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RESEARCH DEPARTMENT OF CHILDREN, INTEGRATION AND EQUAL OPPORTUNITY

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Abstract

This research examines the various approaches taken by economists and sociologists for analyzing intergenerational mobility. Social mobility models based on social classes arising from an occupational classification scheme are analyzed. A test for the statistical validity of classification schemes is proposed and tested using Danish sample survey data that was first collected in 1976 and augmented in 2000. This is referred to as a homogeneity test and is a likelihood ratio test of a set of linear restrictions which define social classes. For Denmark it is shown that this test fails for an Erikson-Goldthorpe classification system, raising doubts about the statistical validity of occupational classification systems in general. We also estimate regression models of occupational earnings, household earnings, and educational attainment using family background variables as covariates controlling for unobservables, measurement error, and simultaneous equation bias. In these models homogeneity tests are also rejected. We conclude from these results that the individual's family background has a small but significant impact on lifetime chances which is not captured by the Erikson-Goldthorpe classification scheme.

Keywords: Social Class, Family Background, and Intergenerational Mobility.

JEL Classifications: I3, J3, J6.

1 Introduction

By intergenerational social mobility, social scientists mean several things. Contemporary European sociologists like Erikson and Goldthorpe (1992, 2002) think of mobility in terms of social classes. From their perspective an individual's social class, which is determined by the individual's type of employment, depends on the social class of his or her parents. On the other hand, there are social scientists who take a different view. Economists like Atkinson *et al* (1983), Björklund and Jäntti (1997), Solon (1999), and Mazumder (2005) see the household as the focal point of their analysis and largely avoid the notion of class altogether. They see mobility as being measured by the intergenerational correlation between father's and son's incomes. Other economists like Mayer (1997), Bowles and Gintis (2001) and Bowles, Gintis and Groves (2005) take a broader view and focus on a range of variables that describe the respondent's childhood environment and parents' characteristics and relate these to achievement. There are also well established traditions in sociology which emphasize the importance of a household-based approach to intergenerational mobility; these are described in Section 2.

Thus, there are two conflicting views of intergenerational mobility. Are lifetime chances of an individual determined by the broad structural characteristics of the labour markets where their parents work, as suggested by the Erikson-Goldthorpe classification scheme? Or, alternatively, are they determined by the economic and social circumstances of the households in which the individual resided as a child or an adolescent? In other words which is the correct transmission mechanism whereby one generation passes advantages to the one which follows it. For policy evaluation this is also an important distinction. If mobility is all about parental class origins it is unlikely that policies like unemployment insurance, welfare assistance to disadvantaged families, or even expanding the educational system will do much to improve the prospects of the children from disadvantaged families. If, the opposite is true and life-time chances are really determined at the level of the household then policies which attempt to help deprived households could be effective.

In this paper we attempt to evaluate these two competing hypotheses. In the process we also investigate whether some of the notions of class that sociologists have proposed can be tested empirically. To do this we examine intergenerational mobility using living conditions survey data obtained from a representative sample of Danish households. Our purpose is to examine the validity of social classification systems for Denmark since there is relatively little information on this topic. We estimate social mobility models based on the Erikson-Goldthorpe (EG) scheme as well as regression models which reflect prominent traditions of status attainment in sociology and earnings functions in economics. For the social mobility models based on the Erikson-Goldthorpe classification scheme we propose simple tests to determine whether the restrictions generated by the social classification

scheme for occupations are satisfied by the data. For Denmark they are not! This raises the possibility that the social classification schemes based on the grouping of occupations are generally not statistically robust and since none of the proponents of these schemes has carried out the tests that we propose there is considerable doubt about the reliability of this type of research.

The paper has the following format. The next section contains a brief literature review of the various approaches that have been used to examine intergenerational mobility. The issues involve class, inequality, income and earnings determination, labour markets, cognitive and non-cognitive skills, and cultural capital; consequently, our review will be selective. Providing an adequate well-digested summary of the all of the relevant literature here is a substantial undertaking and would take us beyond the basic objectives of our research.

In section 4 we estimate social mobility models based on the EG occupational classification scheme using a sample survey in which respondents were first interviewed in 1976 and reinterviewed again in 2000 to pick up new information. We find that the parameter restrictions which are implied by the classification scheme are not satisfied by the data. The alternative characterization of intergenerational mobility in terms of the dependence of respondent's earnings, educational, and occupational success on the social and economic characteristics of the households in which they resided as children and adolescents is examined in a regression framework. Two models are estimated here. Both recognize the interdependence of education and earnings by estimating a simultaneous equation regression model where the two endogenous variables are either household income or occupational status, as measured by the average income of the occupation, together with a linear probability equation for an educational attainment dummy.

