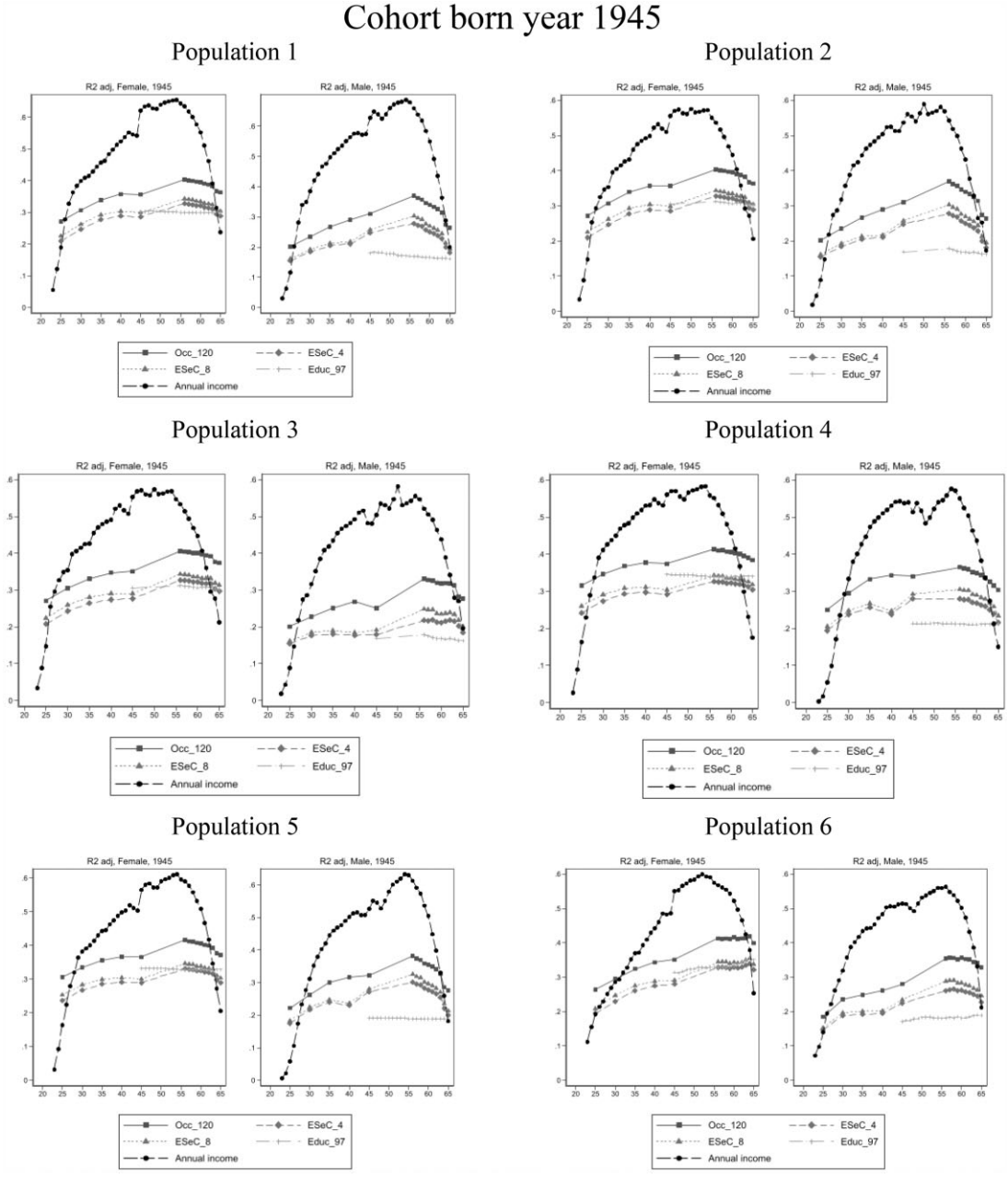

Figure 4. The predictive power (adjusted R^2 based on separate regressions for each independent variable for each cohort × age) of annual class, annual occupation, and annual earnings for lifetime earnings. Separately for women and men

Note: The diagram shows the result for all men and women (separately) born in the year 1945. Six populations (P1–P6) with different restrictions are presented. P1 is the least restricted population and includes all individuals who have at least 20 years earnings above zero. P2, as P1, but adds the restriction that all individuals have valid occupational information. P3, as P2, but excludes self-employed. P4 is the most restricted population, and only includes individuals with full information on earnings and occupation across all ages. P5, as P4, but has less restriction on occupational information across ages. P6, as P1, but excludes all individuals with very low earnings (below 100,000 SEK, approx. 10,000 euro in 2017 values). See Method and Data Section and Table 1 for further details.