2 Mobility Studies

Social scientists have considered the issue of intergenerational mobility from several points of view. Sociologists like Featherman and Hauser (1978), Erikson and Goldthorpe (1992 and 2002), and more recently Breen and Goldthorpe (2001) considered this in the context of social mobility tables whose row and column entries consist of cross tabulations of social classes which are defined as aggregations of occupational categories.[1] Alternatively, both sociologists and economists have characterized mobility in terms of the dependence of earnings, educational attainment, or occupation on the characteristics of the respondent's

[1] See Haveman and Wolfe (1995) for a summary of attainment studies prior to 1995 and Breen and Jonsson (2005) for the most recent sociological literature. See also Björklund and Jäntti (2000) and Piketty (2000) for overviews of the differences in approaches between economists and sociologists in the analysis of intergenerational mobility.

parents and other social background variables. There are many contributions and the various approaches followed by researchers interested in intergenerational mobility have been considered as complimentary and investigators have usually been free to do what pleased them in terms of what they thought was important or interesting. Björklund and Jäntti (2000; 16 and 21) compare two of these approaches for a set of countries and note that rankings in terms of intergenerational social mobility are not the same as those for income mobility.

Theories of social stratification in sociology invariably involve occupations. Where an individual fits into society is largely determined by what that person does for a living. But sociologists divide on how to deal with large numbers of occupations. Here there are two choices available to researchers to deal with this problem. Occupations can be classified according some criterion and then the classes which arise from applying this criterion can be subjected to various types of analysis. Alternatively, occupations can be assigned a score which depends on the characteristics of the occupation. Mobility issues are then defined in terms of how the current generation's occupational score or class relates to the occupational scores or classes of the previous generation. Both procedures have long traditions in empirical sociology and have arisen out of necessity because of the difficulties associated with dealing with large numbers of occupations. We discuss classification systems first and then deal with procedures which have been used to provide numerical representations of occupations.

Employment or as they write 'employment relations' are at the centre of the EG (1992: 36-45) classification scheme. The basic criterion underlying their scheme is the relation the worker has to his or her work place in terms of whether the worker is an employer, self-employed, or an employee.[2] Their classification scheme has several forms. The seven class version is unordered but they claim that the three class version outlined above "could be more-or-less equally well taken as an ordering of class positions in terms of their prestige, socioeconomic status, or 'general desirability' ".

The EG scheme, in particular, and more generally concepts like 'class' or 'status' that are the foundations of social mobility analysis have been discussed critically within sociology by Breen and Rottman (1995: 155-157), Blackburn and Prandy (1997), Grusky and Sørensen (1998), Munk (1999), Grusky and Weeden (2001, 2002) and Goldthorpe (2002, 2007).[3] In a series of recent papers Weeden and Grusky (2005) and Weeden *et al* (2007) have severely criticized the EG scheme. The most virulent attack comes

[2] On page 37 they write "The aim of the class schema is to differentiate positions within *labour markets* and *production units* or, more specifically, to differentiate such positions in terms of the *employment relations* that they entail[9]" The 9 refers to a footnote at the bottom of page 37.

[3] There is some development in Goldthorpe's ideas concerning the classification scheme in the chapter on class analysis in his 2007 book. What impact these contributions will have on the practical application of his scheme, however, is not clear.

from Weeden *et al* (2007: 704) who dismiss big class schemes like Erikson-Goldthorpe as 'statistical constructions of academics or Census Bureau officials' and are in favour of micro classification systems based on occupations like lawyer, secretary or carpenter because they emphasize the notions of Marx and Weber that it is the *structure at the site production* that is the essential ingredient in the process which determines life-time chances Weeden and Grusky (2005:144, f4). But their real contribution is to provide a test of 'big class' models including that of Erikson and Goldthorpe. They find that these big class models are rejected in favour of models which use the information on occupations although the methods that they use differ from ours.

An earlier criticism comes from Kelley (1990: 325) who thinks that unordered class models raise serious methodological problems.[4] We share this concern but this is only part of the problem with class based theories of mobility. Large numbers of classes are required to generate within class homogeneity a requirement that prevents an ordering of the classes, thus, compromising their relevance. With respect to the Erikson-Goldthorpe scheme this point is emphasized by Bergmann and Joye (2003: 17) who note

> "For instance, if we consider the seven class schema, which Goldthorpe seems to prefer we find that supreme court judges and the shift supervisors of fast food restaurants occupy the same class but hold very different positions on various hierarchies(e.g. prestige, income, cultural capital, authority, etc.)"

But reducing the number of classes to the point where they can be socially ordered destroys their homogeneity which may, in turn, invalidate any of the empirical results if the procedure for aggregating the occupations into classes is not consistent with the data.

Numerical representations of occupations avoid the problems that arise in classification systems. Duncan (1961) constructed an index of occupations by taking the rankings of occupations in terms of social prestige from National Opinion Research Center (NORC) surveys and regressing them on the educational attainments (years of schooling) and the average earned income of the occupations which were ranked. The index is a linear combination of these two variables. Thus, the index is certainly social in the sense that it reflects society's opinion of the status or social value of the occupation but it is also an economic index since it is based on two performance measures one of which is purely

[4] He writes: "we study social mobility in order to understand stratification, hierarchy and their links across generations. So a ranking of occupations from high status to low is essential: the fundamental social conflicts over who gets good jobs, with high pay and good working conditions that go with them, and who gets poor ones with the accompanying poverty, dirt and toil. ...Not to know who wins and who loses the competition is to miss the main point."

economic in nature. It is, naturally, referred to as a socioeconomic index with the abbreviation, SEI. Blau and Duncan (1967) used this to construct occupational categories, sixteen in all, which Featherman and Hauser (1978) later utilized as a basis for their intergenerational mobility tables, father's occupation vs. son's occupation. As a result the groups are ordered with respect to the social prestige of the occupation. Because of this Featherman and Hauser quite reasonably refer to changes from one occupational class to another as 'upward or downward mobility'.

In the literature on economic mobility education, occupation and earnings have been analyzed by both economists and sociologists. Featherman and Hauser (1978: 235), in addition to looking at class mobility tables, also ran regressions of completed years of schooling, current occupational prestige, as measured by the Duncan scale, and annual earnings on a set of family background variables including father's occupation and education, number of siblings, race, whether the respondent came from a broken home, and geographical location. Jencks *et al* (1979), Mayer (1997), Korenman and Winship (2000), Bowles and Gintis (2002), and Bowles Gintis and Osborne (2005) and McIntosh and Munk (2007) among many others have attempted to see how sensitive an individual's earnings or educational attainment are to a more comprehensive set of family background variables. A classic in this tradition is the contribution by Cameron and Heckman (1998) who examined the dependence of educational outcomes on family background variables.

A different approach is followed by Atkinson *et al* (1983), Solon (1992), Zimmerman (1992), Björklund and Jäntti (1997), Dearden *et al* (1997), Solon (1999), Corak and Heisz (1999), Haider and Solon (2006), Grawe (2006) and Böhlsmark and Lindquist (2006) in which the relation between son's income and father's (permanent) income is examined. While this yields a simple index of mobility, namely the regression coefficient attached to the natural logarithm of the father's permanent income, these models are not very informative about the mechanism underlying the process whereby one generation depends on the one which preceded it. Much of the literature on intergenerational mobility finds that variables which describe the social and economic circumstances in which children grew up are important in determining later success both in the educational system and in labour markets. As result we shall have to wait until there are studies that add information on fathers permanent income to a list of other family background variables to see exactly what role father's permanent income plays in the determination of the success of the father's offspring.

For Denmark there have been both classical mobility studies and those involving intergenerational income mobility. Early studies include Svalastoga (1959) and Hansen (1978, 1984). More recent work by Munk (1999, 2003) deals with current Danish social mobility. Björklund *et al* (2002), Hussain *et al* (2006) and Jäntti *et al* (2006) deal with intergenerational income mobility issues in the Solon framework.

Finally, some sociologists also downplay the idea of class in their analysis of intergenerational mobility. Bourdieu (1986, 2000) is an example and he also stresses the role of the household in which the respondent grew up. He sees the transmission mechanism as being dominated by the investment activities[5]of the parents whose social position, which is sometimes seen as a measure of social class by other sociologists, determines the amount and composition of cultural and economic capital that children get when they are growing up. Cultural capital, which Bourdieu sees as essential in the development of the child's tastes and preferences is transmitted through parental attitudes, aspirations and tastes. (This is what Bourdieu calls disposition or habitus). Other practitioners of this type of analysis is de Graaf and Kalmijn (2001). This is in sharp contrast to Goldthorpe (2007) who does not think that class membership has much to do with access to cultural capital.

3 The Data Set

The Danish National Institute of Social Research commissioned a living standards survey on a random sample of adult Danes in 1976 and resurveyed them again in 2000. The details are in Hjorth Andersen (2003). The coverage was fairly general and focused on both the respondent's year 2000 position as well as a selection of family background variables. Summary statistics for the data employed here is contained in Table 1. There are three types of individual: the respondent, the respondent's father, and the respondent's mother. In the year 2000 the respondent was asked to report his or her household income, and whether he or she had an attained level of education past grade 9 so that the educational variable is a dummy variable indicating this condition. This particular representation was chosen for its simplicity and to make it consistent with parental education variables. Household incomes before taxes are measured in thousands of Danish kroner for the year 2000. Unfortunately, there is no information on the respondent's own income nor is there any information on the incomes or ages of the parents. It is regrettable that there is not more information on the economic conditions in the household were the respondents resided as children. The absence of parental ages is less serious since parental occupations are quite stable over time and in any case we wanted the parent occupations when the respondents were young. In one of our regression models we use a variable which we call occupational income. This is just the average household income of individuals in the sample who have the same occupation as the respondent. Naturally, its mean is the same as household income but exhibits less variation. This idea was first developed by Kohler and Mathieu (1990). It has not been used very frequently by economists; Raaum *et al* (2007) is a recent exception.

[5]His work is sometimes compared to the human capital model of Gary Becker.