Appendix and a table with exact levels for selected ages are found in the Appendix Table A1). As expected, the class differentials in earnings are not very clear at the beginning of working life, but from the age of around 28 years, the service class emerges as the group with the highest earnings. For women, there is a substantial decline in earnings around the ages that typically follow childbirth, and this will obviously have a large negative impact on their lifetime earnings. For men, we see that the service class has relatively strong earnings growth up to the age of around 35 years, which is also the case for those with mixed contracts. For women, the growth takes place around the ages 35–50 years for all classes and is probably largely related to an increase in work hours. When earnings below 100,000 SEK (approximately €10,000) are excluded for Population 6, there is an even more evident downward tendency in earnings for women in child-rearing ages, by comparison with the very start of their careers. We can also note that the level of earnings is substantially higher for the self-employed when we exclude all earnings below 100,000 SEK (approximately €10,000). This could indicate both that a substantial part of the self-employed have very low earnings, and that this is a heterogeneous category, but also that there may be reliability issues with the earnings of the self-employed.

The Predictability of Lifetime Earnings

In Figure 4, we come to the heart of the matter and present the explained variance for lifetime earnings by annual earnings, annual class (two versions), annual occupation, and annual education for the cohort born in 1945 (the results for other cohorts are reported in the Supplementary Appendix).[3] It is clear that annual earnings outperform class and occupation as a predictor, at least between the ages 30 and 60 years. At the same time as annual earnings outperform the other measures in mid-working life, class and occupation are as expected slightly better at both low and high ages. Hence, H1a/b/c are all supported, and education stands out as the most stable proxy at high ages although generally at lower levels than class and occupation. Occupation and class are probably less stable at high ages because, again, a large proportion tend to have atypical occupations at the end of working life and probably often after actual retirement. This is also supported by a comparison with Population 6, since the lines become somewhat more horizontal after 55 years of age, when those with very low annual earnings are excluded (below 100,000 SEK approximately €10,000).

Moving on to the subsequent hypotheses, there is no clear support for H2; the predictive power of class does not stabilize before that of occupation. Over all, none of the predictors clearly stabilizes, but they rather keep on increasing across ages up to around 55–60 years, depending on which cohort is examined. Interestingly, the gain obtained by moving between class schemas that use four or eight classes is rather limited, but H3 is definitely supported: occupations are clearly a stronger predictor of lifetime earnings than class. H4a/b are supported for men but only H4b for women; occupation and class are better predictors than education at high ages for men, and probably also in mid-life careers, although we lack the data points required to observe this. For women, education is about as good/bad as class, whereas occupation is a stronger predictor.

When it comes to gender differences, we can at least partly refute H5a/b. With the lifetime earnings measure based on percentiles (see Figure 4), we instead find the opposite: class and occupation are more important for women than for men, while there is some support for H5a/b for occupation and the eight-class schema when using the logged earnings lifetime measure (see Supplementary Appendix). While H5a/b are partly refuted, H6a/b are basically supported; at the early stage of careers, class and occupation are relatively strong predictors in relation to annual earnings for women compared to men. Stated differently, annual earnings perform worse for women than for men in years when part-time work is common among women.

Besides these hypotheses, it is worth noting the substantial drop in predictive power for annual earnings during the years of the deep recession in the 1990s. Thus, the economic downturn led to annual earnings being relatively atypical in relation to lifetime earnings during these years, whereas it appears as though occupation and class are considerably more stable even here, although it is unfortunate that occupational information is missing for a large part of the 1990s recession.