The respondents were first surveyed in 1976 and were asked to report their parent's occupations. These were grouped into 16 occupational categories. These categories were then aggregated into social classes. The occupational categories are listed in Table 2 as are the social classes. The rule for determining how occupational categories are allocated to social classes follows that of EG as closely as possible and appears in the notes to Table 2. There is less information on the two parents than the respondent and this appears in the second and third panels of Table 1. In this survey the parents were born on average around 1925. At this time most of the differentiation in educational attainments was at lower levels of education. We did not find these to be particularly informative about respondent outcomes and used a variable which indicated some education past grade 9 instead. Mother's education is measured in the same way.

In the original survey interviewed 5166 respondents in 1976, of which 2755 were reinterviewed in 2000. The decline in the sample size is due to mortality and other non-specified forms of non-response. 1267 died or moved abroad so that much of the attrition in the sample can be assigned to the category 'missing at random'. In this sample there are missing observations on many variables so that there are only 2041 respondents for which there is 2000 social class data and 2255 for which there is income data. Respondents older than 65 were also excluded. This leaves 1521 respondents.

All survey data is subject to measurement error and this survey is no exception. Most of the error can be expected to arise here because the respondents are being asked to remember information about other people or which relates to a previous time period. The probabilities of not remembering parent occupations or how much education their parents obtained would appear to be quite small. On the other hand, the respondents are being asked to report their household incomes and there could be errors here because some households simply do not know this or they are unwilling to provide the true amount.

4 Probability And Regression Models

4.1 Probability Models

In the first part of this section we will turn our attention to the estimation of social mobility based on probability models which explain the respondent's social classes which are defined by aggregating occupations as of the year 2000. Sociologists usually attempt to model the entries or cells in the mobility table which is just a two way origin-destination table where the origin is the father's social class and the destination is the respondent's social class. However, this is not generally a good idea since the estimates of the parameters of the covariates which define these cell probabilities are quite sensitive to omitted

variable bias. Instead we explain the probabilities of the destination outcomes using dummy variables to represent the class of the respondent's father.

The classification scheme that aggregates our occupational categories into classes is the five category classification scheme used by Erikson and Goldthorpe (1992) so that there are six rows and columns in Table 3. The entries in the first five rows and columns of this table are cell proportions which sum to 1.0. The last row is the destination distribution and the last column is the origin distribution. These, of course, agree with Table 1. In what follows we refer to occupational categories simply as occupations. The original classification system that was used on this data base has its origins in the work of Noordhoek (1969) and Hansen (1984) who in reaction to the social status measurements of Svalastoga (1959) developed a classification scheme with five social groups which, while emphasizing the hierarchical nature of employment relations in terms of the amount of responsibility the respondent had, is similar to the EG system. While this may be more suitable for Denmark than the EG scheme, we thought it was more appropriate for comparative purposes to use the five class EG system.

Before examining a formal test of the EG scheme we determine what this scheme says about Danish social mobility. The percentage of the off diagonal elements in the Table 3, the total mobility rate, is sometimes used as a measure of absolute mobility. For the Danish mobility table this is 76.2 and is higher than for all the countries summarized in Björklund and Jäntti (2000: 16). Furthermore, Denmark is characterized by downward mobility at the top of the table and upward mobility at the bottom. For example, respondents with fathers in social class I are three times as likely to be in social class II than respondents with fathers in social class II are to be in social class I. This negative relationship between origin and destination social classes is captured by the rank correlation coefficient between the respondent' social class and his or her father's social class which is -0.132 and is significant. Hence, the social mobility table indicates that Denmark is a highly mobile society. It is also a better society in 2000 in the sense that there is a much smaller proportion of Danes in the two lowest social classes than was the case in 1976. Whether any of these results should be believed will be considered in section 5.

Turning now to formal tests of the EG scheme, it can be characterized by a set of parameter restrictions whose validity can be tested. Our procedure for estimating the individual destination probabilities is to apply an unordered (nominal) logit model to the five alternative destination social outcomes using a set of covariates which include the age and gender of the respondent and a set of dummy variables indicating the occupation or social class to which the respondent's father belonged. The probability of respondent i being in social class j is

$$p_{ij} = \frac{\exp(X_i\alpha^j)}{1 + \sum \exp(X_i\alpha^j)} \quad j = I, ..., V \tag{1}$$

where X_i the vector containing the natural logarithm of age and gender together 4 dummy variables for father's social classes or 15 dummy variables for father's occupations depending which model is being estimated. This means that

$$X_i\alpha^j = \alpha_0^j + \alpha_a^j \ln(age_i) + \alpha_s^j Sex_i + \sum_{k=I}^{IV} \alpha_k^j FSC_{ki} \tag{2}$$

or

$$X_i\alpha^j = \alpha_0^j + \alpha_a^j \ln(age_i) + \alpha_s^j Sex_i + \sum_{k=1}^{16} \alpha_k^j FOC_{ki} \tag{3}$$

where FSC is father's social class and FOC is father's occupation.

Because there are five origin categories there are four origin social class parameter vectors to be estimated, $(\alpha_I^j, \alpha_{II}^j, \alpha_{III}^j, \alpha_{IV}^j)$, for each $j = I, II, II, IV$ in the model described by equations (1) and (2). We treat the fifth social class as the reference class. However, the occupation of the respondent's father is also available so it is possible to test the hypothesis the restrictions defining the classification scheme are satisfied by the data. For the occupations there also has to be a reference occupation. This is occupation 6 so α_6^j is equal to zero. The model to be estimated here is equation (1) and (3). If the classification scheme is correct then this means that in a model where the occupations are used there can be no significant differences across the occupation parameters for the constituent occupations in the social class. In other words, the classes have to be homogenous with respect to occupation. If these parameters are represented by the vector $(\alpha_1^j, \alpha^j{}_2, ..., \alpha_{16}^j)$ it is clear from Table 2 that the scheme will be consistent with the data only if the hypothesis that $\alpha_{1,}^j \alpha_8^j, \alpha_9^j, \alpha_{10}^j, \alpha_{11}^j, \alpha_{12}^j, \alpha_{15}^j$ and α_{16}^j are all equal to α_I^j and $\alpha_2^j, \alpha_{13}^j$ and α_{14}^j are equal to α_{II}^j etc. is satisfied by the data. For the occupations there also has to be a reference occupation. This is occupation 6 so α_6^j is equal to zero. In practice, this means that as long as the constituent parameter estimates are not too unequal within each class the hypothesis will not be rejected. This set of restrictions is easily tested by running both models and comparing the ln-likelihood functions using a classical likelihood ratio test. We refer to this test as a homogeneity test. Of course, this type of homogeneity test can be applied to any classification system as long as the rules for allocating occupations to classes are known. Here we are only testing the EG scheme.

The results of this test appear in the first row of Table 4 labelled the Unordered Logit Model. The actual chi-square value for 44 degrees of freedom is 92.550. The p-value for this statistic is 0.001 so the hypothesis that the parameter restrictions which define the EG classification scheme are rejected. Here degrees of freedom are determined by the number of parameter restrictions that are required to aggregate the occupations into social classes.

The logit model based on the social classes is rejected in favour of the logit model containing the occupations, themselves. There are significant differences in the occupation coefficients within some of the social classes, especially class I, so the classification scheme can not be used to summarize the effects of the respondent's father's occupation on the respondent's social class. There is information in the father's occupations themselves that is missing from the social classes and suppressing this information can lead to incorrect inferences concerning the effect of parent occupation and other variables on respondent's social class. The EG classification scheme, as a statistical phenomenon, is not supported by the data! In section 5 we will discuss why this result occurs in more detail. The fact that parent's origin occupations can not be aggregated into statistically valid social classes raises questions about the validity of the destination social classification system as well. It would be desirable to run a logit model on the destination occupations and compare the results with the destination social classes but there are too many occupations for this to be done given the sample size.

It is also important to note that many of the coefficients associated with the father's social class dummies were not significant. Although the model based on occupations is the preferred specification, with 72 parameters it is over-parameterized and many of the estimated coefficients have implausible values and very large standard errors. The model fits the data poorly explaining only 5.4% of the variation in the data. Models including father's and mother's as well as the respondents educations were also run. All of the these educational variables were highly significant but did not prevent the model from failing its homogeneity test. Inferences about the importance of the respondent's own education should be treated with caution, however, because of potential biases in its estimated coefficient due to the fact that it is also an outcome variable.

The conclusion from all of this is that the EG occupational classification scheme based on the type of employment relationship is an unsatisfactory framework for analyzing issues of intergenerational mobility. Alternatives involving different outcome variables as well as a much larger list of regressors should be examined. The importance of the respondent's own education in these models suggests that an important part of the mechanism which determines how socio-economic success is passed from one generation to the next is missing from the EG system. This requires careful analysis, but in a way which recognizes that the respondent's education is also an outcome variable that needs to be explained.

4.2 Regression Models

The deficiencies of the social class model above suggested a need for alternatives. Many researchers both in sociology and economics, especially human capital theorists in the

Becker-Tomes (1986) tradition, have stressed the importance of the characteristics of household in which the respondent grew up as determinants of the respondent's socio-economic success. We follow in this tradition by taking a more family or household oriented approach. Our outcome variables will include the respondent's education, household income and occupation and we will include as regressors the variables that describe the respondent's socio-economic background as far as this is possible given our data.