All in all, from Figure 4, it is obvious that annual earnings outperform other proxies for lifetime earnings for a large part of the life course. Hence, class and occupation are worse predictors of lifetime earnings than the more direct measure of annual earnings. At the same time, annual earnings are rather poor proxies both early and late in careers, and are relatively speaking worse in times of economic turbulence. A number of additional analyses are reported in the Supplementary Appendix, and some of these results have been mentioned above. One result that deserves comment is that analyses of lifetime earnings in terms of logged earnings, which was described above as the more straightforward measure,

are more sensitive to low earnings. Although the use of this measure leads to the same conclusions, the results are most similar when earnings below a certain threshold are excluded (see Population 6).

Concluding Discussion

So, does your class give more than a hint of your lifetime earnings? We would argue that both class and occupation are relatively poor predictors of lifetime earnings, particularly compared to measures of annual earnings. This is in line with previous research on annual earnings in the United States (Kim, Tamborini and Sakamoto, 2018) as well as research on long-term household disposable income in the United States and Germany (Brady *et al.*, 2018). At the same time, our findings clearly show that a life course perspective is of vital importance to gaining a deeper understanding of how class and other proxies are related to lifetime earnings: class and occupation, as well as education, are somewhat more stable proxies of lifetime earnings in both the early (not shown for education) and late phases of working life. Hence, while annual earnings capture lifetime earnings well in mid-career, the other proxies are better for the start and the end of careers. However, taking the whole picture into account, class but also other occupational measures, can hardly be seen as good proxies for lifetime earnings compared to annual earnings. These are the paper's main findings and their limitations and implications will be discussed below. Besides these findings, our results indicate that (i) in line with previous research, 'micro-classes' perform better than 'big classes' and (ii) contrary to some previous research, our results indicate that class and occupation have stronger predictive power for women compared to men. These findings will also be discussed further below.

Before turning to the implications of our findings, it is worth mentioning some limitations of the study, of which the most obvious is that the data only cover Swedish men and women born in the 1940s. This is a consequence of our aim to capture lifetime earnings accumulated over almost complete work lives. Since we follow individuals whose careers are situated in a historical era that is commonly understood as a period of prosperity and stability in the aftermath of the Second World War, we could think of these birth cohorts as being especially likely to have avoided scattered careers with many interruptions. This would be particularly true for men, whereas women's careers were often interrupted by periods of being home with children. On the one hand, it seems plausible that careers were at least as stable for these birth cohorts as for those born later, and as a result that the careers of the birth cohorts of the 1940s were characterized by relatively little volatility in earnings and were at least as structured by occupation and class as the earnings of cohorts that were born later. On the other hand, income differences between classes declined in Sweden up to the late 1980s, and unemployment was relatively low. Thus, the working class was perhaps catching up a bit with more advantaged classes. This means that we cannot rule out the possibility that the birth cohorts of the 1940s deviate from cohorts that were born later. However, research indicates that countries differ substantially in wage and earnings inequality, where Sweden has relatively low inequalities, while class inequalities capture a similar proportion of the total earnings inequalities across countries (Le Grand and Tåhlin, 2013; Goedemé *et al.*, 2021). This speaks in favour of that the class patterns of the Swedish 1940s cohort would be similar to other cohorts in Sweden and in other countries. Nonetheless, career mobility could also differ between cohorts and countries, and this mobility will also affect class earnings differentials across the life course. Thus, more research is warranted to corroborate the findings of this paper across cohorts and countries.

So what are the implications of these findings? Most importantly, they indicate that both class and occupation are far from being able to capture lifetime earnings accurately. Hence, we should not assume that, e.g. intergenerational class immobility can be straightforwardly interpreted as involving stability in lifetime earnings. If we were aiming to draw this kind of conclusion, intergenerational earnings correlations would capture considerably more of the association in lifetime earnings than class mobility, at least if we avoid including earnings for those below 30 and above 60 years of age. However, this does not necessarily imply that class mobility studies are redundant, only that they do not tap mobility in terms of lifetime earnings to a very great extent. One way to go in the future would perhaps be to downplay the focus on lifetime earnings for class, and instead rather to think of class as an omnibus measure of occupational advantages, with classes and also occupations probably tapping into several aspects of occupational advantage, e.g. earnings potential, autonomy at work, and advantages in terms of other work conditions.