We estimate a system of two equations

$$e_i = \beta_0 + \beta_a \ln(age_i) + \beta_s Sex_i + \beta_F FED_i + \beta_M MED_i + \sum_{k=1}^{16} \beta_k FOC_{ki} + \varepsilon_{ei} \quad (4)$$

$$z_i = \gamma_0 + \gamma_a \ln(age_i) + \gamma_s Sex_i + \gamma_e e_i + \sum_{k=1}^{16} \gamma_k FOC_{ki} + \varepsilon_{zi} \quad (5)$$

where e_i is the respondent's education dummy and FED_i and MED_i are the education dummies of the respondent $i's$ father and mother, respectively. z_i is the natural logarithm of the occupation income index or household income. We denote these two variables as z_{oi} and z_{hi} for individual i. $(\varepsilon_e, \varepsilon_z)$ are random disturbance terms which capture unobservables like ability or ambition. Our estimation procedure, GMM, allows them to be jointly distributed and possibly heteroscedastic.[6] Homogeneity tests were also carried out on these models. For both the occupation index and household income both tests were rejected. These results appear in rows 2 and 3 of Table 4. Wald tests are used here and the degrees of freedom are the number of restrictions. Parameter estimates for these two models appear in Tables 5 and 6. As was the case for the unordered logit specification in the previous subsection, many of the father's social class dummies were not significant when they were used as regressors in place of the father's occupation dummies.

For the simultaneous regression models gender, and father's and mother's education are highly significant as are many of the occupation dummies, especially those associated with the higher status occupations. For the both income equations the parameters associated with the respondent's education, γ_e, are large, highly significant, and about four times larger than the ordinary least squares estimate.

[6] As check to ensure that there are no 'weak instrument' problems both regression models were estimated by systems maximum likelihood methods. The parameter estimates were very similar to the GMM estimates reported in Tables 5 and 6.

5 Discussion and Conclusions

The EG system fails the homogeneity test because of the occupational heterogeneity within class I. This is most obvious in the regression models where there are fewer parameters. In the unordered probability models of destination classes in the EG scheme there are 72 parameters, whereas there are only 17 for each of the income equations in Tables 5 and 6. The large Wald statistics in Table 4 arise because there are large and significant differences in the coefficients in the household income equation, for example, between large and medium entrepreneurs, occupations 16 and 15. From Table 5, these are 0.530 and 0.280, respectively. The difference is 0.251 and has a standard error of 0.126 and is significant. There are other differences as well; for example, large agricultural land owners are different from self-employed professionals. That the size of the entrepreneur should matter is, perhaps, not surprising but it does suggest that 'employment relations' are not a very good basis for allocating occupations to classes. Both types of entrepreneur are in essentially the same employment relations environment but have quite different impacts on their offspring's incomes.[7]

There is an additional dimension to the heterogeneity in class I. Most of the occupations in class I have significant reduced form coefficients for father's occupation[8] in both regressions. But occupations 1 and 10, large agricultural land holders and administrative civil servants do not. While they both belong to class I in the EG scheme they are not properly classified since they do not have the same coefficients as the other occupations in class I. It is, therefore, possible that the downward mobility at the top of the EG social mobility table is an artifact of the classification system itself rather than being a real change in intergenerational mobility.

Our results, like the results of many other researchers, point to the importance of the family or household in which the individual resided as a child or adolescent as the appropriate unit for analysis. The importance of father's occupation and the two parental education variables confirms this. For Denmark classifying occupations by the respondent's type of employment along the lines suggested by Erikson and Goldthorpe is actually unhelpful and makes it difficult to uncover the real mechanisms by which the current generation's life chances are determined.

But there is a more subtle problem here and it becomes obvious when we ask what actually determines the type of employment contract an individual is likely to obtain when

[7] These differences within class I are also sufficient to cause the homogeneity test to fail for the 11 category Erikson-Goldthorpe scheme.

[8] The reduced form estimates for father's occupation k are $\delta_k = \gamma_k + \gamma_e \beta_k$, $k = 1, ...16$. These express the total effect of the father's occupation on the respondent's household income which includes the direct effect on father's occupation on household income plus the indirect effect of father's occupation on the respondent's education.

he or she enters the labour market. Erikson and Goldthorpe tell us that this depends only on the type of labour contract that the individual's father had. Now this is obviously not true. The type of job and the contract type that it entails actually depends, in addition to firm and industry specific factors, on what skills and educational qualifications and training that the individual brings to the labour market. Well educated and highly motivated persons are likely to get good jobs, climb the promotional ladder quickly and some will end up as being owners or managers. At the other end of the spectrum the poorly educated and less competent will almost invariably end up as employees in low skill occupations doing routine low status jobs.

If the type of employment contract that the individual obtains depends mainly on the characteristics they bring to the labour market then, of course, it will also be determined by the same variables that determine how much education as well as the cognitive and non-cognitive skills that are possessed by the individual. The results of the literature which we surveyed in section 2 indicate that there are a large number of variables which explain the individual's education, occupation, and income outcomes. These are parental educational attainment, occupation, income, attitudes, aspirations and tastes as well variables which measure how much of the parents time and effort were allocated to bringing up their children and those which describe the quality of life of the household in which the individual grew up, the quality of schools attended etc. These variables also determine the type of employment contract an individual has.[9]

The fact that the essential distinguishing feature of the Erikson-Goldthorpe classification system is itself derivable from a more fundamental set of relationships tells us why should not be using it to characterize or measure intergenerational mobility. Mobility is determined by the degree of dependence of one generation's outcomes on the characteristics of the generation which preceded it. So, for example, running a regression of an individual's years of schooling on a set of fathers and mothers EG social class dummies will understate this degree of dependence (as measured by R^2, for example) compared to a regression which contains all of the variables listed in the previous paragraph. We can expect the error to be quite large here since, as we have shown the occupation variables do better than the EG class dummies, but parental education variables are often more significant than the parent occupation variables.

When class representations fail it is because they attempt to represent the large and diverse set of variables upon which the individual's success depends by a single summary statistic which sociologists then refer to as social class. Searching for such summary statistics, in our view, is a futile exercise. Parental educational attainments are important but so are parental occupations, attitudes towards school, and the amount and quality

[9] Of course, there are some individuals who actually inherit the occupations of their fathers by taking over a family business, for example. This is much less prevalent now than it was several generations ago.

of investments that they make in their children. There appears to be no satisfactory way of aggregating all of these contributing factors into a single index without losing most of the information contained in the original data.

What we have found here is perhaps what most economists would have expected so why should this issue be of interests to economists? There are several reasons. The EG scheme does have some credibility with economists. Their notions of social class are sometimes used by economists as a way of characterizing parental occupations. Examples are Feinstein and Symons (1999) and Dearden and Machin and Reed (1997). In 2002 Erikson and Goldthorpe were invited by the editors on the *Journal of Economic Perspectives* to present their views on alternatives to the procedures that economists use to analyze intergenerational mobility issues. Presumably, they thought that economists would benefit from knowing more about their social classification scheme. In that paper Erikson and Goldthorpe mention that their scheme has been adopted as the official British social classification scheme. They were hopeful that the European union would follow suite. That occupational data should be delivered in a format which has not been thoroughly tested for its internal consistency is something that should worry all social scientists. Researchers may use the scheme without realizing that it may be flawed. And unless the data generating organizations provide detailed occupational codes on all of their surveys the scheme will never be tested properly and it will be impossible to search for reasonable alternatives.

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TABLES

TABLE 1
Danish Living Conditions Survey Sample Statistics

Respondent's Characteristics		Father's Characteristics	Mother's Characteristics
Education	0.688	0.529	0.243
Age	53.136	- -	-
Sex (Male = 1)	0.529	- -	-
Household Income	42.855	- -	-
Respondent's Social Class		Father's Social Class	Mother's Social Class
Social Class I	0.348	0.380	0.052
Social Class II	0.423	0.184	0.016
Social Class III	0.019	0.048	0.007
Social Class IV	0.192	0.160	0.055
Social Class V	0.018	0.227	0.870

Notes: Social classes are generated by aggregating occupational groups. Social Class I is the highest and contains all the high prestige occupations. Social Class V is unskilled labour. The rule for assigning occupational groups the social classes is defined in the notes to Table 2.

TABLE 2
Social Classification of Occupations, 1976 and 2000.

No.	**Name of Father's Occupation In 1976**	**EG Social Classification**	**Name of Respondent's Occupation In 2000**
1	Large Agricultural Land Holder	Class I	
8	Routine Non-Manual Workers	Class I	Routine Non-Manual Workers
9	Higher Grade Professionals	Class I	Medium Grade Professionals
10	Administrative Civil Servants	Class I	Higher Grade Professionals
11	Ordinary State Employees	Class I	
12	Self-Employed Professionals	Class I	
15	Medium Entrepreneurs	Class I	Medium Entrepreneurs
16	Large Entrepreneurs	Class I	Large Entrepreneurs
2	Small Agricultural Land Holder	Class II	Small Agricultural Land Holders
13	Self-Employed Craft Workers	Class II	Self-Employed Craft Workers
14	Small Entrepreneurs	Class II	Small Entrepreneurs
3	Self-Employed Agricultural Workers	Class III	
4	Paid Agricultural Workers	Class III	
5	Skilled Labour	Class IV	Skilled Labour
7	Low Grade Technical & Sales Workers	Class IV	Low Grade Technical & Sales Workers
6	Unskilled Labour	Class V	Unskilled Labour

Notes. The Roman numerals indicate the social class to which an occupational category is assigned. Using the EG system, these classes are defined as $I = \{1, 8, 9, 10, 11, 12, 15, 16\}$, $II = \{2, 13, 14\}$, $III = \{3, 4\}$, $IV = \{5, 7\}$, and $V = \{6\}$.

TABLE 3
Danish Social Mobility Table: 1976-2000 (N=1521).