Although class and occupation are relatively stable as predictors of lifetime earnings, one finding that, to our knowledge, is new in our article is the decline in predictive power noted in the last phase of working life. Hence, an additional potential caveat related to class/occupation that needs to be addressed in future research is that class/occupation may be less valid indicators of

advantage in the long run, not only at the start of careers but also the very end of careers. Even if we shift theoretical focus from lifetime earnings to occupational advantage in general, something interesting is happening in this late phase of the career, and it appears as though individuals' occupations/classes are untypical in this phase. To some extent, this may be the result of people retiring before the age of 65 years, and shifting occupation and reducing their work hours.

Moreover, our findings support the idea that micro-classes capture considerably more variation in earnings inequalities than big classes, both for women and men. However, in practice, many social scientists use smaller surveys in which it is impossible to use a large number of micro-classes or occupations. Even with large-scale data, as in our case, it is often useful to aggregate occupations into a smaller number of large classes—not least for the purposes of graphic presentations. However, whenever big classes are used, we need to consider that we are only tapping into a certain proportion of occupational inequalities and not all of them. It is also worth mentioning that education was a surprisingly poor proxy for lifetime earnings, and particularly so for men, although the measure we used was extremely detailed. This result is not in in line with the findings of Kim, Tamborini and Sakamoto (2018) and, hence, it may be the case that this result is valid for Sweden but not for the United States.

Finally, our findings shed new light on how class differences differ for women and men, with our results partly indicating that class and occupation have more predictive power for women than men. This goes against the assumptions of male biases in occupationally based measures as well as the idea that the typically scattered female career would make measures like class less relevant for women than for men. It also goes against previous findings (Kim, Tamborini and Sakamoto, 2018). One possible reason for our result is that women's employment is more concentrated to the health and care sector in the public sector in Sweden, where the earnings dispersion within occupations is lower than for male occupations (cf. Bihagen, 2008). When using the lifetime measure based on logged earnings, and not the percentile values, occupation and detailed class instead have higher predictive power for men. This could be caused by very high general earnings of Service I and some other occupations among men. Nonetheless, the idea that occupationally based measures are worse for women than for men finds no support in our findings for Sweden, although it may be the case in other countries (Kim, Tamborini and Sakamoto, 2018). Still, our findings suggest that it is a good idea to conduct separate gender analyses, since patterns of inequalities differ quite considerably by gender.

To summarize, our results go against the idea that the strength of measures of class and occupation is that they capture lifetime earnings well. Apart from at the start and the end of working life, a measure of annual earnings will be a better proxy for lifetime earnings. It is outside the scope of this study to find the most appropriate proxy of lifetime earnings but it is most likely to be a measure of earnings averaged across a few years avoiding young and old ages (cf. Böhlmark and Lindqvist, 2006; Haider and Solon, 2006). In other words, there is a larger life-cycle bias for annual earnings than for the other measures, but there is some life-cycle bias even for these, and generally speaking annual earnings outperform the other measures. It is important to consider such biases in research on, for instance, intergenerational mobility but also to revise ideas about what occupational measures actually capture. Theoretically, we would suggest placing more emphasis on a broader range of advantages that are associated with occupation and class than earnings and income-related aspects alone, and empirically, we would propose more studies on how occupational measures are associated with such advantages. It is worth emphasizing that the mechanisms of employment relationship theory, i.e. asset specificity and monitoring problems, are by no means questioned by our analyses (Goldthorpe, 2000, but see Tåhlin, 2007). However, our findings question the idea that class and occupation are good predictors of an individual's lifetime earnings.

Notes

1 We also tested cut-off thresholds from 25 to 50 per cent, and this only affected the size of the self-employed category very marginally.
2 It is worth comparing Populations 4 and 5 and it seems as though there are no large selection issues in terms of class distributions when it comes to using the occupational registry from the year 2001, i.e. the class distributions prior to 2001 are similar if we require occupational data after 2001 or not.
3 With a vast amount of observations, as in this study, the choice of fitness statistics does not alter any of the results substantially. See Supplementary Appendix for robustness tests using AIC and BIC.

Supplementary Data

Supplementary data are available at *ESR* online.

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Appendix Table A1. The predictive power (adjusted R^2 based on separate regressions for each independent variable for each cohort × age) of annual class, annual occupation, and annual earnings for lifetime earnings. Separately for women and men

Age (years)	Earnings		Micro-class		ESeC 8		ESeC 4		Earnings		Micro-class		ESeC 8		ESeC 4	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
	Population 1								Population 2							
25	0.12	0.19	0.20	0.27	0.17	0.23	0.15	0.21	0.09	0.14	0.20	0.27	0.16	0.23	0.15	0.21
30	0.38	0.40	0.24	0.31	0.19	0.26	0.18	0.25	0.32	0.35	0.24	0.31	0.19	0.26	0.18	0.25
35	0.50	0.45	0.27	0.34	0.21	0.29	0.20	0.28	0.44	0.43	0.27	0.34	0.21	0.29	0.20	0.28
40	0.56	0.52	0.29	0.36	0.22	0.30	0.21	0.29	0.50	0.50	0.29	0.36	0.22	0.30	0.21	0.29
45	0.63	0.62	0.31	0.36	0.26	0.30	0.25	0.29	0.54	0.56	0.31	0.36	0.26	0.30	0.25	0.29
50	0.66	0.64	–	–	–	–	–	–	0.59	0.58	–	–	–	–	–	–
55	0.68	0.64	–	–	–	–	–	–	0.57	0.55	–	–	–	–	–	–
60	0.55	0.55	0.34	0.40	0.27	0.33	0.25	0.32	0.43	0.45	0.34	0.40	0.27	0.33	0.25	0.32
64	0.29	0.31	0.27	0.37	0.21	0.31	0.20	0.29	0.25	0.27	0.27	0.37	0.21	0.32	0.20	0.29
	Population 3								Population 4							
25	0.09	0.15	0.20	0.27	0.16	0.22	0.15	0.21	0.06	0.16	0.25	0.32	0.20	0.26	0.19	0.24
30	0.32	0.35	0.23	0.31	0.19	0.26	0.18	0.24	0.33	0.41	0.30	0.35	0.25	0.29	0.24	0.27
35	0.44	0.43	0.25	0.33	0.19	0.28	0.18	0.26	0.47	0.48	0.33	0.37	0.27	0.31	0.26	0.29
40	0.49	0.49	0.27	0.35	0.18	0.29	0.18	0.27	0.53	0.53	0.34	0.38	0.24	0.31	0.24	0.30
45	0.50	0.55	0.25	0.35	0.19	0.29	0.18	0.28	0.51	0.56	0.34	0.37	0.29	0.30	0.28	0.29
50	0.58	0.57	–	–	–	–	–	–	0.52	0.57	–	–	–	–	–	–
55	0.55	0.55	–	–	–	–	–	–	0.57	0.56	–	–	–	–	–	–
60	0.44	0.45	0.32	0.40	0.23	0.34	0.21	0.32	0.44	0.46	0.35	0.41	0.29	0.34	0.27	0.32
64	0.27	0.28	0.28	0.37	0.22	0.32	0.20	0.30	0.21	0.23	0.32	0.39	0.26	0.33	0.24	0.31
	Population 5								Population 6							
25	0.06	0.16	0.22	0.31	0.18	0.25	0.18	0.24	0.14	0.19	0.18	0.26	0.15	0.21	0.15	0.23
30	0.31	0.38	0.26	0.34	0.22	0.28	0.22	0.27	0.32	0.29	0.24	0.30	0.20	0.25	0.19	0.23
35	0.45	0.44	0.30	0.36	0.25	0.30	0.24	0.29	0.43	0.37	0.25	0.32	0.20	0.28	0.19	0.26
40	0.50	0.50	0.32	0.37	0.24	0.30	0.23	0.29	0.48	0.44	0.26	0.34	0.20	0.29	0.19	0.28
45	0.53	0.56	0.32	0.37	0.28	0.30	0.27	0.29	0.51	0.55	0.28	0.35	0.23	0.29	0.22	0.28
50	0.58	0.59	–	–	–	–	–	–	0.53	0.58	–	–	–	–	–	–
55	0.63	0.60	–	–	–	–	–	–	0.56	0.57	–	–	–	–	–	–
60	0.51	0.51	0.36	0.41	0.30	0.34	0.28	0.32	0.50	0.52	0.36	0.42	0.28	0.34	0.26	0.33
64	0.26	0.27	0.29	0.38	0.24	0.31	0.22	0.30	0.33	0.38	0.34	0.42	0.26	0.35	0.25	0.34