Destination	Class I 2000	Class II 2000	Class III 2000	Class IV 2000	ClassV 2000	Row Sum
Origin						
Class I 1976	0.120	0.155	0.006	0.084	0.015	0.380
Class II 1976	0.055	0.079	0.007	0.043	0.000	0.184
Class III 1976	0.022	0.018	0.003	0.004	0.001	0.048
Class IV 1976	0.051	0.073	0.002	0.034	0.001	0.160
Class V 2000	0.099	0.098	0.002	0.026	0.002	0.227
Column Sum	0.348	0.423	0.019	0.192	0.018	1.0

TABLE 4

Likelihood Ratio and Wald Test Statistics for Various Models

Model	**Test Statistic**	**Value**	**P-value**
Unordered Logit Model	LR: $\chi^2_{(44)}$	80.608	0.0005
Occupational Income Model	Wald: $\chi^2_{(8)}$	31.200	0.0001
Household Income Model	Wald: $\chi^2_{(8)}$	39.513	0.0000

Notes. These tests are tests of the parameter restrictions which define social classes. The likelihood ratio test is designated by LR. The logit models were estimated by maximum likelihood so an LR test is used. The simultaneous equation models were estimated by GMM so a Wald test is used.

TABLE 5

Parameter Estimates For The Occupational Income Model

Variable	Father's Social Classs In 1976	z_o	**e**
e		0.475** (0.113)	–
ln(Age)		0.018 (0.062)	-0.177† (0.107)
Sex		-0.059** (0.020)	0.148** (0.023)
Father's Education			0.081** (0.0270
Mother's Education			0.094** (0.023)
Father's Occupation In 1976			
1 Large Agricultural Land Holder	I	0.028 (0.022)	0.020 (0.043)
8 Routine Non-Manual Workers	I	0.043 (0.037)	0.101† (0.055)
9 Higher Grade Professionals	I	0.063 (0.041)	0.129* (0.055)
10 Administrative Civil Servants	I	0.067 (0.049)	0.186** (0.059)
11 Ordinary State Employees	I	0.049 (0.038)	0.105† (0.060)
12 Self-Employed Professionals	I	0.182** (0.044)	0.213** (0.063)
15 Medium Entrepreneurs	I	0.145** (0.046)	0.024 (0.086)
16 Large Entrepreneurs	I	0.213** (0.076)	-0.086 (0.134)
2 Small Agricultural Land Holder	II	0.013 (0.027)	0.033 (0.060)
13 Self-Employed Craft Workers	II	0.010 (0.034)	0.101† (0.056)
14 Small Entrepreneurs	II	0.017 (0.038)	0.159** (0.050)
3 Self-Employed Agricultural Workers	III	0.016 (0.046)	-0.052 (0.084)
4 Paid Agricultural Workers	III	0.023 (0.034)	0.001 (0.082)
5 Skilled Labour	IV	0.004 (0.027)	0.060 (0.047)
7 Low Grade Technical & Sales Workers	IV	0.033 (0.039)	0.122† (0.053)
6 Unskilled Labour	V	-	-
R^2		0.084	0.087
W Statistic			5.064

Notes. The symbol z_o and z_h represent the natural logarithms of the occupational and household income, respectively. e is a dummy variable which takes the value one if the respondent has any education past grade nine or ten. The quantities in brackets to the right of the estimate is its standard error. †,*, and ** mean significant at the 10, 5, and 1 percent levels. The W statistic is a quadratic form which can be used to test the overidentifying moment restrictions. It has a χ^2 distribution with 42 degrees of freedom.

TABLE 6

Parameter Estimates For The Household Income Model

Variable	Father's Social Class In 1976	z_h	**e**
e		0.519* (0.263)	–
ln(Age)		-1.119** (0.138)	-0.183 (0.107)
Sex		0.062 (0.045)	0.148** (0.023)
Father's Education			0.099** (0.031)
Mother's Education			0.073** (0.024)
Father's Occupation In 1976			
1 Large Agricultural Land Holder	I	-0.017 (0.047)	0.016 (0.043)
8 Routine Non-Manual Workers	I	0.112 (0.078)	0.095† (0.055)
9 Higher Grade Professionals	I	0.128 (0.090)	0.123* (0.055)
10 Administrative Civil Servants	I	0.000 (0.107)	0.177** (0.059)
11 Ordinary State Employees	I	0.120 (0.079)	0.098 (0.061)
12 Self-Employed Professionals	I	0.349** (0.110)	0.210** (0.062)
15 Medium Entrepreneurs	I	0.280** (0.086)	0.014 (0.082)
16 Large Entrepreneurs	I	0.530** (0.104)	-0.092 (0.136)
2 Small Agricultural Land Holder	II	0.023 (0.064)	0.031 (0.060)
13 Self-Employed Craft Workers	II	0.090 (0.068)	0.094† (0.056)
14 Small Entrepreneurs	II	0.066 (0.082)	0.150** (0.050)
3 Self-Employed Agricultural Workers	III	-0.029 (0.114)	-0.054 (0.084)
4 Paid Agricultural Workers	III	-0.055 (0.078)	0.005 (0.082)
5 Skilled Labour	IV	-0.021 (0.065)	0.049 (0.048)
7 Low Grade Technical & Sales Workers	IV	-0.096 (0.124)	0.122† (0.072)
6 Unskilled Labour	V	-	-
R^2		0.083	0.087
W Statistic			1.076

Notes. See notes for Table 5